

Technical Meeting and Exhibition

MS&T22

MATERIALS SCIENCE & TECHNOLOGY

Featuring:

THE
Advanced Materials
SHOW | USA

THE
NANO TECHNOLOGY
SHOW

October 9-12, 2022 | Pittsburgh, Pennsylvania, USA

FINAL TECHNICAL PROGRAM

The content in this final technical program was generated on September 28, 2022. Please refer to the online session sheets for the most up-to-date information.



Topic Area/Symposium	Date	Time	Room	Page
Program Highlights				
MS&T22 Plenary Session	TUE	PM	Ballroom A	74
MS&T22 Poster Session	MON	PM	Ballroom BC	112
ACerS Richard M. Fulrath Award Session I	MON	PM	407	33
ACerS Richard M. Fulrath Award Session II	TUE	AM	407	54
ACerS Basic Science Division Robert B. Sosman Lecture	WED	PM	407	96
ACerS Frontiers of Science and Society - Rustum Roy Lecture	TUE	PM	407	74
ACerS GOMD Alfred R. Cooper Award Session	TUE	AM	412	65
ACerS/EPDC: Arthur L. Friedberg Ceramic Engineering Tutorial and Lecture	MON	AM	407	11
Additive Manufacturing				
Additive Manufacturing and Cellular/Lattice Structures: Designs, Realization and Applications				
Cellular/Lattice Structures I	MON	AM	305	11
Cellular/Lattice Structures II	MON	PM	305	33
Poster Session	MON	PM	Ballroom BC	115
Cellular/Lattice Structures III	WED	AM	307	77
Additive Manufacturing Modeling, Simulation, and Machine Learning: Microstructure, Mechanics, and Process				
Mechanical Properties	MON	AM	303	11
Microstructures & Defects I	MON	PM	303	33
Poster Session	MON	PM	Ballroom BC	115
Machine Learning and Artificial Intelligence	TUE	AM	303	54
Microstructures & Defects II	WED	AM	303	77
AM Processes	WED	PM	303	96
Additive Manufacturing of Ceramic-based Materials: Process Development, Materials, Process Optimization and Applications				
Additive Manufacturing of Ceramics-based Materials I	MON	AM	307	12
Additive Manufacturing of Ceramics-based Materials II	MON	PM	307	34
Poster Session	MON	PM	Ballroom BC	116
Additive Manufacturing of Ceramics-based Materials III	WED	PM	307	97
Additive Manufacturing of High and Ultra-high Temperature Ceramics and Composites: Processing, Characterization and Testing				
Composites and Reinforcements	WED	AM	306	78
New Methods and Characterization	WED	PM	306	97
Additive Manufacturing of Metals: Microstructure, Properties and Alloy Development				
Fe-based Alloys - 316L	MON	AM	301	13
Ni-based Super Alloys	MON	AM	302	13
Functional Materials and W-based Systems	MON	PM	301	35
Al-based Alloys	MON	PM	302	35
Fe-based Alloys II	TUE	AM	301	54
Ni-based Alloys II	TUE	AM	302	55
High Temperature and Refractory Materials	WED	AM	301	78
Other Non-ferrous Materials	WED	AM	302	79
Other Materials	WED	PM	301	98
Processing and Characterization	WED	PM	302	98
Additive Manufacturing of Polymeric-based Materials: Challenges and Potentials				
Modeling/Simulation and Innovation of Additive Manufacturing of Polymeric-based Materials	MON	PM	306	36
Characterization and Novel Approaches to Mitigate the Challenges of Polymeric-based Materials in Additive Manufacturing	TUE	AM	306	56
Additive Manufacturing of Titanium-based Materials: Processing, Microstructure and Material Properties				
Poster Session	MON	PM	Ballroom BC	116
Ti6Al4V	TUE	AM	305	56
Ti-alloys	WED	AM	305	79

Program At A Glance

Topic Area/Symposium	Date	Time	Room	Page
Ti-processing	WED	PM	305	99
Additive Manufacturing: An Industrial, Academic and Governmental Perspective				
Session I	MON	AM	306	14
Additive Manufacturing: Equipment, Instrumentation and In-Situ Process Monitoring				
Standards in Additive Manufacturing Materials	MON	PM	304	36
Poster Session	MON	PM	Ballroom BC	116
Equipment, Instrumentation and In-Situ Process Monitoring I	TUE	AM	304	57
Equipment, Instrumentation and In-Situ Process Monitoring II	WED	AM	304	80
Equipment, Instrumentation and In-Situ Process Monitoring III	WED	PM	304	99
Additive Manufacturing: Mechanisms and Mitigation of Aqueous Corrosion and High-temperature Oxidation				
Corrosion Behavior of Additively Manufactured Metals and Alloys	TUE	AM	307	57
Artificial Intelligence				
AI for Big Data Problems in Advanced Imaging, Materials Modeling and Automated Synthesis				
AI and ML for Materials Discovery I	MON	AM	304	18
Poster Session	MON	PM	Ballroom BC	118
AI and ML for Imaging and Characterization	TUE	AM	311	62
AI for Materials Discovery II	WED	AM	311	82
AI for Materials Design	WED	PM	311	100
Materials Informatics for Images and Multi-dimensional Datasets				
Poster Session	MON	PM	Ballroom BC	122
Session I	WED	AM	310	90
Session II	WED	PM	310	108
Materials Processing and Fundamental Understanding Based on Machine Learning and Data Informatics				
AI-guided Microstructure Study	MON	AM	311	24
AI-guided Processing Study	MON	PM	311	48
Poster Session	MON	PM	Ballroom BC	122
Uncertainty Quantification in Data-Driven Materials and Process Design				
Data-driven Process-Structure-Property Surrogate Modeling	MON	AM	310	31
Materials Design under Uncertainty	MON	PM	310	52
Biomaterials				
3D Printing of Biomaterials and Devices				
Session I	MON	AM	319	10
Session II	MON	PM	319	32
Poster Session	MON	PM	Ballroom BC	115
Session III	TUE	AM	319	53
Next Generation Biomaterials				
Next Generation Biomaterials I	MON	AM	318	25
Next Generation Biomaterials II	MON	PM	318	49
Poster Session	MON	PM	Ballroom BC	123
Next Generation Biomaterials III	TUE	AM	318	71
Next Generation Biomaterials IV	WED	AM	318	91
Society for Biomaterials: Biological Response to Materials and Material's Response to Biological Environments				
Session I	MON	AM	315	27
Session II	MON	PM	315	50
Poster Session	MON	PM	Ballroom BC	124
Society for Biomaterials: Biomaterial Applications				
Cardiovascular Biomaterials	MON	AM	316	28
Biomaterials for Healing and Regeneration	MON	PM	316	50
Biomaterials for Drug Delivery and Stimuli-responsive function	TUE	AM	316	71
Dental and Orthopaedic Biomaterials	WED	AM	316	93

Topic Area/Symposium	Date	Time	Room	Page
Society for Biomaterials: Biomaterial Applications in Today's Industry: Development, Translation & Commercialization				
Society for Biomaterials: Applications in Today's Healthcare Industry	MON	AM	317	28
Poster Session	MON	PM	Ballroom BC	124
Society for Biomaterials: Student Poster Contest + Rapid Fire				
Student Poster Contest + Rapid Fire	MON	PM	Ballroom BC	125
Ceramic and Glass Materials				
Advances in Dielectric Materials and Electronic Devices				
Processing, Properties, and Biomedical Applications	MON	AM	410	16
Piezoelectrics, Microwave Materials, and Conductive Applications	MON	PM	410	38
Poster Session	MON	PM	Ballroom BC	117
Capacitors, Relaxors, Electrostriction, and Energy Applications	TUE	AM	410	60
Ceramics and Glasses Modeling by Simulations and Machine Learning				
Machine Learning Modeling of Glass and Ceramics	MON	AM	408	18
Simulation of Glass and Ceramics	MON	PM	408	41
Poster Session	MON	PM	Ballroom BC	118
Dislocations in Ceramics: Processing, Structure, Mechanics, and Functionality				
Dislocations in Ceramics: Mechanics and Functionality	WED	PM	409	103
Engineering Ceramics: Microstructure-Property-Performance Relations and Applications				
Advanced Processing and Properties of Engineering Ceramics	MON	PM	415	44
Poster Session	MON	PM	Ballroom BC	120
Mechanical Properties of Engineering Ceramics	TUE	AM	415	65
Processing-Microstructure-Property Relations of Engineering Ceramics	WED	AM	415	86
Properties and Applications of Engineering Ceramics and Composites	WED	PM	415	104
Glasses and Optical Materials: Current Issues and Functional Applications				
Silicate (rich) Glasses	MON	AM	412	21
Non-silicate Glasses	MON	PM	412	44
Poster Session	MON	PM	Ballroom BC	120
Cooper Distinguished Lecture	TUE	AM	412	65
Journal of the American Ceramic Society Awards Symposium				
Journal of the American Ceramic Society Awards Symposium	TUE	AM	408	69
Manufacturing and Processing of Advanced Ceramic Materials				
New Advances in Ceramic Processing I: Sintering	MON	PM	411	48
New Advances in Ceramic Processing II: Conventional vs. Additive Manufacturing	TUE	AM	411	70
Novel Processing of Oxide Ceramics I	WED	AM	411	89
Processing of Carbides, Borides, and Nitrides	WED	PM	410	108
Novel Processing of Oxide Ceramics II	WED	PM	411	107
Mesoscale Phenomena in Functional Polycrystals and Their Nanostructures				
Poster Session	MON	PM	Ballroom BC	122
Electronic, Thermal and Optical Phenomena	WED	AM	412	90
Dielectric and Magnetic Phenomena	WED	PM	412	109
Phase Transformations in Ceramics: Science and Applications				
Poster Session	MON	PM	Ballroom BC	123
Session I	WED	AM	408	92
Session II	WED	PM	408	109
Solid-state Optical Materials and Luminescence Properties				
Processing and Study of Advanced Optical Materials I	MON	AM	409	29
Processing and Study of Advanced Optical Materials II	MON	PM	409	51
Poster Session	MON	PM	Ballroom BC	125
Optical Materials and Luminescence Properties	TUE	AM	409	72
Undergraduate Research in Ceramics				
Undergraduate Research in Ceramics	WED	AM	409	94

Program At A Glance

Topic Area/Symposium	Date	Time	Room	Page
Education				
ACerS/TMS Emerging Faculty Symposium				
Faculty Life and Collaborations	WED	AM	312	76
Funding, Mentorship, and Growth as Faculty Members	WED	PM	312	96
Curricular Innovations and Continuous Improvement of Academic Programs (and Satisfying ABET along the Way): The Elizabeth Judson Memorial Symposium				
Curricular Advances and Accreditation	MON	AM	312	19
What Should We Teach and How Should We Teach it?	MON	PM	312	42
Fundamentals and Characterization				
Alloy Phase Transformations at Elevated Temperatures				
Session I	MON	PM	326	40
Poster Session	MON	PM	Ballroom BC	118
Session II	TUE	AM	326	62
Session III	WED	AM	319	83
Dynamic Behavior of Materials: Experiments and Molecular Dynamics Simulations				
Dynamic Behavior of Materials: Experiments and Molecular Dynamics Simulations	MON	AM	326	20
Emergent Materials under Extremes and Decisive In Situ Characterizations				
In Situ Characterization	WED	AM	325	85
Extreme Conditions	WED	PM	325	103
Grain Boundaries, Interfaces, and Surfaces: Fundamental Structure-Property-Performance Relationships				
Interfaces in Functional Materials	MON	AM	335	21
Mechanics at Interfaces	MON	PM	323	45
Poster Session	MON	PM	Ballroom BC	120
Segregation	TUE	AM	323	66
Grain Growth	WED	AM	323	87
Processing and Microstructure	WED	PM	323	105
High Entropy Materials: Concentrated Solid Solutions, Intermetallics, Ceramics, Functional Materials and Beyond III				
Processing and Properties	MON	AM	324	22
Theory and Modeling	MON	PM	324	45
Poster Session	MON	PM	Ballroom BC	121
Materials Discovery and Design	TUE	AM	324	66
Processing and Properties II	WED	AM	324	87
Materials Discovery and Design II & Theory and Modeling II	WED	PM	324	105
Inference-based Approaches for Material Discovery and Property Optimisation				
Structure-Property Inference from Experiments	WED	AM	326	88
Structure-Property Inference from Simulations	WED	PM	326	106
Metal Powder Synthesis and Processing				
Session I	MON	AM	323	24
Poster Session	MON	PM	Ballroom BC	123
Synthesis, Characterization, Modeling and Applications of Functional Porous Materials				
Porous Materials I	MON	AM	325	29
Porous Materials II	MON	PM	325	51
Poster Session	MON	PM	Ballroom BC	126
Porous Materials III	TUE	AM	325	72
Porous Materials IV	WED	PM	334	110
Iron and Steel (Ferrous Alloys)				
Advancements in Steel Structural Refinement				
Poster Session	MON	PM	Ballroom BC	117
Session I	TUE	AM	406	59

Topic Area/Symposium	Date	Time	Room	Page
Advances in Ferrous Metallurgy				
HSLA Steel and Advances in Characterization Techniques	MON	AM	406	17
AHSS and Steelmaking Process Innovation	TUE	AM	405	61
Poster Session	MON	PM	Ballroom BC	117
Advances in Zinc-coated Sheet Steel Processing and Properties				
Advances in Zinc-coated Sheet Steel Processing and Properties	MON	PM	406	40
Steels for Sustainable Development				
Poster Session	TUE	PM	Ballroom BC	125
Hydrogen & New Applications	WED	AM	406	93
Renewables & Power Generation	WED	PM	406	110
Lightweight Alloys				
Development in Light Weight Alloys and Composites				
Processing and Mechanical Performance	MON	PM	317	43
Data Processing and Performance	TUE	AM	403	64
Microstructure and Mechanical Properties	WED	AM	403	85
Microstructure, Processing and Mechanical Properties	WED	PM	403	102
ICME-based Titanium Alloys and Processes Design				
ICME-based Titanium Alloys and Processes Design	MON	PM	403	46
Light Metal Technology				
Light Metal Technology	TUE	AM	402	70
Processing-Microstructure-Property Relationships of Titanium and Titanium Alloys				
Session I	MON	AM	328	26
Session II	TUE	AM	312	71
Materials-Environment Interactions				
Advanced Coatings for Wear and Corrosion Protection				
Session I	MON	AM	334	15
Session II	MON	PM	334	37
Advanced Materials for Harsh Environments				
Session I	MON	AM	333	16
Session II	MON	PM	333	38
Poster Session	MON	PM	Ballroom BC	116
Session III	TUE	AM	333	59
Session IV	WED	AM	334	81
Computation Assisted Materials Development for Improved Corrosion Resistance				
Session I	TUE	AM	334	63
High Temperature Oxidation of Metals and Ceramics				
Corrosion	MON	PM	335	46
Poster Session	MON	PM	Ballroom BC	121
Oxidation of Metals and Accident Tolerant Fuel	TUE	AM	335	67
Environmental Barrier Coatings, Thermal Barrier Coatings, and Hypersonics	WED	AM	335	88
Oxidation of Ceramics and HEA/Refractory Alloys	WED	PM	335	106
Progressive Solutions to Improve Corrosion Resistance for Nuclear Waste Storage				
Molecular Dynamics Simulations and Machine Learning for Glass Corrosion, Glass Design and Canisters Lifetime	WED	AM	333	92
Thermal History Effects on Borosilicate Glasses and Glass Ceramics and Canisters Stress Corrosion Cracking Mitigation	WED	PM	333	110
Thermodynamics of Materials in Extreme Environments				
Thermodynamics of Molten Salts	MON	AM	415	30
Poster Session	MON	PM	Ballroom BC	126
Thermodynamics and Stabilities of Alloys and Ceramics	TUE	AM	310	74

Program At A Glance

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Modeling				
Integration between Modeling and Experiments for Crystalline Metals: From Atomistic to Macroscopic Scales IV				
Session I	MON	AM	401	23
Session II	MON	PM	401	47
Session III	TUE	AM	401	68
Session IV	TUE	AM	404	69
Session V	WED	AM	401	89
Session VI	WED	PM	401	107
Multi Scale Modeling of Microstructure Deformation in Material Processing				
Multi Scale Modeling of Microstructure Deformation in Material Processing	MON	AM	403	25
Nanomaterials				
Advances in Emerging Electronic Nanomaterials: Synthesis, Enhanced Properties, Integration, and Applications				
2D TMDC and Quantum Materials	MON	AM	321	17
Graphene and Other Nanomaterials	MON	PM	321	39
Poster Session	MON	PM	Ballroom BC	117
Atomic Layer Processing: In-Situ Characterization, Modeling, Area-Selective Deposition, and Microelectronics Applications	TUE	AM	321	60
Controlled Synthesis, Processing, and Applications of Structural and Functional Nanomaterials				
2D Materials Synthesis & Properties	MON	AM	320	19
Nanostructure Synthesis & Mechanisms	MON	PM	320	42
Poster Session	MON	PM	Ballroom BC	119
Nanostructured Films & Properties	TUE	AM	320	63
Energy Applications	WED	AM	320	84
Heterostructures & Polymer-Derived Ceramics	WED	PM	320	102
Nanotechnology for Energy, Environment, Electronics, Healthcare and Industry				
Poster Session	MON	PM	Ballroom BC	123
Session I	WED	AM	321	91
Nuclear Energy				
Advanced Characterization of Materials for Nuclear, Radiation, and Extreme Environments III				
Thermomechanical Properties	MON	AM	329	15
Beamline/Scattering	MON	PM	329	37
In Situ Microscopy	TUE	AM	329	58
Spectroscopy/Tomography	WED	AM	327	80
Ceramics for a New Generation of Nuclear Energy Systems and Applications				
Ceramic Nuclear Fuel	MON	PM	402	41
Poster Session	MON	PM	Ballroom BC	119
Ceramics for Nuclear Energy Application	WED	AM	329	84
Nuclear Waste Management	WED	PM	329	101
Tackling Structural Materials Challenges for Advanced Nuclear Reactors				
Advanced Structural Materials	MON	AM	330	30
Molten Salt Systems	MON	PM	330	52
Investigating Microstructural Features	TUE	AM	330	73
Advanced Manufacturing	WED	AM	330	94
Mechanical Behaviors	WED	PM	330	111
Processing and Manufacturing				
Advanced Joining Technologies for Automotive Lightweight Structures				
Self-piercing Riveting (SPR)	TUE	AM	317	58
Friction Stir Welding (FSW)	WED	AM	328	81
Resistance and Ultrasonic Spot Welding Plus (RSW & USW, etc.)	WED	PM	328	100

Topic Area/Symposium	Date	Time	Room	Page
Advances in Surface Engineering				
Session I	MON	PM	328	39
Session II	TUE	AM	328	61
Innovative Process Design and Processing for Advanced Structural Materials				
Welding, Electrical Current-induced Phenomenon, and Additive Manufacturing	MON	AM	327	22
Mechanics and Modeling	MON	PM	327	46
Poster Session	MON	PM	Ballroom BC	121
Advanced Structural Materials	TUE	AM	327	67
Processing and Performance of Materials Using Microwaves, Electric and Magnetic Fields, Ultrasound, Lasers, and Mechanical Work – Rustum Roy Symposium				
Session I	MON	AM	402	26
Poster Session	MON	PM	Ballroom BC	124
Sustainability, Energy, and the Environment				
14th Symposium on Green and Sustainable Technologies for Materials Manufacturing and Processing				
Application of Sustainable Materials for Functional Applications I/Novel Manufacturing Methods	MON	AM	414	10
Application of Sustainable Materials for Functional Applications II	MON	PM	414	32
Poster Session	MON	PM	Ballroom BC	113
Sustainable Processing of Ceramics and Composites I/Novel Processing of Coatings and Metals	TUE	AM	414	53
Sustainable Processing of Ceramics and Composites II	WED	AM	414	75
Advanced Ceramics for Environmental Remediation				
Session I	MON	AM	411	14
Advances and Challenges in Decarbonization of the Steel Industry				
Session I	WED	AM	405	82
Energy Materials for Sustainable Development				
Storage Batteries I	MON	AM	413	20
Radiative and Electrochemical Conversion/Storage Batteries	MON	PM	413	43
Poster Session	MON	PM	Ballroom BC	119
Fuel Cells and Electrolyzers	TUE	AM	413	64
Electrets and Magnetic Conversion/Capacitive Storage and Electrochemical Conversion	WED	AM	413	86
Thermal Conversion	WED	PM	413	104
Special Topics				
2022 Undergraduate Student Poster Contest				
2022 Undergraduate Student Poster Contest	MON	PM	Ballroom BC	113
ACerS Robert B. Sosman Award Symposium: Advancing the Science of Materials for Extreme Environments				
Session I	WED	AM	407	76
Session II	WED	PM	407	95
Art and Cultural Heritage: Discoveries during the Pandemic Year				
Poster Session	MON	PM	Ballroom BC	118
Session I	WED	AM	402	83
Session II	WED	PM	402	101
K-12 Educators Forum				
Session I	MON	AM	405	23
Session II	MON	PM	405	47
Resisting Degradation from the Environment: A Symposium Honoring Carolyn M. Hansson's Research and Pioneering Experiences as a Woman in STEM				
Talks to Introduce Posters I	MON	AM	404	27
Talks to Introduce Posters II	MON	PM	404	49
Poster Session	MON	PM	Ballroom BC	124

Technical Meeting and Exhibition

MS&T22

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FINAL TECHNICAL PROGRAM



SUSTAINABILITY, ENERGY, AND THE ENVIRONMENT

14th Symposium on Green and Sustainable Technologies for Materials Manufacturing and Processing — Application of Sustainable Materials for Functional Applications I/Novel Manufacturing Methods

Sponsored by: ACerS Engineering Ceramics Division

Program Organizers: Surojit Gupta, University of North Dakota; Mritunjay Singh, Ohio Aerospace Institute; Tatsuki Ohji, National Institute of Advanced Industrial Science and Technology; Hisayuki Suematsu, Nagaoka University of Technology; Enrico Bernardo, University of Padova; Rajiv Asthana, University of Wisconsin; Yiquan Wu, Alfred University; Zhengyi Fu, Wuhan University of Technology; Allen Apblett, Oklahoma State University

Monday AM | October 10, 2022
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Session Chairs: Huong Le, Faraday Technology; Junichi Tatami, Yokohama National University; Bai Cui, University of Nebraska-Lincoln; Hisayuki Suematsu, Nagaoka University of Technology

8:00 AM Invited

A Computationally Engineered Sustainable Approach for Tuning Nanoclays for Biomaterials Applications: *Kalpana Katti¹, Krishna Kundu¹, Hanmant Gaikwad¹, Dinesh Katti¹, ¹North Dakota State University*

8:30 AM

Capture of Plant Nutrients by Ceramics for Subsequent Use as a Slow Release Fertilizer: *Allen Apblett¹, Russel Rahman¹, Ciara Kelley¹, Patrick Kitzel¹, ¹Oklahoma State University*

8:50 AM

Change in the Density Distribution during Sintering of Alumina Ceramics Visualized by In-situ OCT Observation: *Junichi Tatami¹, Mitsuki Tajima¹, Motoyuki Iijima¹, Takuma Takahashi², ¹Yokohama National University; ²Kanagawa Institute of Industrial Science and Technology*

9:10 AM

Electrochemical Remediation of PFAS-Contaminated Aqueous Waste Streams: *Huong Le¹, Brian Skinn¹, Katherine Lee¹, Stephen T. Snyder¹, Maria Inman¹, ¹Faraday Technology*

9:30 AM

Critical Metals Recovery from Recycled Lithium-ion Batteries: *Meng Shi¹, Luis Diaz¹, John Klaehn¹, Aaron Wilson¹, Tedd Lister¹, ¹Idaho National Laboratory*

9:50 AM Break

10:10 AM Invited

Direct Selective Laser Sintering for Additive Manufacturing of Advanced Ceramic Materials: *Bai Cui¹, Xiang Zhang¹, Fei Wang¹, Zhipeng Wu¹, Michael Nastasi², Yan Chen³, Yongfeng Lu¹, ¹University of Nebraska-Lincoln; ²Texas A&M University; ³Oak Ridge National Laboratory*

10:40 AM Invited

Green Routes to Materials Via Reaction of Metal Oxides with Aqueous Reagents: *Allen Apblett¹, ¹Oklahoma State University*

11:10 AM

Effect of Hydrolysis on Mechanical Properties of Rice Husk Reinforced Composites for 3D Printing: *Athira Nair Surendran¹, Sreesha Malayil¹, Kunal Kate¹, Jagannadh Satyavolu¹, ¹University of Louisville*

11:30 AM

Enabling Sustainability and Circularity Through Big Area Additive Manufacturing: *Soydan Ozcan¹, ¹Oak Ridge National Laboratory*

BIOMATERIALS

3D Printing of Biomaterials and Devices — Session I

Sponsored by: ACerS Bioceramic Division

Program Organizers: Sahar Vahabzadeh, Northern Illinois University; Susmita Bose, Washington State University; Amit Bandyopadhyay, Washington State University; Mukesh Kumar, LincoTek Medical; Mangal Roy, Indian Institute of Technology - Kharagpur (IIT-Kgp)

Monday AM | October 10, 2022
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Session Chairs: Hongsoo Choi, Daegu-Gyeongbuk Institute of Science and Technology; Sahar Vahabzadeh, Northern Illinois University

8:00 AM Invited

3-D Printing in Regenerative Engineering: *Yusuf Khan¹, Cato Laurencin¹, Godwin Dzidotor², Amir Seyedsalehi², ¹University of Connecticut Health Center; ²University of Connecticut*

8:30 AM Invited

3D Printing Integrated with Controlled Delivery for In Situ Tissue Engineering of Complex and Inhomogeneous Tissues from Endogenous Stem/Progenitor Cells: *Solaiman Tarafder¹, Chang Lee¹, ¹Columbia University Medical Center*

9:00 AM

3D Bioprinting with Engineered Living Materials for Advanced Biofabrication: *Weinan Xu¹, ¹University of Akron*

9:20 AM

Solvent Cast 3D Printing with Different Molecular Weight Polymers: *Tyler French¹, John Tolbert¹, Lesley Chow¹, ¹Lehigh University*

9:40 AM Invited

The Regulatory Roles of the Substrate Microenvironment in Cancer Progression in Tissue Engineering Scaffolds: *Dinesh Katti¹, Sharad Jaswandkar¹, Hanmant Gaikwad¹, Kalpana Katti¹, ¹North Dakota State University*

10:00 AM Break

10:20 AM

Effect of Sr²⁺ and Ca²⁺ ions on 3D printed Beta Tricalcium-Phosphate/Alginate Composite Scaffolds for Bone Tissue Engineering: *Shebin Tharakan¹, Sally Lee¹, Serin Ahn¹, Chris Mathew¹, Michael Hadjiargyrou¹, Azhar Ilyas¹, ¹New York Institute of Technology*

10:40 AM

Additive Manufacturing Process Simulation of Polyetherimide Porous Scaffolds for Bone Tissue Engineering Applications: *Ramsha Imran¹, Ans Al Rashid¹, Muammer Koc¹, ¹Hamad Bin Khalifa University*

11:00 AM Invited

Selective Artificial Neural Network by Targeted Delivery of Neuronal Cells Using Magnetically Controlled 3D Printed Microrobots: *Hongsoo Choi*¹; ¹Daegu-Gyeongbuk Institute of Science and Technology

11:30 AM Invited

Biohybrid Functional Material Design by Engineered Peptides: *Candan Tamerler*¹; ¹University of Kansas

SPECIAL TOPICS

ACerS/EPDC: Arthur L. Friedberg Ceramic Engineering Tutorial and Lecture

Sponsored by: ACerS/Education and Professional Development Council

Monday AM | October 10, 2022

407 | David L. Lawrence Convention Center

Session Chair: Liping Huang, Rensselaer Polytechnic Institute

9:00 AM Invited

From Moon Rocks to Melting Gels: *Lisa Klein*¹; ¹Rutgers University

ADDITIVE MANUFACTURING

Additive Manufacturing and Cellular/Lattice Structures: Designs, Realization and Applications — Cellular/Lattice Structures I

Sponsored by: TMS Additive Manufacturing Committee, TMS Materials Characterization Committee

Program Organizers: Li Yang, University of Louisville; Allison Beese, Pennsylvania State University; John Carpenter, Los Alamos National Laboratory; Carolyn Seepersad, University of Texas at Austin; Miguel Aguilo, Morphorm LLC

Monday AM | October 10, 2022

305 | David L. Lawrence Convention Center

Session Chair: Li Yang, University of Louisville

8:00 AM

Design, Manufacture, Modelling and Testing of Honeycombs with Aperiodic Order: *Richard Moat*¹; *Chikwesiri Imediogwu*¹; *Daniel Clarke*¹; *Patrick Carter*¹; *Iestyn Jowers*¹; *Uwe Grimm*¹; ¹The Open University

8:20 AM

A Simplistic Experimental Study of the Material Property and Quality Issues with Topology Optimization Designs Fabricated by Powder Bed Fusion Additive Manufacturing: *Li Yang*¹; *William Dorsch*¹; ¹University of Louisville

8:40 AM

3D Printed Fibrous Cellular Multifunctional Structures: *William Johnston*¹; *Janith Godakawela*¹; *Carlos Gatti*¹; *Suresh Keshavanarayana*¹; *Bhisham Sharma*¹; ¹Wichita State University

9:10 AM

AM-Fabricated Plate Lattice Structures for Impact Applications: *Joseph Berthel*¹; *Nicholas Jones*¹; *Brandon McWilliams*²; *Jian Yu*²; *Rahul Panat*¹; *Jack Beuth*¹; ¹Carnegie Mellon University; ²US Army DEVCOM Army Research Laboratory

9:30 AM

Optimized Dissolvable Support Design for 316L Stainless Steel Produced by Laser Powder Bed Fusion: *Shawn Hinnebusch*¹; *David Anderson*¹; *Kevin Glunt*¹; *Robert Hoffman*²; *Owen Hildreth*²; *Albert To*¹; ¹University of Pittsburgh; ²Colorado School of Mines

9:50 AM Break

10:10 AM

Permeable Additive Manufacturing (PermiAM) for Rocketry: *Adam Polizzi*¹; *Kimberly Devore*²; *Matthew Kuhns*²; *Jeremy Iten*¹; ¹Elementum 3D; ²Masten Space Systems

10:30 AM

Laser-based 4D Printing of Ni-Mn-Ga Magnetic Shape Memory Alloys Lattice Structures: *Anastassia Milleret*¹; *Ville Laitinen*²; *Nour-eddine Fenineche*³; *Moataz Attallah*¹; ¹University of Birmingham; ²Lappeenranta-Lahti University of Technology; ³UTBM

10:50 AM

Mechanical Behavior of 7050 Aluminum AM Lattice Structures: *Ben Dimarco*¹; *Noah Gula*¹; *Jeremy Seidt*¹; *Edward Herderick*¹; ¹The Ohio State University

ADDITIVE MANUFACTURING

Additive Manufacturing Modeling, Simulation, and Machine Learning: Microstructure, Mechanics, and Process — Mechanical Properties

Program Organizers: Jing Zhang, Indiana University – Purdue University Indianapolis; Brandon McWilliams, US Army Research Laboratory; Li Ma, Johns Hopkins University; Yeongil Jung, Changwon National University

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Session Chairs: Jing Zhang, Indiana University - Purdue University Indianapolis; Li Ma, Johns Hopkins University Applied Physics Laboratory; Brandon McWilliams, CCDC Army Research Laboratory; Yeon-Gil Jung, Changwon National University

8:00 AM

Effects of a Novel Post Processing Technique on Mechanical Performance of AlSi10Mg Produced via LPBF: *John Lewandowski*¹; *Austin Ngo*¹; *Jag Sankar*²; *Tony Schmitz*³; *Jian Cao*⁴; *Glenn Daehn*⁵; ¹Case Western Reserve University; ²North Carolina A & T State University; ³University of Tennessee-Knoxville; ⁴Northwestern University; ⁵The Ohio State University

8:20 AM

A Modeling Tool for Mechanical Performance Prediction and Qualification of Additive Manufacturing Parts: *Behrooz Jalalahmadi*¹; *Jingfu Liu*¹; *Ziye Liu*¹; ¹Sentient Science

8:40 AM

Computational Fluid Dynamics Data-driven Heat Source Model for Finite Element Process Simulation in Laser Powder Bed Fusion Additive Manufacturing: *Seth Strayer¹; Florian Dugast¹; Albert To¹*
¹University of Pittsburgh

9:00 AM

Residual Stress Modeling during Wire Arc Additive Manufacturing of Low Temperature Transformation Alloy: *Guru Charan Reddy Madireddy¹; Yousub Lee¹; Kyle Saleeby¹; Wei Tang¹; Thomas Feldhausen¹; Alex Plotkowski¹*; ¹Oak Ridge National Laboratory

9:20 AM

Modified Inherent Strain Modeling of Residual Stress and Distortion in WAAM and LPBF Processes: *Wen Dong¹; Albert To¹*; ¹University of Pittsburgh

9:40 AM

Anisotropic Distortion Modeling during Sintering of Binder Jet Printed Parts: *Basil Paudel¹; Albert To¹*; ¹University of Pittsburgh

10:00 AM Break

10:20 AM

Additive Manufacturing Moment Measure: A Reduced Order Model of the Laser Powder Bed Fusion Process: *Samuel Hocker¹*; Brodan Richter¹; Joseph Zalameda¹; Peter Spaeth¹; Erik Frankforter¹; Andrew Kitahara²; ¹NASA; ²National Institute of Aerospace

10:40 AM

Mesoscale Modeling of the Additively Manufactured 316L: Effects of Microstructure and Microscale Residual Stresses: *Mohammadreza Yaghoobi¹*; Yin Zhang²; Krzysztof S. Stopka³; David J Rowenhorst⁴; Ting Zhu²; John E. Allison¹; David L. McDowell²; ¹University of Michigan; ²Georgia Institute of Technology; ³Purdue University; ⁴US Naval Research Laboratory

11:00 AM

Crystal Plasticity Modeling Effort to Capture Microstructural Variations in Cold Sprayed Materials: *Aulora Rusk¹*; Yubraj Paudel¹; Ryan Cochran¹; Shiraz Mujahid¹; Marc Pepi²; Hongjoo Rhee³; Peter Czech³; ¹Center for Advanced Vehicular Systems; ²Army Research Laboratory; ³American Lightweight Materials Manufacturing Innovation Institute

11:20 AM

Phase Stability and Mechanical Properties of Ni-Al and Ni-Cr Binary Solid Solutions Using CASTEP Supercell Approach: *Violet Hilane¹*; Maje Phasha¹; Marandela Mulaudzi¹; Josias Van der Merwe²; ¹Mintek; ²University of the Witwatersrand

11:40 AM

Additively Manufactured Multi-metallic Design for Ti-6Al-4V and Inconel 718 Joining by Scheil-Gulliver Ternary Projection Diagrams: *Saeid Alipour Masoumabad¹*; Arezoo Emdadi²; ¹Missouri University of Science & Technology; ²Missouri University of Science and Technology

ADDITIVE MANUFACTURING

Additive Manufacturing of Ceramic-based Materials: Process Development, Materials, Process Optimization and Applications — Additive Manufacturing of Ceramics-based Materials I

Sponsored by: ACerS Basic Science Division, ACerS Engineering Ceramics Division, ACerS Manufacturing Division

Program Organizers: Lei Chen, University of Michigan-Dearborn; Xuan Song, University of Iowa; Xiangyang Dong, Missouri University of Science and Technology; Yiquan Wu, Alfred University; Paolo Colombo, University of Padova; Rajendra Bordia, Clemson University; Long-Qing Chen, Pennsylvania State University

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Session Chairs: Lei Chen, University of Michigan-Dearborn; Richard Thuss, TTEC LLC

8:00 AM Invited

Transparent Alumina Fabricated by Energy Efficient Spark Plasma Sintering: *Eugene Olevsky¹*; CheolWoo Park¹; Elisa Torresani¹; Chris Haines²; ¹San Diego State University; ²US Army DEVCOM - Army Research Laboratory

8:40 AM

A Study of Lithography-Based Additive Manufacturing of Ceria Ceramics: *Ryan Fordham¹*; Nicholas Voellm¹; Shawn Allan¹; Nicole Ross¹; S.K. Sundaram²; ¹Lithoz America; ²Alfred University

9:00 AM

Brittle Particle Cold Spray Technology: *Richard Thuss¹*; ¹TTEC LLC

9:20 AM

Ceramic 3D Printing for Investment Casting: *Cindy Schick¹*; Richard Gaignon¹; *Rouslan Svintsitski¹*; ¹3DCERAM-SINTO

9:40 AM

Production of 3D Printed Electrodes for Batteries: *Sina Bakhtar Chavari¹*; Bharat Yelamanchi¹; Ana Martinez²; Alexis Maurel²; Eric MacDonald³; Pedro Cortes¹; ¹Youngstown State University; ²University of Texas at El Paso; ³UTEP

10:00 AM Break

10:20 AM

Effects of Bimodal Particle Size Distribution on Mechanical and Thermal Properties of Densified SiC-Si Composites from Binder Jetting: *Mark Du¹*; Jonova Thomas¹; Wenhua Yu¹; Dileep Singh¹; ¹Argonne National Laboratory

10:40 AM

Direct Ink Writing of Nanoscale Feature Ceramics via Preceramic Polymer-block Copolymer Inks: *John Bowen¹*; Matthew Dickerson²; Jennifer Lewis³; ¹UES Inc.; ²Air Force Research Lab; ³Harvard University

11:00 AM

Ceramic Additive Manufacturing for Innovative Zirconia-based Material: *Richard Gaignon¹*; Helen Reveron²; Sylvain Fournier²; Guilhem Baeza²; Jérôme Chevalier²; *Rouslan Svintsitski¹*; ¹3DCERAM; ²Université de Lyon-Insa de Lyon, Mateis

11:20 AM

Additive Manufacturing of Alumina Toughened Zirconia and Zirconia Toughened Alumina: *Nicholas Voellm*¹; Shawn Allan¹; Ryan Fordham¹; Nicole Ross¹; ¹Lithoz America

11:40 AM

Advanced Manufacturing of Controlled SOFC Electrolyte and Electrode Microstructures through Aerosol Deposition: *Joshua Tenney*¹; Edward Sabolsky¹; Harry Abernathy²; Tao Yang²; Katarzyna Sabolsky¹; Evan Helgeson¹; Jordan Conte¹; Michael Jones¹; ¹West Virginia University; ²DOE- National Energy Technology Laboratory

ADDITIVE MANUFACTURING

Additive Manufacturing of Metals: Microstructure, Properties and Alloy Development — Fe-based Alloys - 316L

Program Organizers: Prashanth Konda Gokuldoss, Tallinn University of Technology; Jurgen Eckert, Erich Schmid Institute of Materials Science; Zhi Wang, South China University of Technology

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Session Chairs: Alber Sadek, Edison Welding Institute; Michael Eff, EWI

8:00 AM

Binder Jetting of Ultra-fine 316L Austenitic Stainless Steel Powder: Microstructure Observation and Mechanical Properties: *Mohammad Jamalkhani*¹; Mohammadreza Asherloo¹; Amir Mostafaei¹; ¹Illinois Institute of Technology

8:20 AM

Understanding Variations in Solidification Behavior of Additively Manufactured 316L Printed via Laser-Wire Directed Energy Deposition: *Olivia Denonno*¹; Charles Smith¹; Matthew Schreiber¹; Kip Findley¹; John Speer¹; Anthony Petrella¹; Craig Brice¹; Jonah Klemm-Toole¹; Zhenzhen Yu¹; ¹Colorado School of Mines

8:40 AM

Understanding the Effects of Residual Stress in Mechanical Behavior of SS-316L Manufactured by Laser-wire DED Process: *Sandeep Dhakal*¹; Allyssa Bateman¹; Boyd Pantan²; Jeffrey Bunn³; Brian Jaques¹; ¹Boise State University; ²Ohio State University; ³Oak Ridge National Laboratory

9:00 AM

Influence of Substrate Geometry and Feedstock Morphology on the Mechanical and Metallurgical Properties of Direct Energy Deposition Stainless Steel 316L: *Samantha Sorondo*¹; Jakob Hamilton¹; Iris Rivero¹; ¹Rochester Institute of Technology

9:20 AM

Effect of Surface Roughness on the Fatigue Behavior of Binder Jet Printed Ultra-fine 316L Austenitic Stainless Steel Powder: *Mohammad Jamalkhani*¹; Amir Mostafaei¹; ¹Illinois Institute of Technology

9:40 AM

Effects of Process Parameters on Mechanical Behavior of Wire Arc Additive Manufactured (WAAM) AISI 316LSi: *Vishnushankar Viraliyur Ramasamy*¹; John Lewandowski¹; ¹Case Western Reserve University

10:00 AM Break

10:20 AM

Effect of Hyaluronic Acid and Proteins on the Corrosion Behavior of Additively Manufactured Stainless Steel 316L: *Deeparekha Narayanan*¹; Lin Chen¹; Bilal Mansoor¹; Matthew Vaughan¹; Ibrahim Karaman¹; Homero Castaneda¹; ¹Texas A&M University

10:40 AM

The Effects of Microstructure and Chemistry on Corrosion Behavior in Additively-manufactured 316L Stainless Steel: *Ryan Khan*¹; Michael Melia¹; Michael Heiden¹; Sara Dickens¹; Paul Kotula¹; Frank DelRio¹; ¹Sandia National Laboratories

11:00 AM

Design of Decarburization after Application of Self-Terminating Dissolution to SS316L Processed by Laser Powder Bed Fusion: *Soumya Sridar*¹; Noah Sargent¹; Stephanie Prochaska²; Mitra Shabani¹; Owen Hildreth²; Wei Xiong¹; ¹University of Pittsburgh; ²Colorado School of Mines

11:20 AM

Corrosion Assessment of Additively Manufactured Stainless Steel 316L in Various Concentrations of Chlorides: *Lin Chen*¹; Deeparekha Narayanan¹; Bilal Mansoor²; Ibrahim Karaman¹; Homero Castaneda¹; ¹Texas A&M University; ²Texas A&M University Qatar

11:40 AM

Framework for Designing Additively Manufactured Metallic Functionally Graded Materials: *Allison Beese*¹; Zi-Kui Liu¹; ¹Pennsylvania State University

ADDITIVE MANUFACTURING

Additive Manufacturing of Metals: Microstructure, Properties and Alloy Development — Ni-based Super Alloys

Program Organizers: Prashanth Konda Gokuldoss, Tallinn University of Technology; Jurgen Eckert, Erich Schmid Institute of Materials Science; Zhi Wang, South China University of Technology

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Session Chairs: Markus Chmielus, University of Pittsburgh; Jovid Rakhmonov, Northwestern university

8:00 AM

Characterizing the Effects of Laser Power, Scanning Velocity, and Deposition Temperature on Inconel 718 Single-track Melt Pool Geometry in Laser Powder Bed Fusion: *William Frieden Templeton*¹; Seth Strayer²; Shawn Hinnebusch²; Albert To²; Sneha Prabha Narra¹; ¹Carnegie Mellon University; ²University of Pittsburgh

8:20 AM

In-situ and Ex-situ Characterization of Inconel 738 Subjected to Additive Manufacturing: *Adriana Eres-Castellanos*¹; Jeremy Shin¹; Ruben Ochoa¹; Chandler Becker¹; Beau Nannie¹; Jonah Klemm-Toole¹; Alec Saville¹; Brian Rodgers¹; Kamel Fezzaa²; Amy Clarke¹; ¹Colorado School of Mines; ²Argonne National Laboratory

8:40 AM

The Competition of Failure Modes in an Additively Manufactured Disk Superalloy: *Tim Gabb*¹; C. Sudbrack²; M. Kirka³; S. Semiatin⁴; T. Smith¹; C. Kantzos¹; ¹NASA Glenn Research Center; ²National Energy Technology Laboratory; ³Oak Ridge National Laboratory; ⁴Air Force Research Laboratory (retired)

9:00 AM

Effect of Hot Isostatic Pressing on Mechanical Properties of Additively Manufactured Ni-based Superalloy Rene65: *Colleen Hilla*¹; Andrew Wessman²; Michael Eff³; Ron Aman³; Michael Mills¹; Wei Zhang¹; ¹Ohio State University; ²University of Arizona; ³Edison Welding Institute

9:20 AM

Superalloy IN625 as a Candidate for Additively Manufactured Injectors for Hydrogen Combustion in Power Generation: *Chantal Sudbrack*¹; Kyle Rozman¹; Kristin Tippey¹; Martin Detrois¹; Lucas Teeter¹; Matthew Searle¹; Ömer Dogan¹; ¹National Energy Technology Laboratory

9:40 AM

Nitride Formation and Their Influence on Delta Phase Precipitation in Additively Manufactured Nickel Superalloys: *James Zuback*¹; Selda Nayir²; Mingze Gao²; Todd Palmer²; ¹National Institute of Standards and Technology; ²Pennsylvania State University

10:00 AM Break

10:20 AM

AM Processing and Microstructural Evolution in Nickel-based Superalloys: *Ruben Ochoa*¹; Amy Clarke¹; ¹Colorado School of Mines

10:40 AM

A Compositional and Microstructural Understanding of Powder-blown Directed Energy Deposition (DED) Used for Functionally Graded Ni-superalloys Alloys for Hot-and-harsh Gas Path Environments: *Marissa Brennan*¹; Chen Shen¹; Shenyang Huang¹; Michael Knussman¹; Daniel Ruscitto¹; Alex Kitt²; Changjie Sun¹; Lee Kerwin²; Anindya Bhaduri¹; Siyeong Ju¹; Hyeyun Song²; Lang Yuan³; ¹GE Research; ²EWI; ³University of South Carolina

11:00 AM

Directed Energy Deposition of Bi-metallic Tensile Specimens by Direct Bonding of Inconel 625 to Stainless Steel 304: *Anthony Stair*¹; Nicholas Jones¹; Jack Beuth¹; Maarten de Boer¹; ¹Carnegie Mellon University

11:20 AM

Multi-material Additive Manufacturing with Inconel 718 and GRCo-84: *Nicholas O'Brien*¹; Zexiao Wang¹; Nicholas Jones¹; Sheng Shen¹; Jack Beuth¹; ¹Carnegie Mellon University

ADDITIVE MANUFACTURING

Additive Manufacturing: An Industrial, Academic and Governmental Perspective — Session I

Program Organizers: Navin Manjooran, Chairman, Solve; Gary Pickrell, Virginia Tech

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Session Chairs: Gary Pickrell, Virginia Tech; Navin Manjooran, Chairman, Solve

8:00 AM Presentation Planned

8:40 AM Presentation Planned

9:20 AM Presentation Planned

10:00 AM Break

10:20 AM

The Effects of Powder Recycling in LPBF AM of Al-Sc-Mg Alloy on Powder Quality: *Junwon Seo*¹; Srujana Rao Yarasi¹; Sandra DeVincent Wolf¹; Bryan Webler¹; Anthony Rollett¹; ¹Carnegie Mellon University

10:40 AM

Additive Manufacturing Research with Mission Intent: JHU/APL's Research toward Solving Critical Defense Challenge Problems: *Morgana Trexler*¹; Michael Presley¹; Steven Storck¹; Gianna Valentino¹; Li Ma²; Brendan Croom¹; Sal Nimer¹; Drew Seker¹; ¹Johns Hopkins University Applied Physics Laboratory

SUSTAINABILITY, ENERGY, AND THE ENVIRONMENT

Advanced Ceramics for Environmental Remediation — Session I

Sponsored by: ACerS Engineering Ceramics Division

Program Organizers: Alberto Vomiero, Lulea University of Technology; Elisa Moretti, Ca' Foscari University of Venice; Tofik Shifa, Ca' Foscari University of Venice; Clara Santato, Ecole Polytechnique Montreal

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Session Chairs: Elisa Moretti, Ca' Foscari University of Venice; Alberto Vomiero, Lulea University of Technology

8:00 AM Invited

2-D and Layered Oxides for Environmental Catalysis Applications: *Scott Mixture*¹; ¹Alfred University

8:20 AM Invited

Dyes and Antibiotics Degradation through Advanced Inorganic Nanostructures: Progress and Limitations of a Materials Science Approach: *Isabella Concina*¹; ¹Lulea University of Technology

8:40 AM Invited

Inorganic Materials for Phosphorus Capture and the STEPS Center: *Jacob Jones*¹; ¹North Carolina State University

9:00 AM Invited

Multifunctional Materials for Emerging Technologies: *Federico Rosei*¹; ¹INRS Centre for Energy, Materials and Telecommunications

9:20 AM

Greener Synthesis of Porous Two-dimensional Nanomaterials and Their Applications in Water Treatment: *Bhavya Joshi*¹; *Fayyaz Memon*¹; *Khalil Ahmed*¹; *Shaowei Zhang*¹; ¹University of Exeter

9:40 AM Invited

Optimization of 1D Core-shell Heterostructures for Gas Sensing: *Nicola Pinna*¹; ¹Humboldt-Universitaet Zu Berlin

10:00 AM Break

10:20 AM Invited

Utilizing Band Diagrams to Engineer the Performance of Photocatalytic Processes: *Kirk Bevan*¹; *Botong Miao*¹; *Asif Iqbal*¹; ¹McGill University

10:40 AM

Nanofibrous Oxide Ceramics: Manufacturing and Applications: *Riley Yager*¹; *Rachel Day*¹; *Tabitha Berry*¹; *Arielle Griffin*¹; *Andrei Stanishevsky*¹; ¹University of Alabama at Birmingham

NUCLEAR ENERGY

Advanced Characterization of Materials for Nuclear, Radiation, and Extreme Environments III — Thermomechanical Properties

Sponsored by: TMS Nanomechanical Materials Behavior Committee, TMS Nuclear Materials Committee

Program Organizers: Cody Dennett, Commonwealth Fusion Systems; Samuel Briggs, Oregon State University; Christopher Barr, Naval Nuclear Laboratory; Michael Short, Massachusetts Institute of Technology; Janelle Wharry, Purdue University; Cheng Sun, Idaho National Laboratory; Caitlin Taylor, Los Alamos National Laboratory; Khalid Hattar, Sandia National Laboratories; Yuanyuan Zhu, University of Connecticut

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Session Chairs: Michael Short, Massachusetts Institute of Technology; Cody Dennett, Commonwealth Fusion Systems

8:00 AM Invited

Defect Structure and Property Evolution in Ion-irradiated Tungsten: Progress towards a Comprehensive Understanding: *Felix Hofmann*¹; *Daniel Mason*²; *Abdallah Reza*¹; *Suchandrima Das*¹; *Hongbing Yu*³; *Sergei Dudarev*²; ¹University of Oxford; ²UKAEA; ³Canadian Nuclear Laboratories

8:30 AM

Characterization of Simultaneous High-energy Proton and Spallation-Neutron Radiation Effects in Structural Alloys: *Timothy Lach*¹; *Maxim Gussev*¹; *David McClintock*¹; ¹Oak Ridge National Laboratory

8:50 AM

Deformation Twinning versus Slip in Ni-based Alloys, Containing Pt2Mo-structured, Ni2Cr-typed Precipitates: *Hi Vo*¹; *Khanh Dang*¹; *Fei Teng*²; *Matt Schneider*¹; *Benjamin Eftink*¹; *Stuart Maloy*³; *Laurent Capolungo*¹; *Peter Hosemann*⁴; ¹Los Alamos National Laboratory; ²Idaho National Laboratory; ³Pacific Northwest National Laboratory; ⁴UC Berkeley

9:10 AM

Automated In Situ Deformation Characterization via Analytical SEM during High Temperature Tensile Testing: *Sebastian Krauss*¹; *Hrishikesh Bale*¹; *Stephen Kelly*¹; ¹ZEISS Research Microscopy Solutions

9:30 AM

Applications of Cryogenic Nanomechanical Testing: *Eric Hintsala*¹; *Douglas Stauffer*²; ¹Bruker Nano Surfaces and Metrology; ²Bruker Nano Surfaces & Metrology

9:50 AM Break

10:10 AM Invited

Advanced In-situ and Post-Irradiation-Examination Thermal Conductivity Measurements of Nuclear Fuels and Materials: *Zilong Hua*¹; *Amey Khanolkar*¹; *Cody Dennett*²; *Robert Schley*¹; *Austin Fleming*¹; *Colby Jensen*¹; *Marat Khafizov*³; *David Hurley*¹; ¹Idaho National Laboratory; ²Commonwealth Fusion Systems; ³Ohio State University

10:40 AM

In-situ Thermal Diffusivity Recovery and Defect Annealing Kinetics in Self-ion Implanted Tungsten Using Transient Grating Spectroscopy: *Mohamed Abdallah Reza*¹; *Hongbing Yu*²; *Cody Dennett*³; *Kenichiro Mizohata*⁴; *Felix Hofmann*¹; *Guanze He*¹; ¹University of Oxford; ²Canadian Nuclear Laboratories; ³Massachusetts Institute of Technology; ⁴University of Helsinki

11:00 AM

Detection of Radiation Vulnerability in Microelectronic Systems: *Sergei Stepanoff*¹; *Md Rassel*²; *Aman Haque*²; *Douglas Wolfe*¹; *Fan Ren*³; *Stephen Pearton*³; ¹The Applied Research Laboratory; ²The Pennsylvania State University; ³University of Florida

11:20 AM

Ring Pull Testing: The Effect of Mandrel Diameter: *Mathew Hayne*¹; *Peter Beck*¹; *James Valdez*¹; *Cheng Liu*¹; *Thomas Nizolek*¹; *Tarik Saleh*¹; *Stuart Maloy*¹; *Benjamin Eftink*¹; ¹Los Alamos National Laboratory

MATERIALS-ENVIRONMENT INTERACTIONS

Advanced Coatings for Wear and Corrosion Protection — Session I

Program Organizers: Evelina Vogli, Lm Group Holdings Inc.; Virendra Singh, Schlumberger

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Session Chairs: Virendra Singh, Schlumberger; Evelina Vogli, LM Group Holdings Inc.

8:00 AM

Mechanical Property and Corrosion Behavior of Ni-based Coating with Al and Mo Addition: *Jaehui Bang*¹; *Junyeop Lee*¹; *Minhye Kang*¹; *Eunkyung Lee*¹; ¹National Korea Maritime and Ocean University

8:20 AM

Coating Properties of Alkyd Resin, Epoxy Resins and Polyurethane Based Nanocomposites: A Review: Ikhuazugbe Ifijen¹; Nyaknno U. Udokpoh¹; Gregory E. Onaiwu²; Kate E. Mokobia³; Ewanole B. Ohiocheoya¹; Osemwekhian Esene¹; ¹Rubber Research Institute of Nigeria; ²Benson Idahosa University; ³Delta State Polytechnic

8:40 AM

Direct Electrodeposition of Corrosion Resistant Coatings onto Aluminum after One Step Surface Pretreatment: Rajeswaran Radhakrishnan¹; Timothy Hall¹; Maria Inman¹; Stephen Snyder¹; Cory Crowley²; ¹Faraday Technology Inc; ²Fermi National Accelerator Laboratory

9:00 AM

Corrosion Resistant Amorphous Based Thermal Sprayed Coatings for Fluoride Molten Salt Environment: Evelina Vogli¹; Jinsuo Zhang²; John Kang¹; Ricardo Salas¹; ¹Lm Group Holdings Inc.; ²Virginia Tech

9:20 AM

Evaluation of Wear and Corrosion Performance of Wire Arc Sprayed Al-Si Coating for Marine Applications: Minhye Kang¹; Junyeop Lee¹; Jaehui Bang¹; Eunkyung Lee¹; ¹Korea Maritime and Ocean University

9:40 AM

Optimization of the Microstructure and Performance of Aluminum Alloy Cold Spray Coatings on Magnesium Alloy Substrates: Sridhar Niverty¹; Rajib Kalsar¹; Anthony Naccarelli²; Timothy Eden²; Vineet Joshi¹; ¹Pacific Northwest National Laboratory; ²Pennsylvania State University

10:00 AM Break

10:20 AM

Metallurgical and Mechanical Bonding of Al₂O₃ on Mold Steel and Wear Behavior: Laser Cladding vs. Thermal Spray: Sumin Song¹; Taebum Kim¹; Sungjin Kim²; Kyuntaek Cho¹; ¹KITECH; ²Sunchon National University

MATERIALS-ENVIRONMENT INTERACTIONS

Advanced Materials for Harsh Environments — Session I

Sponsored by: ACerS Electronics Division

Program Organizers: Navin Manjooran, Chairman, Solve; Gary Pickrell, Virginia Tech

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Session Chairs: Gary Pickrell, Virginia Tech; Navin Manjooran, Chairman, Solve

8:00 AM Presentation Planned

8:40 AM

Grain Boundary Engineering to Improve Austenitic Stainless Steels Stress Corrosion Cracking Behavior in Boiling Saturated Magnesium Chloride Solutions: Osama Alyousif¹; ¹Kuwait University

9:00 AM

Characterization of Nb-Si Alloys for High-temperature Applications: Kaiser Aguirre¹; Scott Oppenheimer²; Akane Suzuki²; Bernard Bewlay²; John Lewandowski¹; ¹Case Western Reserve University; ²GE Research

9:20 AM

Corrosion Detection in Oil and Gas Pipeline Using 3-D Bluetooth Printed Microsensor: Stephen Appiah¹; Holly Martin¹; Pedro Cortes¹; Frank Li¹; Vamsi Bora¹; Brendan Kuzior¹; ¹Youngstown State University

9:40 AM

Corrosion Phenomena in Powder-Processed Aluminum Alloys Containing Quasicrystalline Dispersoids: Sarshad Rommel¹; Hannah Leonard¹; Mingxuan Li¹; Thomas Watson²; Tod Policandriotes³; Mark Aindow¹; ¹University of Connecticut; ²Pratt & Whitney; ³Collins Aerospace

10:00 AM Break

10:20 AM

Electrochemical Characterization of Joints Inconel 600 to Ti-Composites, Immersed in Seawater: Mariano Braulio-Sánchez¹; Pedro Durán-Reséndiz¹; Rogelio Orozco-Martínez¹; ¹Instituto Tecnológico Superior del Sur de Guanajuato

10:40 AM

Exfoliated-graphite-based Flexible Graphite as a Multifunctional Material for Harsh Environments: Deborah Chung¹; ¹State University of New York Buffalo

11:00 AM Concluding Comments

CERAMIC AND GLASS MATERIALS

Advances in Dielectric Materials and Electronic Devices — Processing, Properties, and Biomedical Applications

Sponsored by: ACerS Electronics Division

Program Organizers: Amar Bhalla, University of Texas; Ruyan Guo, University of Texas at San Antonio; Rick Ubic, Boise State University; Matjaž Spreitzer, Jožef Stefan Institute

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Session Chair: Amar Bhalla, University of Texas San Antonio

8:00 AM

Design of Highly Reliable Dielectrics with Cold Sintering: Jake DeChiara¹; Zhongming Fan¹; Clive Randall¹; ¹Pennsylvania State University

8:20 AM

Designing Novel Dielectric Composites with High Thermal Conductivity Enabled by Cold Sintering: Javier Mena-García¹; Arnaud Ndayishimiye¹; Zhongming Fan¹; Devon Eichfeld¹; Christopher Wheatley¹; Haley Jones¹; Andrea Arguëlles¹; Brian Foley¹; Clive Randall¹; ¹The Pennsylvania State University

8:40 AM

Tape Casting and Optimization of the Slurry Composition of a SiCer-compatible LTCC-tape: Clemens Motzkus¹; Beate Capraro¹; Fraunhofer IKTS

9:00 AM

Non-destructive Evaluation of Inkjet Printed Cobalt Ferrite/Barium Titanate Films: William Flynn¹; ¹University of Texas at San Antonio

9:20 AM

Tunable Properties of Zinc Oxide Films Using In-situ Reactive Hybrid 3D Printing: *Sean Garnsey*¹; William Flynn¹; Matthew Trippy¹; Ruyan Guo³; Amar Bhalla¹; ¹ECE/ COE, University of Texas at San Antonio

9:40 AM

Leveraging Coupled-Cluster Techniques to Predict Pre-Cursor Material Improvements: *Matthew Trippy*¹; Maximillian Estrada¹; Sean Garnsey¹; Paul Flynn¹; Amar Bhalla¹; Ruyan Guo¹; ¹University of Texas at San Antonio

10:00 AM Break

10:20 AM

Magnetoelectric Nanorobot - A Revolutionary Nanoscale Device for Targeted Treatment: *Soutik Betal*¹; Amar Bhalla²; Ruyan Guo²; ¹IIT Delhi; ²University of Texas at San Antonio

NANOMATERIALS

Advances in Emerging Electronic Nanomaterials: Synthesis, Enhanced Properties, Integration, and Applications – 2D TMDC and Quantum Materials

Sponsored by: TMS: Nanomaterials Committee

Program Organizers: Chang-Yong Nam, Brookhaven National Laboratory; Jung-Kun Lee, University of Pittsburgh; Stephen McDonnell, University of Virginia

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Session Chairs: Chang-Yong Nam, Brookhaven National Laboratory; Stephen McDonnell, University of Virginia

8:00 AM Invited

Two Dimensional Materials for Neuromorphic Computing: *Tania Roy*¹; ¹University of Central Florida

8:30 AM Invited

Wafer-scale Heterogeneous Integration of Atomically Thin Electronic Materials on Arbitrary Substrates toward Mechanically Reconfigurable Devices: *Yeonwoong Jung*¹; ¹University of Central Florida

9:00 AM Invited

Synthesis and Integration of Transition Metal Dichalcogenides: *Stephen McDonnell*¹; ¹University of Virginia

9:30 AM Invited

Synthesis, Nanofabrication and Characterization of 2D Magnetic Semiconductors for Magnetic Tunnel Junctions: *Eui-Hyeok Yang*¹; ¹Stevens Institute of Technology

10:00 AM Break

10:15 AM Invited

Raman Spectroscopy Studies of Magneto-optical Effects in CrI₃: *Wencan Jin*¹; ¹Auburn University

10:45 AM Invited

Applications of Electron Spectro-microscopy to Investigations of Chemistry and Electronic Structure of 2D Materials: *Jerzy Sadowski*¹; ¹Brookhaven National Laboratory

11:15 AM Invited

Synthesis of Atomically Precise Graphene Nanoribbons with Tunable Electronic Properties: *An-Ping Li*¹; ¹Oak Ridge National Laboratory

IRON AND STEEL (FERROUS ALLOYS)

Advances in Ferrous Metallurgy – HSLA Steel and Advances in Characterization Techniques

Sponsored by: AIST Metallurgy – Processing, Products & Applications Technology Committee

Program Organizers: Siddhartha Biswas, Big River Steel; Daniel Baker, General Motors Corporation; Lijia Zhao, Northeastern University

Monday AM | October 10, 2022

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Session Chair: Siddhartha Biswas, Big River Steel

8:00 AM

A Rapid CCT Predictor for Low Alloys Steels and its Application to Compositionally Heterogeneous Material: *Joshua Collins*¹; Ed Pickering²; ¹The University of Manchester; ²University of Manchester

8:20 AM

Adapting HSLA-100 to Thick-Section Forgings: *Josh Mueller*¹; Virginia Euser¹; Joshem Gibson¹; Mark Royer²; ¹Los Alamos National Laboratory; ²Lehigh Heavy Forge Corporation

8:40 AM

Characterization of Ductility Limiting Precipitation at High Temperatures in HSLA steels: *Alyssa Stubbers*¹; John Balk¹; ¹University of Kentucky

9:00 AM

Further Analysis of the Relationship between Precipitate Formation and a Loss of Hot Ductility in Two Microalloyed Steels: *Paul Estermann*¹; Viorel-Sergiu Ilie²; Jakob Six²; Ernst Kozeschnik¹; ¹Technische Universität Wien; ²Voestalpine Stahl GmbH

9:20 AM

Evaluation of Martensite Transformation Temperatures Using Magnetometry: *Nicholas Jones*¹; Paul Lambert¹; Jin-Hyeong Yoo¹; Suok-Min Na¹; Charles Fisher¹; ¹Naval Surface Warfare Center, Carderock Division

9:40 AM

Rigorous, Machine-Learning based Classification of Steel Microstructures Using EBSD: *Michael Hjelmstad*¹; Pat Trimby¹; ¹Oxford Instruments

10:00 AM Break

10:15 AM

Stereological Analysis for Microstructure Quantification in Advanced High Strength Steels: *Brian Lin*¹; Narayan Pottore¹; Sriram Sadagopan¹; Jiahao Cheng²; Xiaohua Hu²; ¹ArcelorMittal Global R&D; ²Oak Ridge National Laboratory

10:35 AM

In-situ Laser Confocal Microscopic Analysis of Phase Transformations in Cr-Ni-Mo and Cr-Mo High-strength Steels Coupled with Dilatometric Study: *Viraj Ashok Athavale*¹; Rogerio Antao Cardoso¹; Katelyn Kiser¹; Mario Buchely¹; Laura Bartlett¹; Ronald O'Malley¹; ¹Missouri University of Science and Technology

10:55 AM

Effect of Leaching Process Variables on the Reaction Kinetics of Pyrite Using Surface Response Methodology: *Hilary Rutto¹; Tumiasang Seodigeng¹; ¹Vaal University of Technology*

11:15 AM

Modelling of Accelerated Runout Table Cooling of Thicker Gauge Steel Products: *Shixin Zhou¹; Ali Doustahadi¹; Vladan Prodanovic¹; Matthias Militzer¹; ¹University of British Columbia*

11:35 AM

Dielectric Behavior of Steel and Its Application in Structural Self-powering: *Deborah Chung¹; Xiang Xi¹; ¹State University of New York Buffalo*

ARTIFICIAL INTELLIGENCE

AI for Big Data Problems in Advanced Imaging, Materials Modeling and Automated Synthesis — AI and ML for Materials Discovery I

Sponsored by: TMS Advanced Characterization, Testing, and Simulation Committee

Program Organizers: Mathew Cherukara, Argonne National Laboratory; Subramanian Sankaranarayanan, University of Illinois-Chicago; Badri Narayanan, University of Louisville

Monday AM | October 10, 2022

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Session Chairs: Badri Narayanan, University of Louisville; Mathew Cherukara, Argonne National Laboratory

8:00 AM

A Feasibility Study of Machine Learning-assisted Alloy Design Using Wrought Aluminum Alloys as An Example: *Yasaman Jamalipour Soofi¹; Md Asad Rahman¹; Yijia Gu¹; Jinling Liu¹; ¹Missouri University of Science and Technology*

8:20 AM

Are Process-Structure-Property Relationships Useful for Materials Design?: *Raymundo Arroyave¹; ¹Texas A&M University*

8:40 AM

A.I. Driven Sustainable Aluminum Alloy Design: *Fatih Sen¹; ¹Novelis*

9:00 AM

De Novo Molecular Drug Design Using Deep and Reinforcement Learning: *Srilok Srinivasan¹; Rohit Batra²; Henry Chan²; Mathew Cherukara²; Jonathan Steckbeck¹; Nicholas Nystrom¹; Subramanian Sankaranarayanan²; ¹Peptilogics; ²Argonne National Laboratory*

9:20 AM

High-dimensional Neural Network Potential for Liquid Electrolyte Simulations: Applications to Li-ion Battery Materials: *Garvit Agarwal¹; Steven Dajnowicz¹; James Stevenson¹; Leif Jacobson¹; Farhad Ramezanghorbani¹; Karl Leswing¹; Mathew Halls¹; Robert Abel¹; ¹Schrodinger Inc*

9:40 AM Question and Answer Period

CERAMIC AND GLASS MATERIALS

Ceramics and Glasses Modeling by Simulations and Machine Learning — Machine Learning Modeling of Glass and Ceramics

Sponsored by: ACerS Glass & Optical Materials Division

Program Organizers: Mathieu Bauchy, University of California, Los Angeles; Peter Kroll, University of Texas at Arlington; N. M. Anoop Krishnan, Indian Institute of Technology Delhi

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Session Chairs: Mathieu Bauchy, UCLA; Peter Kroll, The University of Texas at Arlington; Anoop Krishnan, IIT Delhi

8:00 AM Invited

Machine Learning Defect Properties of Semiconductors: *Arun Kumar Mannodi Kanakkithodi¹; ¹Purdue University*

8:30 AM

Natural Language Processing Aided Understanding of Material Science Literature: *Mohd Zaki¹; Tanishq Gupta¹; N. M. Anoop Krishnan¹; Mausam Mausam¹; ¹Indian Institute of Technology Delhi*

8:50 AM

Machine Learning-Derived Atomistic Potentials for $Y_2Si_2O_7$ and $Yb_2Si_2O_7$: *Cameron Bodenschatz¹; Wissam Saidi²; Jamesa Stokes¹; ¹NASA Glenn Research Center; ²University of Pittsburgh*

9:10 AM

Using Machine Learning Empirical Potentials to Investigate Interdiffusion at Metal-Chalcogenide Alloy Interfaces: *Siddarth Achar¹; Derek Stewart²; Julian Schneider³; ¹University of Pittsburgh; ²Western Digital Technologies; ³Synopsys Inc.*

9:30 AM

Quantifying the Local Structure of Metallic Glass as a Function of Composition and Atomic Size: *Thomas Hardin¹; Michael Chandross¹; Murray Daw²; ¹Sandia National Laboratories; ²Clemson University*

9:50 AM

Data-driven Prediction of Room Temperature Density of Multicomponent Silicate-based Glasses: *Kai Gong¹; Elsa Olivetti¹; ¹Massachusetts Institute of Technology*

10:10 AM Break

10:30 AM Invited

A Physics Informed Machine Learning Approach to Predict Glass Forming Ability: *Collin Wilkinson¹; Cory Trivelpiece²; Rebecca Welch¹; John Mauro¹; ¹Pennsylvania State University; ²Savannah River National Laboratory*

11:00 AM

Data Driven Design and Enhancement of Machinable Glass Ceramics: *Prachi Garg¹; Scott Broderick¹; Baishakhi Mazumder¹; ¹University at Buffalo*

11:20 AM

Predicting and Accessing Metastable Phases: *Vancho Kocovski¹; James Valdez²; Benjamin Derby¹; Ghanshyam Pilania¹; Blas Uberuaga¹; ¹Los Alamos National Laboratory*

11:40 AM

Predicting the Dynamics of Atoms in Glass-Forming Liquids by a Surrogate Machine-Learned Simulator: *Mathieu Bauchy*¹; ¹University of California, Los Angeles

NANOMATERIALS

Controlled Synthesis, Processing, and Applications of Structural and Functional Nanomaterials — 2D Materials Synthesis & Properties

Sponsored by: ACerS Basic Science Division, ACerS Electronics Division, ACerS Engineering Ceramics Division

Program Organizers: Haitao Zhang, University of North Carolina at Charlotte; Gurpreet Singh, Kansas State University; Kathy Lu, Virginia Polytechnic Institute and State University; Edward Gorzkowski, Naval Research Laboratory; Jian Shi, Rensselaer Polytechnic University; Michael Naguib, Tulane University; Sanjay Mathur, University of Cologne

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Session Chairs: Michael Naguib, Tulane University; Haitao Zhang, University of North Carolina at Charlotte

8:00 AM Keynote

Near-field Imaging of 2D-heterostructures: Portraying Optical Nonuniformity at the Nanoscale: *Slava V Rotkin*¹; ¹The Pennsylvania State University

8:30 AM Invited

Visualizing Complex Many-body Phenomena in Atomically Thin Quantum Materials: *Jyoti Katoh*¹; ¹Carnegie Mellon University

9:00 AM

Synthesis of Solid-Solution MXenes with Tunable Electronic, Optical, and Electrochemical Properties: *Christopher Shuck*¹; Meikang Han¹; Kathleen Maleski¹; Yizhou Yang¹; James Glazar²; Alexandre Foucher²; Kanit Hantanasirisakul¹; Asia Sarycheva¹; Nathan Frey²; Steven May¹; Vivek Shenoy²; Eric Stach²; Yuri Gogotsi¹; ¹Drexel University; ²University of Pennsylvania

9:20 AM

Safer Etching of Ti₃AlC₂ MAX Phases to Directly Yield Ti₃C₂T_z MXene Nanosheets Using Quarternary Ammonium Fluorides: *Vrushali Kotasthane*¹; Zeyi Tan¹; Junyeong Yun¹; Jodie Lutkenhaus¹; Micah Green¹; *Miladin Radovic*¹; ¹Texas A&M University

9:40 AM

Transition Metal Carbo-Chalcogenide “TMCC” a New Family of Two-dimensional Materials: *Ahmad Ibrahim*¹; Manish Kothakonda¹; Fei Wang¹; Eric Tseng²; Kaitlyn Prenger¹; Xiaodon Zhang¹; Per Persson²; Jiang Wei¹; Jianwei Sun¹; Michael Naguib¹; ¹Tulane University; ²Linköping University

10:00 AM Break

10:20 AM Invited

Exciton Physics at the Atomic Scale: *Dan Gunlycke*¹; ¹U.S. Naval Research Laboratory

10:50 AM Invited

Synthesis of Nanolamellar Ultra-high Temperature Carbides by High-temperature Phase Transformation of 2D MXenes: *Babak Anasori*¹; ¹Purdue School of Eng. & Tech., IUPUI

11:20 AM

Fundamental Understanding of Defect Evolution in Two-dimensional Phosphorus Under Ion Irradiation: *Saransh Gupta*¹; Badri Narayanan¹; ¹University of Louisville

11:40 AM

Scalable Synthesis of Titanium Carbo-oxides Nanofilaments and 2D Flakes, Their Properties, and Potential Applications: *Hussein Badr*¹; Michel Barsoum¹; ¹Drexel University

12:00 PM

Synthesis of Functional Semiconducting Metal-sulfide Materials by Molecular Building Blocks: *Veronika Brune*¹; Sanjay Mathur¹; ¹University of Cologne

EDUCATION

Curricular Innovations and Continuous Improvement of Academic Programs (and Satisfying ABET along the Way): The Elizabeth Judson Memorial Symposium — Curricular Advances and Accreditation

Sponsored by: TMS Accreditation Committee, TMS Education Committee

Program Organizers: Alison Polasik, Campbell University; Jeffrey Fergus, Auburn University; Assel Aitkaliyeva, University of Florida; Kester Clarke, Colorado School of Mines

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Session Chairs: Robert Heard, Carnegie Mellon University; Kester Clarke, Colorado School of Mines

8:00 AM

ABET and Continuous Improvement: What's New, and Q&A: *Janet Callahan*¹; ¹Michigan Technological University

8:20 AM

Inclusive Pedagogy in Introductory Materials Science Courses: *Vincent Sokalski*¹; ¹Carnegie Mellon University

8:40 AM

Preparing Engineering Students to Work in and Design Solutions for Diverse Populations: *Jeffrey Fergus*¹; ¹Auburn University

9:00 AM Panel Discussion: Best Practices as You Prepare for an ABET Visit

9:40 AM

Helping to Prepare Students for Communicating in the Professional World: *Gregg Janowski*¹; ¹University of Alabama at Birmingham

10:00 AM Break

10:20 AM

Technical Communication: Graduate Student Training via Regular Reporting within I/UCRCs: *Kester Clarke*¹; ¹Colorado School of Mines

10:40 AM Panel Discussion: Teaching Technical Communication and "Soft Skills"

FUNDAMENTALS AND CHARACTERIZATION

Dynamic Behavior of Materials: Experiments and Molecular Dynamics Simulations — Dynamic Behavior of Materials: Experiments and Molecular Dynamics Simulations

Sponsored by: TMS: Computational Materials Science and Engineering Committee

Program Organizers: Ghatu Subhash, University of Florida; Douglas Spearot, University of Florida

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Session Chairs: Ghatu Subhash, University of Florida; Douglas Spearot, University of Florida

8:00 AM Keynote

Structure / Property (Constitutive and Dynamic Strength / Damage) Characterization of Single-Phase FeAl: *George Gray*¹; Saryu Fensin¹; Carl Cady¹; H Wang²; Kenneth Vecchio²; ¹Los Alamos National Laboratory; ²University of California San Diego

8:40 AM

Shock-induced Spallation in Monocrystalline Boron Carbide: *Ghatu Subhash*¹; Amith Adoor Cheenady¹; ¹University of Florida

9:00 AM

Phase Transformation in Cu: *Nilanjan Mitra*¹; ¹Johns Hopkins University

9:20 AM

Atomic Simulations of Shock Wave Propagation in Polymers and Their Interfaces: Nuwan Dewapriya¹; *Ron Miller*¹; ¹Simon Fraser University

9:40 AM

Shock Compression of Cu_xZr_{100-x} Metallic Glasses: Peng Wen¹; Brian Demaske²; Simon Phillpot³; *Douglas Spearot*³; ¹Nanjing University of Science and Technology ; ²Sandia National Laboratories; ³University of Florida

10:00 AM Break

10:20 AM

Exploring Thermal, Mechanical, and Electrical Shock via In-situ Electron Microscopy: Eric Lang¹; Ryan Schoell¹; Nathan Madden¹; Kathryn Small¹; *Khalid Hattar*¹; ¹Sandia National Laboratories

10:40 AM

A Molecular Dynamics Study of the Effect of an Oxide Layer on the High Velocity Deposition of Tantalum Nanoparticles: *Stephen Bierschenk*¹; Michael Becker¹; Desiderio Kovar¹; ¹The University of Texas at Austin

11:00 AM

Micro Cold Spray of Zinc Oxide Films: *Scott Burlison*¹; Michael Becker¹; Desiderio Kovar¹; ¹University of Texas at Austin

11:20 AM

Scaling up Molecular Dynamics Simulations of High Velocity Particle Impacts: *Aidan Moyers*¹; Michael Becker¹; Desiderio Kovar¹; ¹The University of Texas at Austin

11:40 AM

Mechanical Properties in Thermally Processed Ag-Cu-Ni Nanoclusters: Effect of Surface Composition and Core-shell Morphology Using Hybrid Monte Carlo/Molecular Dynamics Simulations: *Serzat Safaltin*¹; Pamir Alpay¹; ¹University of Connecticut

SUSTAINABILITY, ENERGY, AND THE ENVIRONMENT

Energy Materials for Sustainable Development — Storage Batteries I

Sponsored by: ACerS Energy Materials and Systems Division

Program Organizers: Krista Carlson, University of Nevada, Reno; Armin Feldhoff, Leibniz University Hannover; Kyle Brinkman, Clemson University; Eva Hemmer, University of Ottawa; Nikola Kanas, BioSense Institute; Kjell Wiik, Norwegian University of Science and Technology; Lei Zuo, Virginia Tech; Joshua Tong, Clemson University ; Danielle Benetti, Institut National de la Recherche Scientifique; Katherine Develos-Bagarinao, National Institute of Advanced Industrial Science and Technology; Soumi Chatterjee, Aditya Birla Science & Technology Company, Ltd

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Session Chairs: Kyle Brinkman, Clemson University ; Krista Carlson, University of Nevada, Reno; Armin Feldhoff, Leibniz Universität Hannover

8:00 AM Introductory Comments

8:10 AM Invited

Design, Modeling, and Direct Write Additive Manufacturing (DWAM) of Electrodes for Batteries: *Amjad Almansour*¹; Roy Sullivan¹; Mrityunjay Singh²; Michael Halbig¹; Daniel Gorican³; ¹NASA Glenn Research Center; ²Ohio Aerospace Institute at NASA Glenn; ³HX5, LLC at NASA Glenn

8:40 AM

Ceramic-based Solid-state Sodium-ion Batteries Fabricated in a Single Step via Cold Sintering: *Zane Grady*¹; Julian Fanghanel¹; Clive Randall¹; ¹Penn State

9:00 AM

Molecular Pathways to Al₂S₃ for Next Generation Battery Application: Chijioke Amadi¹; *Veronika Brune*¹; Michael Wilhelm¹; Sanjay Mathur¹; ¹University of Cologne

9:20 AM

Self-propagating High Temperature Synthesis of Chevrel Phase Sulfides from Elemental Precursors: *Tessa Gilmore*¹; Pelagia-Irene Gouma¹; ¹The Ohio State University

9:40 AM Invited

Processing and Characterization of Li₇La₃Zr_{0.5}Nb_{0.5}Ta_{0.5}Hf_{0.5}O₁₂ High-entropy Li-garnet Electrolyte: *Zhezhen Fu*¹; ¹University of Wisconsin-Platteville

10:00 AM Break

10:20 AM

Cycling Demonstration of Sequential Deposition Synthesis-synthesized Lithium Garnet Films in Full Batteries: *Jesse Hinricher*¹; Chae-Ah Kim²; Heung Chan Lee³; Lincoln Miara²; Won Seok Chang³; Andrea Maurano²; Jeong-Ju Cho²; Zachary Hood¹; Jennifer Rupp¹; ¹Massachusetts Institute of Technology; ²Samsung Research America; ³Samsung Advanced Institute of Technology

10:40 AM

Electrospun Vanadium Pentoxide Nanofibers as a Photocathode in a Light Rechargeable LIB: *Michael Wilhelm*¹; Ruth Adam¹; Aman Bhardwaj¹; Veronika Brune¹; Sanjay Mathur¹; ¹University of Cologne

11:00 AM

Synthesis of Ce-Doped NaSICON Using Mechanical-Activation-Enhanced-Process: *Brian Johnston*¹; ¹North Central College

CERAMIC AND GLASS MATERIALS

Glasses and Optical Materials: Current Issues and Functional Applications — Silicate (rich) Glasses

Sponsored by: ACeRS Basic Science Division, ACeRS Glass & Optical Materials Division

Program Organizers: Doris Möncke, Alfred University; Mathieu Hubert, Corning Incorporated

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Session Chair: Dominique de Ligny, University Erlangen

8:00 AM Invited

Thin-Film Glassy Solid Electrolytes Enabling High Energy Density Na Solid State Batteries: *Steve Martin*¹; ¹Iowa State University

8:30 AM

Oxygen Triclusters and Five-Coordinated Alumina Species in Calcium-aluminosilicate Glasses: *Sierra Astle*¹; Rebecca Welch¹; John Mauro¹; ¹Penn State University

8:50 AM

Effect of Modifier Cation Type on Structure and Nickel Speciation in Alkali Borosilicate Glasses: *Lucas Greiner*¹; Brian Topper¹; Randall Youngman²; Doris Möncke¹; ¹Alfred University; ²Corning Inc.

9:10 AM

MD Simulations of SLS Batch Melting: *Alastair Cormack*¹; ¹Alfred University

9:30 AM

Continuation of the Investigation of Double Ion-exchange in Mixed Alkali-lime Silicate Glasses: *Jacob Kasprzyk*¹; William LaCourse¹; ¹Alfred University

9:50 AM

Effect of Ion-exchange Strengthening on the Mechanical Behavior of Sodium Aluminophosphosilicate Glass: *Kasimuthamaniyan S*¹; Allu Amarnath Reddy²; N. M. Anoop Krishnan¹; Nitya Nand Gosvami¹; ¹Indian Institute of Technology Delhi; ²CSIR-Central Glass and Ceramic Research Institute

10:10 AM Break

10:30 AM

3D Mapping of Glass Indentation Stress Fields: *Amanda Bellafatto*¹; Ivar Reimanis¹; ¹Colorado School of Mines

10:50 AM

Glass Structure-Terahertz Properties Relationship: Power-Law Model and Deviations in Sodium Borosilicate, Tellurite, and Chalcogenide Glass Families: *Nicholas Tostanoski*¹; S. K. Sundaram¹; ¹Alfred University

FUNDAMENTALS AND CHARACTERIZATION

Grain Boundaries, Interfaces, and Surfaces: Fundamental Structure-Property-Performance Relationships — Interfaces in Functional Materials

Sponsored by: ACeRS Basic Science Division

Program Organizers: Shen Dillon, University of California, Irvine; Wolfgang Rheinheimer, Julich Research Center; Catherine Bishop, University of Canterbury; Ming Tang, Rice University; John Blendell, Purdue University; Wayne Kaplan, Technion - Israel Institute Of Technology; Melissa Santala, Oregon State University

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Session Chairs: Shen Dillon, University of California, Irvine; Wayne Kaplan, Technion - Israel Institute of Technology

8:00 AM

Understanding of Interface-property Relationships of Vertically Aligned Mixed Ionic Electronic Conductor-ionic Conductor Heterostructures: *Gene Yang*¹; Mohammad El Loubani¹; Dongkyu Lee¹; ¹University of South Carolina

8:20 AM

Influence of Misfit Dislocations on Oxygen Vacancy Migration at SrTiO₃/BaZrO₃ Heterointerfaces: Will Ebmeyer¹; *Pratik Dholabhai*¹; ¹Rochester Institute of Technology

8:40 AM Invited

Electronic Structure Engineering through Atomic-scale Strain Control In Complex Oxide Heterostructures: *Peter A. van Aken*¹; ¹Max Planck Institute for Solid State Research

9:10 AM Invited

Grain Boundary Metal-insulator Transitions in Ionic Ceramics: *Edwin Garcia*¹; ¹Purdue University

9:30 AM

Impact of Grain Boundaries on the Dielectric Behavior of Graphite: *Deborah Chung*¹; Xiang Xi¹; ¹State University of New York Buffalo

9:50 AM Break

10:10 AM Invited

Grain Boundary Segregation and Impedance in Dielectric Ceramics: *Elizabeth Dickey*¹; Andrew Aumen¹; Seonghwan Hong¹; ¹Carnegie Mellon University

10:40 AM

Moisture Incorporation and Degradation in Dielectrics and Piezoelectrics: *John McGarrah*¹; Elizabeth Dickey²; ¹NC State University; ²Carnegie Mellon University

11:00 AM Invited

Advanced (S)TEM Characterization of the Role of Interfaces and Defects during Electrochemical Cycling of Oxide Based Solid Electrolytes and Electrode Materials: Kai Wang¹; Ziming Ding¹; Yushu Tang¹; Georgian Melinte¹; Xiaoke Mu¹; Di Wang¹; Ben Breitung¹; *Christian Kuebel¹*; ¹Karlsruher Institute for Technologie

11:30 AM

Multiphysics-Based Data Analytics of LiMn2O4 Particles Decrepitation: *Alfredo Sanjuan¹*; Edwin Garcia¹; ¹Purdue University

FUNDAMENTALS AND CHARACTERIZATION

High Entropy Materials: Concentrated Solid Solutions, Intermetallics, Ceramics, Functional Materials and Beyond III – Processing and Properties

Sponsored by: TMS: Nanomaterials Committee

Program Organizers: Yu Zhong, Worcester Polytechnic Institute; Michael Gao, National Energy Technology Laboratory; Xingbo Liu, West Virginia University; Peter Liaw, University of Tennessee; Jian Luo, University of California, San Diego; Yiquan Wu, Alfred University; Mitra Taheri, Johns Hopkins University; Amy Clarke, Colorado School of Mines

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Session Chairs: Martin Detrouis, National Energy Technology Laboratory; Amy Clarke, Colorado School of Mines

8:00 AM Keynote

Do We Need a Refractory Alloy with Super-high Strength at Room Temperature?: *Daniel Miracle¹*; S. Rao²; Oleg Senkov²; Carolina Frey³; ¹Air Force Research Laboratory; ²Air Force Research Laboratory; MRL Materials Resources LLC; ³University of California Santa Barbara

8:30 AM

Probing Short-Range Order and Its Effect on the Mechanical Properties of a CrCoNi Multi-principal Element Alloy Using Nanoindentation: *Mingwei Zhang¹*; Qin Yu¹; Dongye Liu²; Robert Ritchie²; Andrew Minor¹; ¹Lawrence Berkeley National Laboratory; ²University of California, Berkeley

8:50 AM

Production, Characterization, Mechanical Properties and Corrosion Resistance of CrCoNi-based Multi-principal Element Alloys: *Francisco Coury¹*; Diego Santana¹; Gustavo Bertoli¹; David Silva¹; Maria Eduarda Pablos¹; Caroline Stoco¹; Guilherme Koga¹; Nicholas Birbilis²; João Pedro Oliveira³; Michael Kaufman⁴; Amy Clarke⁴; ¹Universidade Federal de São Carlos; ²Australian National University; ³Universidade NOVA de Lisboa; ⁴Colorado School of Mines

9:10 AM

Revealing Phase Transformation and Deformation Behavior in a B2-base High-Entropy Alloy by In-situ Neutron Diffraction: *Rui Feng¹*; Peter Liaw²; Ke An¹; ¹Oak Ridge National Laboratory; ²The University of Tennessee, Knoxville

9:30 AM Invited

Manufacturing of HEAs at Different Scales: *Martin Detrouis¹*; Michael Gao¹; Paul Jablonski¹; ¹National Energy Technology Laboratory

9:50 AM Break

10:10 AM Invited

A Bayesian Approach to Efficiently Discover Refractory High Entropy Alloys: *Raymundo Arroyave¹*; ¹Texas A&M University

10:40 AM

Thermodynamics and Phase Transformations in Refractory Complex Concentrated Superalloys: *Eric Lass¹*; ¹University of Tennessee-Knoxville

11:00 AM

Deformation Behaviors and Mechanisms in Single BCC Phase Refractory High-entropy Alloys: *Chanho Lee¹*; George Kim²; Yi Chou³; Michael Gao⁴; Ke An⁵; Gian Song⁶; Yi-Chia Chou³; Wei Chen²; Nan Li¹; Saryu Fensin¹; Peter Liaw⁷; ¹Los Alamos National Laboratory; ²Illinois Institute of Technology; ³National Chiao Tung University; ⁴National Energy Technology Laboratory; ⁵Oak Ridge National Laboratory; ⁶Kongju National University; ⁷The University of Tennessee, Knoxville

11:20 AM

Design & Microstructural Evolution of Fe-rich, Co-Free Multi-principal Element Alloys: *James Frishkoff¹*; Nathan Brown¹; Madeline Rivera¹; Kester Clarke¹; Amy Clarke¹; ¹Colorado School of Mines

PROCESSING AND MANUFACTURING

Innovative Process Design and Processing for Advanced Structural Materials – Welding, Electrical Current-induced Phenomenon, and Additive Manufacturing

Program Organizers: Ju-Young Kim, UNIST; Jae-il Jang, Hanyang University; Sung-Tae Hong, University of Ulsan; Rongshan Qin, The Open University

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Session Chairs: Megumi Kawasaki, Oregon State University; Sung-Tae Hong, University of Ulsan

8:00 AM

A Novel Gas-pocket Assisted Underwater Friction Stir Spot Processing Technique for Underwater Welding: Soumyabrata Basak¹; Mounarik Mondal¹; Kun Gao¹; *Sung-Tae Hong¹*; Sam Anaman²; Hoon-Hwe Cho²; ¹University of Ulsan; ²Hanbat National University

8:20 AM Invited

A New Method for Measurement of Flow Stresses at High Strain Rates and Temperatures for Improved Simulation of Friction Stir Welding: Kennen Brooks¹; Bryan Ramos¹; *Matthew Goodson¹*; Ryan Melander¹; David Prymak¹; Michael Miles¹; Tracy Nelson¹; Troy Munro¹; Fredrick Michael²; ¹Brigham Young University; ²NASA Marshall Space Flight Center

8:40 AM Invited

Effects of Electric Current on the Plastic Deformation Behavior of Pure Copper, Iron, and Titanium: *Christopher Rudolf¹*; ¹US Naval Research Laboratory

9:00 AM Keynote

Electric Current-induced Phenomena in Materials: *Heung Nam Han*¹; ¹Seoul National University

9:40 AM Keynote

Co-design of 3D Printing, Parts and Microstructure: *Anthony Rollett*¹; Nicholas Lamprinakos¹; Junwon Seo¹; Srujana Yarasi¹; ¹Carnegie Mellon University

10:20 AM Break

10:40 AM Invited

Structural Evolution during Nanostructuring and Heating of an Additive-manufactured Stainless Steel Examined by X-ray and In-situ Neutron Diffraction Analyses: *Megumi Kawasaki*¹; Jae-Kyung Han¹; Xiaojing Liu²; Yusuke Onuki³; Yulia Kuzminova⁴; Stanislav Evlashin⁴; Klaus-Dieter Liss²; ¹Oregon State University; ²Guangdong Technion - Israel Institute of Technology; ³Ibaraki University; ⁴Skolkovo Institute of Science and Technology

11:00 AM

Novel Solid-State Metal Powder Fabrication Process for Feedstock of Metal Matrix Composites Additive Manufacturing: Taegyu Lee¹; SeungHyeok Chung¹; *Wonjong Jeong*¹; Ho Jin Ryu¹; ¹KAIST

MODELING

Integration between Modeling and Experiments for Crystalline Metals: From Atomistic to Macroscopic Scales IV — Session I

Sponsored by: TMS Advanced Characterization, Testing, and Simulation Committee, TMS Materials Characterization Committee, TMS: Nanomaterials Committee

Program Organizers: Mariyappan Arul Kumar, Los Alamos National Laboratory; Irene Beyerlein, University of California, Santa Barbara; Levente Balogh, Queen's University; Caizhi Zhou, University of South Carolina; Lei Cao, University of Nevada; Josh Kacher, Georgia Institute of Technology

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Session Chairs: Amit Misra, University of Michigan; Hamidreza Abdolvand, The University of Western Ontario

8:00 AM Invited

Integration of Experiments and Modeling in Polycrystalline Plasticity of Mg-Al Single Phase Alloys: *Moshen Andani*¹; A Lakshmanan¹; Y Yoo¹; V Sundararaghavan¹; J Allison¹; Amit Misra¹; ¹University of Michigan

8:30 AM

Modeling of the Tension-compression Asymmetry Reduction of ECAPed Mg-3Al-1Zn Through Grain Fragmentation: *Georges Ayoub*¹; Ali Kobaissy²; Mutasem Shehadeh²; ¹University of Michigan; ²American University of Beirut

8:50 AM

Concurrent Atomistic-continuum Simulation of the Interplay between Dislocations, Phase Transformation, Twinning, and Reverse Phase Transformation in Plastically Deformed Materials: *Liming Xiong*¹; ¹Iowa State University

9:10 AM

Mapping the Dislocation Density Around a SS316L Weld Using Synchrotron X-ray Diffraction to Validate Finite Element Method Plasticity Modeling: *Lucas Ravkov*¹; Ondrej Muransky²; Levente Balogh¹; ¹Queen's University; ²Australian Nuclear Science and Technology Organisation

9:30 AM Invited

New Insights into the Spatiotemporal Structure of Plastic Flow In hcp Materials by Combination of Advanced In Situ Techniques and Modeling: *Kristian Mathis*¹; ¹Nuclear Physics Institute of the CAS

10:00 AM Break

10:20 AM

Role of Dislocations and Deformation Twinning on the High-pressure Phase Transformation in Zirconium: *Mariyappan Arul Kumar*¹; T Yu²; Y Wang²; Rodney McCabe¹; Carlos Tome¹; Laurent Capolungo¹; ¹Los Alamos National Laboratory; ²The University of Chicago

10:40 AM

A Numerical Study on How Surfaces Bias Relative Slip Family Activity: Ruxin Zhang¹; Thomas Bieler¹; *Philip Eisenlohr*¹; ¹Michigan State University

11:00 AM Invited

Deformation Mechanisms of Hexagonal Close-packed Materials: Modeling and Experimentation: *Hamidreza Abdolvand*¹; ¹The University of Western Ontario

SPECIAL TOPICS

K-12 Educators Forum — Session I

Sponsored by: ACeRS

Program Organizers: Kathleen Richardson, University of Central Florida; Adelle Schade, Albright College

Monday AM | October 10, 2022

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Session Chair: Kathleen Richardson, University of Central Florida

9:00 AM Invited

The Art of Teaching Materials Characterization Techniques to K-12 Students: *Julie Donnelly*¹; Rashi Sharma¹; Casey Schwarz²; Matilynn Lam¹; ¹University of Central Florida; ²Ursinus College

9:35 AM Invited

Total Experience Learning in Practice: K to 12 Materials and Glass Science Inventive Education: Adelle Schade¹; *Karen DeNunzio*¹; Kayla Gordon¹; Chris Spohn¹; ¹Albright College

10:10 AM Break

10:30 AM Invited

Glass science and Materials engineering to Engage Students (GaMES): An Interdisciplinary Materials Science Camp Designed to Inspire 4th-10th Grade Students through Unique Topics in STEM: *Casey Schwarz*¹; Max Liggett¹; Kat Swan¹; Caroline Vauclair¹; Jason Bennett¹; Quentin Altemose¹; Julie Donnelly²; Rashi Sharma²; ¹Ursinus College; ²University of Central Florida

11:05 AM Invited

Uncovering the Genius That Resides In Every Child, Total Experience Learning: *Adelle Schade*¹; Karen DeNunzio¹; Ellen Albright¹; ¹Albright College

ARTIFICIAL INTELLIGENCE

Materials Processing and Fundamental Understanding Based on Machine Learning and Data Informatics — AI-guided Microstructure Study

Program Organizers: Kathy Lu, Virginia Polytechnic Institute and State University; Jian Luo, University of California, San Diego; Xian-Ming Bai, Virginia Polytechnic Institute and State University; Yi Je Cho, Sunchon National University

Monday AM | October 10, 2022

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Session Chair: Kathy Lu, Virginia Polytechnic Institute and State University

8:00 AM Invited

AI/ML-Driven Multi-Scale Modeling and Design of Structural Materials: *Pinar Acar*¹; Sheng Liu¹; Mahmudul Hasan¹; Arulmurugan Senthilnathan¹; Hengduo Zhao¹; ¹Virginia Tech

8:30 AM

AI Driven Microscopic Analysis to Predict the Local Structure in Zirconia Ceramics: *Prachi Garg*¹; Kristofer Reyes¹; Baishakhi Mazumder¹; ¹University at Buffalo

8:50 AM

Graph Neural Network Modeling of Deforming Polycrystals: *Darren Pagan*¹; ¹Pennsylvania State University

9:10 AM

High-throughput Machine Learning Experiments with Graph Neural Networks for Predicting Abnormal Grain Growth in Polycrystalline Materials: *Ryan Cohn*¹; Elizabeth Holm¹; ¹Carnegie Mellon University

9:30 AM

Microstructure Characterization and Reconstruction by Deep Learning Methodology: *Satoshi Noguchi*¹; Junya Inoue¹; ¹The University of Tokyo

9:50 AM

Large Scale Atomistic Simulation of the B1-B4 Phase Transition of GaN with the Machine Learning Potential: *Qiang Zhu*¹; Pedro Santos¹; Yansun Yao²; ¹University of Nevada, Las Vegas; ²University of Saskatchewan

FUNDAMENTALS AND CHARACTERIZATION

Metal Powder Synthesis and Processing — Session I

Sponsored by: TMS Powder Materials Committee

Program Organizers: James Paramore, US Army Research Laboratory; Iver Anderson, Iowa State University Ames Laboratory; Kyle Tsaknopoulos, Worcester Polytechnic Institute

Monday AM | October 10, 2022

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Session Chairs: Kyle Tsaknopoulos, Worcester Polytechnic Institute; James Paramore, United States Army Research Laboratory; Iver Anderson, Iowa State University Ames Laboratory

8:00 AM

Synthesis and Characterization of Gas Atomized Ultra-high Strength Steel Powder Feedstock for Additive Manufacturing: *Thinh Huynh*¹; Kevin Graydon¹; Brandon McWilliams²; Kyu Cho²; Yongho Sohn¹; ¹University of Central Florida; ²DEVCOM US Army Research Laboratory

8:20 AM

Large Scale Manufacture and Processing of Nano-Crystalline Metal Powders by Mechanical Alloying (MA): *Ryan Koseski*¹; Brian Gordon²; ¹Veloxint CIF; ²Touchstone Research Labs

8:40 AM

Mechanical Alloying and Thermal Stability of Amorphous Co-C Alloys: Alex Aning¹; Hesham Elmkharram¹; ¹Virginia Polytechnic Institute

9:00 AM

Engineering Amorphous Aluminum High Entropy Powder for Producing High Strength Cold Sprayed Deposits: *Denny John*¹; Kazue Orikasa¹; Tanaji Paul¹; Cheng Zhang¹; Arvind Agarwal¹; ¹Florida International University

9:20 AM

A Framework for Powder Evaluation with Reuse in Laser Powder Bed Fusion Additive Manufacturing: *Chinmay Phutela*¹; Federico Bosio¹; Nesma Aboulkhair¹; ¹Technology Innovation Institute

9:40 AM

Microstructural Comparison of Metal Hydrides Fabricated Using Direct Hydriding and Powder Metallurgy Techniques: *Caitlin Taylor*¹; Aditya Shivprasad¹; Thomas Nizolek¹; Rodney McCabe¹; Tyler Smith¹; Michael Torrez¹; Erik Luther¹; Tarik Saleh¹; ¹Los Alamos National Laboratory

10:00 AM Break

10:20 AM

Production Research of High-cut Steels by Methods of Hot Isostatic Pressing of Powder Materials: *Anton Matiukhin*¹; Vitalii Shyrokovokov¹; Sergey Sheyko²; Anna Ben¹; Elena Kulabneva¹; Tetiana Matiukhina¹; ¹"Zaporizhzhia Polytechnic" National University; ²Zaporizhzhia National University

10:40 AM

Resistance Sintering Solid-state Bonding Model: *Olga Eliseeva*¹; Jerry Gould¹; ¹EWI

MODELING

Multi Scale Modeling of Microstructure Deformation in Material Processing — Multi Scale Modeling of Microstructure Deformation in Material Processing

Sponsored by: AIST Metallurgy — Processing, Products & Applications Technology Committee

Program Organizers: Lukasz Madej, AGH University of Science and Technology; Jaimie Tiley, Oak Ridge National Laboratory; Krzysztof Muszka, AGH University of Science and Technology; Danuta Szeliga, AGH University of Science and Technology

Monday AM | October 10, 2022
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Session Chair: Krzysztof Muszka, AGH University

8:00 AM

PRISMS-fatigue: A General Framework for Fatigue Analysis in Polycrystalline Metals and Alloys Using the Crystal Plasticity Finite Element Method: *Mohammadreza Yaghoobi¹; Krzysztof S. Stopka²; Aaditya Lakshmanan¹; Veera Sundararaghavan¹; John E. Allison¹; David L. McDowell³; ¹University of Michigan; ²Purdue University; ³Georgia Institute of Technology*

8:20 AM

Microstructure Based Computational Analysis of Heterogeneous Materials: *Riddhi Joshi¹; Tanaji Paul¹; Cheng Zhang¹; Benjamin Boesl¹; Arvind Agarwal¹; ¹Florida International University*

8:40 AM

Development of the Random Cellular Automata Model of Unconstrained Grain Growth: *Mateusz Sitko¹; Michal Czarnecki¹; Lukasz Madej¹; ¹AGH University of Science and Technology*

9:00 AM

Hardness-dependent Plasticity and Damage Initiation Within Simulated Tension-shear Testing of AHSS Resistance Spot Welds: *Eric Brizes¹; Nathan Daubenmier¹; Antonio Ramirez¹; ¹OSU Welding Engineering*

9:20 AM

New Insights into the Cube Texture Development during Recrystallization of High to Medium SFE FCC Metals: *Supriyo Chakraborty¹; Chaitali Patil¹; Stephen Niezgoda¹; Yunzhi Wang¹; ¹The Ohio State University*

9:40 AM

Multi Scale Modeling of Elastic Properties of FeMnNiCoMo System: *Kamil Cichocki¹; Tomasz Kargul¹; Piotr Bala¹; Krzysztof Muszka¹; ¹AGH University of Science and Technology*

10:00 AM

Stochastic Model Describing Phase Transformations in Steels Accounting for a Random Character of Nucleation: *Danuta Szeliga¹; Roman Kuziak²; Lukasz Poloczek²; Jan Kusiak¹; Maciej Pietrzyk¹; ¹AGH University of Science and Technology; ²Lukasiewicz Research Network, Institute for Ferrous Metallurgy*

BIOMATERIALS

Next Generation Biomaterials — Next Generation Biomaterials I

Sponsored by: ACerS Bioceramics Division

Program Organizers: Roger Narayan, University of North Carolina; Sanjiv Lalwani, Lynntech, Inc.

Monday AM | October 10, 2022
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Session Chairs: Roger Narayan, North Carolina State University; Min Wang, University of Hong Kong; Federico Rosei, Énergie Matériaux Télécommunications Research Centre

8:00 AM Invited

3D Printing of Diamond for Biomedical Applications: *Kate Fox¹; ¹MIT University*

8:30 AM Keynote

Bubbles, Particles, Capsules and Smart Fibers; Their Sustained Manufacturing: *Mohan Edirisinghe¹; ¹University College London*

9:00 AM Invited

Materials Development for 3D/4D Printing in Tissue Engineering: *Min Wang¹; ¹University of Hong Kong*

9:30 AM Invited

Novel Chevrel Phase Nanomaterials: *Pelagia Gouma¹; ¹The Ohio State University*

9:50 AM Break

10:10 AM Invited

Structure / Property Relationships in Biomaterials at the Nanoscale: *Federico Rosei¹; ¹INRS Centre for Energy, Materials and Telecommunications*

10:30 AM Invited

Tunable Nano-cerium Oxide for Radiation Mitigation: *Sudipta Seal¹; Melanie Coathup¹; Craig Neal¹; Fei Wei¹; ¹University of Central Florida*

10:50 AM

Digital Light Processing-based Additive Manufacturing of Medical Devices: *R Sachan¹; Roger Narayan¹; ¹NC State University*

LIGHTWEIGHT ALLOYS

Processing-Microstructure-Property Relationships of Titanium and Titanium Alloys – Session I

Sponsored by: TMS: Titanium Committee

Program Organizers: Yufeng Zheng, University of Nevada-Reno; Rongpei Shi, Lawrence Livermore National Laboratory; Benjamin Morrow, Los Alamos National Laboratory; Sriram Vijayan, The Ohio State University; Keyou Mao, Oak Ridge National Laboratory

Monday AM | October 10, 2022
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Session Chairs: Yufeng Zheng, University of Nevada Reno; Sriram Vijayan, The Ohio State University

8:00 AM Invited

Design of New Metastable Ti Alloys and Determinations of Their Deformation Mechanisms Active during Tensile Deformation: Brian Welk¹; Nevin Taylor¹; Zachary Kloenne¹; G. Babu Viswanathan¹; Hamish Fraser¹; ¹The Ohio State University

8:30 AM Invited

Tailoring Martensitic Transformation in Metastable Beta-Ti Alloys: Yunzhi Wang¹; ¹Ohio State University

9:00 AM Invited

Approaches to Improving Yield-strength without Compromising Strain-hardenability in β -Titanium Alloys: Srinivas Aditya Mantri¹; Mohan Sai Kiran Nartu¹; Abhishek Sharma²; Sriswaroop Dasari¹; Riyadh Salloom¹; Ravisankar Haridas¹; Fan Sun²; Frederic Prima²; Hamish Fraser³; Srinivasan Srivilliputhur¹; *Rajarshi Banerjee*¹; ¹University of North Texas; ²Chimie ParisTech; ³The Ohio State University

9:30 AM Invited

Microstructure-based Equivalent Initial Flaw Size (m-EIFS) Distributions for Airframe Structural Components: Adam Pilchak¹; Manisha Banker¹; Michelle Harr¹; Joshua Shaffer¹; Thomas Carmody¹; Nathan Crosby²; Juan Ocampo³; Harry Millwater⁴; Ayman Salem¹; ¹Materials Resources LLC; ²Aeromatter; ³Aeromatter and St. Mary's University; ⁴University of Texas San Antonio

10:00 AM Invited

Using Synchrotron X-ray Characterization to Understand Slip Processes in Titanium Alloys: Darren Pagan¹; ¹Pennsylvania State University

10:30 AM Break

10:45 AM

Hierarchical Twinning Microstructure in the Metastable β Titanium Alloys: Dian Li¹; Yufeng Zheng¹; ¹University of Nevada, Reno

11:05 AM

Nanoindentation Studies and Bulk Mechanical Properties of Additively Manufactured Titanium Alloys: Yu Zou¹; ¹University of Toronto

PROCESSING AND MANUFACTURING

Processing and Performance of Materials Using Microwaves, Electric and Magnetic Fields, Ultrasound, Lasers, and Mechanical Work – Rustum Roy Symposium – Session I

Sponsored by: ACerS Basic Science Division, ACerS Manufacturing Division

Program Organizers: Morsi Mahmoud, King Fahd University of Petroleum & Minerals; Dinesh Agrawal, Pennsylvania State University; Guido Link, Karlsruhe Institute of Technology; Motoyasu Sato, Chubu University; Rishi Raj, University of Colorado; Christina Wildfire, National Energy Technology Laboratory; Zhiwei Peng, Central South University

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Session Chair: Rishi Raj, University of Colorado

8:00 AM

Consolidating Tungsten in 2s at a Furnace Temperature of 900 oC using Flash Sintering Approach: Emmanuel Bamidele¹; Rishi Raj²; Syed Jalali²; ¹University of Colorado, Boulder; ²University of Colorado Boulder

8:20 AM

Spatially Tuned Properties of Soft Magnetic Alloys by Transverse Induction Annealing: Tyler Paplham¹; Ahmed Talaat¹; David Greve²; Paul Ohodnicki¹; ¹University of Pittsburgh; ²DWGreve Consulting, Carnegie Mellon University

8:40 AM Invited

In-situ Diffraction of Ultrasonically-modified Phase Evolution in a Ternary Al-Si-Mg Alloy: Katherine Rader¹; Jonova Thomas²; Chihpin Chuang²; Dileep Singh²; Adrian Sabau³; Aashish Rohatgi¹; ¹Pacific Northwest National Laboratory; ²Argonne National Laboratory; ³Oak Ridge National Laboratory

9:00 AM Invited

Post-processing of Additively Manufactured 316 Stainless Steel by Electron Wind Force: Daudi Waryoba¹; James Kidd¹; Zahabul Islam¹; Aman Haque¹; ¹Pennsylvania State University

9:20 AM Invited

Carbon-Carbon Composite Materials from 3D Printed Preforms Graphitized by Electric Field Assisted Sintering: Arin Preston¹; Jorgen Rufner¹; Joshua Kane¹; Troy Holland¹; Robert Fox¹; Blesson Isaac¹; Lu Cai¹; Kunal Mondal¹; ¹Idaho National Lab

9:40 AM Invited

The Coupled Effect of Temperature and Electric Field on Diffusion Welding of Alloy 617 via Electric Field Assisted Sintering: Xinchang Zhang¹; Jorgen Rufner¹; Michael McMurtrey¹; Ryann Rupp¹; ¹Idaho National Laboratory

10:00 AM Break

10:20 AM

Microwave Sintering of Bioinspired Porous Alumina Foams: Andre Cardoso¹; Claudia Perdomo¹; Julia Xaraba¹; Ruth Kiminami¹; Rodolfo Gunnewiek¹; ¹UFSCar

10:40 AM

Graphene Infused High Conductivity Copper: *Syed Jalali¹; Rishi Raj¹*
¹University of Colorado Boulder

11:00 AM

Using Organic Acids to Densify Ceramics: *Julian Fanghanel¹; Clive Randall¹*
¹Penn State

11:20 AM

Touch Free Flash Sintering of Ceramics: *Syed Jalali¹; Rishi Raj¹*
¹University of Colorado, Boulder

11:40 AM

Mechanochemistry: From Scientific Mystery to Scalable Materials Preparation and Recycling Technique: *Viktor Balema¹*
¹ProChem Inc.

SPECIAL TOPICS

Resisting Degradation from the Environment: A Symposium Honoring Carolyn M. Hansson's Research and Pioneering Experiences as a Woman in STEM — Talks to Introduce Posters I

Sponsored by: TMS: Corrosion and Environmental Effects Committee, TMS: Steels Committee

Program Organizers: Jenifer Locke, Ohio State University; Brendy Rincon Troconis, University of Texas at San Antonio; Ashley Paz y Puente, University of Cincinnati; George Gray, Los Alamos National Laboratory; Suveen Mathaudhu, Colorado School of Mines; David Shifler, Office of Naval Research

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Funding support provided by: Office of Naval Research

Session Chair: Jenifer Locke, Ohio State University

8:00 AM

Environmental Effect on Reinforced Concrete Structures; DURACON Project, 20 Years of Contributions: *Oladis Troconis de Rincon¹; Juan Montenegro²; Rosa Vera³; Ruby Mejia de Gutierrez⁴; Erika Saborio⁵; Andres Torres-Acosta⁶; Pedro Castro-Borges⁷; Manuela Salta⁸; Isabel Martinez⁹; Miguel Pedron¹⁰; Valentina Millano¹¹; Miguel Sanchez¹¹*
¹UTSA; ²Universidad de San Andres; ³PUCV; ⁴Universidad del Valle; ⁵ICE; ⁶Tecnologico de Monterrey; ⁷CINVESTAV, Unidad Merida; ⁸LNEC; ⁹ETCC; ¹⁰Universidad de la Republica; ¹¹CEC-LUZ

8:20 AM

Galvanic Corrosion of Active and Passive Steel Bars with Different Area Ratios: *Amir Poursaei¹; Zheng Dong²*
¹Clemson University; ²Zhejiang University of Technology

8:40 AM

Corrosion and Environmentally Assisted Cracking (EAC) Evaluation of Additively Manufactured (AM) High Strength Precipitation Hardened Steel (UNS S17400): *Michelle Koul¹; Conner Panick²*
¹United States Naval Academy; ²U.S. Navy

9:00 AM

Evaluating the Sensitivities of SCC Susceptibility in Stainless-steel Nuclear Waste Storage Containers: *Sarah Blust¹; James Burns¹*
¹University of Virginia

9:20 AM

Corrosion of Fe-Cr-Mn Stainless Steel in Supercritical Water: *Joseph Kish¹; Shooka Mahboubi¹; Yinan Jiao¹*
¹McMaster University

9:40 AM

Oxidation Behavior of Model FeCrAl Steel and APMT Alloy After Exposure in Steam: *Kinga Unocic¹; Kenneth Kane¹; Yukinori Yamamoto¹; Bruce Pint¹*
¹Oak Ridge National Laboratory

10:00 AM Break

10:20 AM

Corrosion and Biocompatibility of 316L Stainless Steels Fabricated by Selective Laser Melting: *Erica Murray¹*
¹Louisiana Tech University

10:40 AM

Investigation of Crack Initiation in Hydrogen Embrittled Ni-base Alloy 725: *Mengying Liu¹; Lai Jiang²; Michael Demkowicz³*
¹Washington and Lee University; ²Texas A&M University; ³Texas A&M University

11:00 AM

Characterization of Internal Oxidation in Alloy 690 and Model Ni Alloys: *Masoud Zakeri¹; Ibrahim Ogunsanya¹; Ali Ashrafria¹; Roger Newman¹*
¹University of Toronto

11:20 AM Fireside Chat with Prof Carolyn Hansson

BIOMATERIALS

Society for Biomaterials: Biological Response to Materials and Material's Response to Biological Environments — Session I

Program Organizers: Thomas Dziubla, University of Kentucky; Christopher Siedlecki, Penn State College of Medicine; Jeffrey Capadona, Case Western Reserve University; Lynne Jones, Johns Hopkins Orthopaedics

Monday AM | October 10, 2022

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Session Chair: Lynne Jones, Johns Hopkins University

8:00 AM Introductory Comments

8:05 AM Invited

Biomaterial-induced Activation of the Blood Coagulation Cascade: *Christopher Siedlecki¹; Lichong Xu¹*
¹Penn State College of Medicine

8:35 AM

Effects of Phospholipid Saturation and Cholesterol Concentration on Liposome Interaction with Fungal and Mammalian Cells: *Ronnie LaMastro¹; Kayla Campbell¹; Peter Gonzalez¹; Anita Shukla¹*
¹Brown University

8:55 AM

Targeting Cancer-associated Fibroblasts within a Tumor Microenvironment via Liposomes with Arginine-based Surface Modifiers: *Tanzeel Ur Rehman¹; Kaitlin Brattlie¹*
¹Iowa State University

9:15 AM

Antibacterial Activity of Titanium-based Material Systems: *Golnaz Karbalaeei Saleh¹; Parvane Shahmohammadi²; Milad Rasouli³*
¹Karaj Islamic Azad University; ²Razi University; ³Tehran University of Medical Sciences

9:35 AM

Biological Response to Medical Implants: The Good, The Bad, and The Ugly: *Lynne Jones¹; ¹Johns Hopkins Orthopaedics*

9:55 AM Break

10:15 AM Invited

Bone Formation via Acoustic Radiation Force: Transdermal Stimulation of Hydrogel-encapsulated Stem Cells: *Yusuf Khan¹; Kevin Grassie²; Hanna Anderson²; William Linthicum²; Bryan Huey²; Fayekah Assanah²; ¹University of Connecticut Health Center; ²University of Connecticut*

10:45 AM Invited

Wear Particle-induced Differentially Polarized Macrophages Exhibit Variation in Protein Profile than M1 and M2: *Divya Bijukumar²; Vaishnavi Beena Valsan¹; Ryan Bomgarden²; Guoxing Zheng¹; Mark Barba³; Deborah Hall⁴; Mathew Thoppil Mathew¹; Robin Pourzal⁴; ¹University of Illinois; ²ThermoFisher Scientific; ³OrthoInnovis; ⁴Rush University Medical Centre*

BIOMATERIALS

Society for Biomaterials: Biomaterial Applications – Cardiovascular Biomaterials

Program Organizers: Jessica Jennings, University of Memphis; Guillermo Ameer, Northwestern University; Danielle Benoit, University of Rochester; Jordon Gilmore, Clemson University

Monday AM | October 10, 2022

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Session Chair: Guillermo Ameer, Northwestern University

8:00 AM Invited

Development of a Microfluidic Blood-Vessel-on-Chip Model: *Shaurya Prakash¹; ¹The Ohio State University*

8:30 AM

Development of Tissue-Specific, Perfusable Vasculature in Microphysiological Systems: *Kevin Ling¹; Arvind Srivatsava¹; Kannan Mannan¹; James McGrath¹; Ruchira Singh¹; Danielle Benoit¹; ¹University of Rochester*

8:50 AM

Platinum Wire-based Aptasensors Exploiting Self-assembled Monolayer (SAM) Components for Cardiac Biomarker Detection: *Prashant Kumta¹; Mitali Patil¹; Sangeetha Kunjukunju¹; John Ohodnicki¹; ¹University of Pittsburgh*

9:10 AM

Additive Manufacturing and Characterization of Stimuli-Responsive Biomaterials for Cardiovascular Stents: *Hamid Ikram¹; Ans Al Rashid¹; Muammer Koc¹; ¹Hamad Bin Khalifa University*

9:30 AM Invited

Combinatorial Approaches to Blood Contacting Materials: *Christopher Siedlecki¹; Lichong Xu¹; ¹Penn State College of Medicine*

10:00 AM Break

10:20 AM

Exploring Single Electrospun PLGA Fiber Mechanics and Fiber Mat Applications in Cardiac Bioengineering: *Lihua Lou¹; Tanaji Paul¹; Alberto Rubfaro¹; Jin He¹; Arvind Agarwal¹; ¹Florida International University*

10:40 AM

Three-dimensional (3D) Iron Oxide Nanoparticles via Green Synthesis: A Review on Their Synthesis and Antibacterial Application: *Ikhazuagbe Ifijen¹; Stanley O. Omorogbe¹; Godfrey Otabor²; ¹Rubber Research Institute of Nigeria; ²University of Benin*

11:00 AM Rapid Fire Posters

BIOMATERIALS

Society for Biomaterials: Biomaterial Applications in Today's Industry: Development, Translation & Commercialization – Society for Biomaterials: Applications in Today's Healthcare Industry

Program Organizers: Bob Hastings, Depuy Synthes, J&J; SuPing Lyu, Medtronic

Monday AM | October 10, 2022

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Session Chair: SuPing Lyu, Medtronic

8:00 AM Invited

Polymer Material Applications in Medical Devices: *SuPing Lyu¹; ¹Medtronic*

8:30 AM Invited

Thermoplastic Polyurethanes in Medical Applications: *Nathan Rohner¹; Anthony Walder¹; Michael Wiggins¹; ¹Lubrizol*

9:00 AM Invited

Predicting Patient Exposure to Medical Device Leachables: *David Saylor¹; ¹U.S. Food and Drug Administration*

9:30 AM Invited

Metallic Materials Application in Medical Devices: *Bernie Li¹; ¹Medtronic*

10:00 AM

Murata's NeuroStone™ Free-Form Inter-Connected Ceramic Technology for Medical Applications: *Mark Waugh¹; Seth Berbano¹; Mike Cannon¹; Faycal Mounaim¹; Takumi Okashiro²; Shu Hamada²; ¹Murata Electronics North America, Inc.; ²Murata Manufacturing Co., Ltd.*

10:20 AM Break

10:40 AM

Silicon Nitride-infused Fabrics Exhibit Antiviral Behavior: *Brittany Heath¹; Chelsey McMinn²; Sherry Van Mondfrans²; Jackson Hendry²; Sean Ronayne²; Douglas Hoxworth²; B. Sonny Bal²; Bryan McEntire²; Kylene Kehn-Hall¹; Ryan Bock²; ¹Virginia Polytechnic Institute and State University; ²SINTX Technologies*

11:00 AM

Evaluation of Antibacterial Silicon Nitride Powder and Infiltrated Fabrics: *Chelsey McMinn¹; Sherry Van Mondfrans¹; Jackson Hendry¹; Sean Ronayne¹; Douglas Hoxworth¹; Bryan McEntire¹; B. Bal¹; Ryan Bock¹; ¹SINTX Technologies*

11:20 AM Invited

Optimized Nanopatterned Electrodes for Enhanced Electrochemical Biosensors: *Emily Kinser¹; ¹3M Company*

11:50 AM

Long-Term Biocompatibility of a Novel Radiopaque Non-compressible Microsphere for Transarterial Embolization: *Kathleen O'Connell¹; Daniel Boyd²; Robert Abraham²; Sharon Kehoe¹; ¹ABK Biomedical Inc.; ²Dalhousie University*

CERAMIC AND GLASS MATERIALS

Solid-state Optical Materials and Luminescence Properties — Processing and Study of Advanced Optical Materials I

Sponsored by: ACerS Basic Science Division

Program Organizers: Yiquan Wu, Alfred University; Jas Sanghera, Naval Research Laboratory; Akio Ikesue, World-Lab. Co., Ltd; Rong-Jun Xie, Xiamen University; Mathieu Allix, Laboratoire CEMHTI; Kiyoshi Shimamura, National Institute for Materials Science; Liangbi Su, Shanghai Institute of Ceramics; Dariusz Hreniak, Institute of Low Temperature and Structure Research

Monday AM | October 10, 2022

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Session Chair: Yiquan Wu, Alfred University

8:00 AM Invited

Ceramic Faraday Rotator for Laser Machining: *Akio Ikesue¹; ¹World-Lab. Co., Ltd*

8:20 AM Invited

Beta-SiC for High Strength Windows: *Joshua Gild¹; Kim Woohong²; Shyam Bayya²; Guillermo Villalobos²; Adam Floyd³; Bryan Sadowski³; Tony Zhou¹; Jasbinder Sanghera²; ¹University Research Foundation; ²US Naval Research Lab; ³Jacobs*

8:40 AM Invited

Ceramic Processes for LHPG (Laser Heated Pedestal Growth): *Hyunjun Kim¹; Randall Hay²; Kent Averett²; Andrew Schlup¹; John Drazin¹; Benjamin Gray³; Randall Corns¹; Robert Turner¹; Cynthia Bowers¹; ¹AFRL/UES; ²AFRL; ³AFRL/Azimuth*

9:00 AM Invited

Development of Novel Garnet-based Transparent Ceramics for the High Power White Lighting: *Jianqiang Li¹; Shaowei Feng¹; Mathieu Allix²; Yongchang Guo¹; Haiming Qin³; ¹University of Science and Technology Beijing; Chinese Academy of Sciences; ²CNRS, CEMHTI UPR 3079, Univ. Orléans; ³Chinese Academy of Sciences*

9:20 AM Invited

Investigation of Micro/Nano Mechanical Behavior of ALON Transparent Ceramics: *Chenyun Zhang¹; Ying Shi¹; Yurui Xing²; Hongti Zhang²; ¹Shanghai University; ²shanghaitech University*

9:40 AM Invited

Crystallization from Glass: Application to Transparent (Glass-) Ceramics: *Mathieu Allix¹; ¹Laboratoire CEMHTI*

10:00 AM Break

10:20 AM Invited

Electroluminescence During Flash Experiments Interpreted as a Solid State Plasma: *Syed Jalali¹; Rishi Raj¹; ¹University of Colorado*

10:40 AM Invited

Non-equilibrium Synthesis of New Oxide Materials with Modified Optical Properties: *Michael Pitcher¹; ¹CNRS UPR3079*

11:00 AM

Structural and Optical Properties of the Spin-coated YAG and Nd:YAG Epitaxial Films: *Iva Milisavljevic¹; Yiquan Wu¹; ¹Alfred University*

FUNDAMENTALS AND CHARACTERIZATION

Synthesis, Characterization, Modeling and Applications of Functional Porous Materials — Porous Materials I

Sponsored by: ACerS Basic Science Division

Program Organizers: Lan Li, Boise State University; Winnie Wong-Ng, National Institute of Standards and Technology; Kevin Huang, University of South Carolina

Monday AM | October 10, 2022

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Session Chair: Lan Li, Boise State University

8:00 AM Introductory Comments

8:05 AM Invited

Neutron and X-ray Scattering to Characterize Adsorbents and Their Hosts: *Hayden Evans¹; Ryan Klein²; Benjamin Trump¹; Craig Brown¹; ¹NIST; ²NREL*

8:35 AM Invited

Energetic Insights into Encapsulation of Molybdenum Oxide and Carbide Particles in Zeolite Y: *Xianghui Zhang¹; Margaret Reece¹; Andrew Strzelecki¹; Cody Cockreham¹; Vitaliy Goncharov¹; Houqian Li¹; Kyungmin Yim²; Jinsoo Kim²; Junming Sun¹; Hui Sun³; Baodong Wang⁴; Xiaofeng Guo¹; Hongwu Xu⁵; Su Ha¹; Yong Wang¹; Di Wu¹; ¹Washington State University; ²Kyung Hee University; ³East China University of Science and Technology; ⁴National Institute of Clean-and-Low Carbon Energy; ⁵Arizona State University*

9:05 AM Invited

Metal Organic Framework Compound, [Ni(4,4'-bipyridine)Ni(CN)4] n, Based on Pillared Cyanonickelate (PICNIC) Architecture: *Winnie Wong-Ng¹; Jeffrey Culp²; Yu-Sheng Chen³; Daniel Siderius¹; Lan Li⁴; ¹National Institute of Standards and Technology; ²NETL; ³University of Chicago; ⁴Boise State University*

9:35 AM Invited

Porous Materials Design Using Machine Learning: *Lan Li¹; ¹Boise State University*

10:05 AM Break

10:25 AM Invited

Investigating Flexible Framework Materials by Combining Powder Diffraction and First-principles Calculations: *Wei Zhou¹; ¹National Institute of Standards and Technology*

10:55 AM Invited

Structure and CO₂ Adsorption Sites in the Flexible Coordination Polymer NiDBM-Bpy from Density Functional Theory Calculations: *Eric Cockayne¹; Winnie Wong-Ng¹; Andrew Allen¹; ¹National Institute of Standards and Technology*

11:25 AM

MOF Derived Green Catalysts: Suzuki-Miyaura C-C Coupling of Aryl Chlorides and Bechamp Reduction of Nitroarenes to Amines Employing Pd@MOF and Porous Co@Carbonized MOFs as Heterogeneous and Recyclable Catalysts: *Krishna Manna*¹; Natarajan S¹; ¹Indian Institute of Science

11:45 AM

Linking Structure and Catalytic Properties of Heterogeneous and Automotive Catalysts Through High Resolution X-ray Nanotomography and Cryogenic Focused Ion Beam Microscopy in Three Dimensions: *Andy Holwell*¹; Maadhav Kothari¹; Markus Boese¹; Aakash Varambha²; Dogan Ozkaya²; ¹Carl Zeiss Microscopy LLC; ²Johnson Matthey Plc

NUCLEAR ENERGY

Tackling Structural Materials Challenges for Advanced Nuclear Reactors — Advanced Structural Materials

Sponsored by: TMS Corrosion and Environmental Effects Committee, TMS Nuclear Materials Committee, TMS: Advanced Characterization, Testing, and Simulation Committee

Program Organizers: Miaomiao Jin, Pennsylvania State University; Xing Wang, Pennsylvania State University; Karim Ahmed, Texas A&M University; Jeremy Bischoff, Framatome; Adrien Couet, University of Wisconsin-Madison; Kevin Field, University of Michigan; Lingfeng He, North Carolina State University; Raul Rebak, GE Global Research

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Session Chair: Miaomiao Jin, Pennsylvania State University

8:00 AM

Mechanistic Calculation of the Effective Silver Diffusion Coefficient in Polycrystalline Silicon Carbide: Application to Silver Release in AGR-1 TRISO Particles: *Pierre-Clement Simon*¹; Larry Agesen¹; Chao Jiang¹; Wen Jiang¹; Jia-Hong Ke¹; ¹Idaho National Laboratory

8:20 AM

High Temperature Zirconium Alloys by Titanium Analogy: *Johan Pauli Magnussen*¹; Helen Swan²; Alexander J. Knowles¹; ¹University of Birmingham; ²National Nuclear Laboratory

8:40 AM Invited

Convolutional Neural Networks Screening Radiation-resistant High Entropy Alloys: *Penghui Cao*¹; ¹University of California, Irvine

9:10 AM

Defect Dynamics and Far-from-Equilibrium Microstructure Evolution in Concentrated Alloys: *Yanwen Zhang*¹; Matheus Tunes²; Stephen Donnelly³; Philip Rack⁴; William Weber⁴; ¹Oak Ridge National Laboratory; ²Los Alamos National Laboratory; ³University of Huddersfield; ⁴University of Tennessee

9:30 AM Invited

Atomistic Calculations and Theoretical Formulations of Thermal Vacancies in Complex Concentrated Alloys: *Yongfeng Zhang*¹; Anus Manzoor¹; Sean Masengale¹; Dilpuneet Aidhy²; ¹University of Wisconsin; ²University of Wyoming

10:00 AM Break

10:20 AM Invited

Novel Refractory High Entropy Alloys for Applications in Extreme Environments: *Osman El-Atwani*¹; Saryu Fensin¹; Duc Nguyen²; Jan Wrobel³; Enrique Martinez⁴; ¹Los Alamos National Laboratory; ²United Kingdom Atomic Energy Authority; ³Warsaw University of Technology; ⁴Clemson University

10:50 AM Invited

Microstructural Response of HT-UPS Steel to Thermal Annealing and Neutron Irradiation: *Maria Okuniewski*¹; ¹Purdue University

11:20 AM

BCC CrAl Thin Film, A Solution for Next-generation High-performance Inert Gas Cooled Nuclear Microreactors: *Sumit Bhattacharya*¹; Yinbin Miao¹; Nicolas Stauff¹; Claudio Filippone¹; Abdellatif Yacout¹; ¹Argonne National Laboratory

11:40 AM

In Situ Dual Ion Irradiation of Additively Manufactured Reduced Activation Ferritic-martensitic Steels: *Robert Renfrow*¹; T.M. Kelsy Green¹; Priyam Patki²; Wei-Ying Chen³; Christopher Field⁴; Kevin Field¹; ¹University of Michigan; ²Intel Corporation; ³Argonne National Laboratory; ⁴Theia Scientific, LLC

MATERIALS-ENVIRONMENT INTERACTIONS

Thermodynamics of Materials in Extreme Environments — Thermodynamics of Molten Salts

Sponsored by: ACerS Basic Science Division, ACerS Energy Materials and Systems Division

Program Organizers: Xiaofeng Guo, Washington State University; Kristina Lilova, Arizona State University; Kyle Brinkman, Clemson University; Alexandra Navrotsky, Arizona State University; Jake Amoroso, Savannah River National Laboratory; Xingbo Liu, West Virginia University; Gustavo Costa, NASA Glenn Research Center

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Session Chair: Xiaofeng Guo, Washington State University

8:00 AM Introductory Comments

8:10 AM Invited

Thermodynamic Database Development with a Focus on Corrosion in Potential Nuclear Reactor Molten Salt Systems: *Theodore Besmann*¹; Juliano Schorne-Pinto¹; Jacob Yingling¹; Johnathan Ard¹; Mina Aziziha¹; Amir Mofrad¹; ¹University of South Carolina

8:40 AM Invited

Predictive Modeling of Complex Liquids with Uncertainty Quantification by Open-Source Tools: Illustrated with Thermodynamic Properties of Molten Salts: *Shun-Li Shang*¹; Rushi Gong¹; Jorge Paz Soldan Palma¹; Brandon Bocklund²; Nathan Smith¹; Yi Wang¹; Hojong Kim¹; Zi-Kui Liu¹; ¹Pennsylvania State University; ²Lawrence Livermore National Laboratory

9:10 AM

Addressing the Thermodynamic Behavior of Volatile Fission Products in Fluoride Salt-Fueled Molten Salt Reactors: Behavior of Cesium and Iodine: *Clara Dixon*¹; Mina Aziziha¹; Juliano Schorne-Pinto¹; Jacob Yingling¹; Amir Mofrad¹; Theodore Besmann¹; ¹University of South Carolina

9:30 AM

Melting Point, Enthalpy of Fusion, and Excess Heat Capacity of a FLiNaK Determined by the CALPHAD Method: *Juliano Schorne Pinto*¹; Johnathon Ard¹; Mina Aziziha¹; Kyle Foster¹; Jacob Yingling¹; Amir Mofrad¹; Matthew Christian¹; Theodore Besmann¹; ¹University of South Carolina

9:50 AM Break

10:00 AM

Thermodynamic Modelling and Experimental Investigation of LiCl-NaCl-UCl₃ and KCl-NaCl-UCl₃ Systems: *Liangyan Hao*¹; Soumya Sridar¹; Thomas Kirtley²; Elizabeth Sooby²; Wei Xiong¹; ¹University of Pittsburgh; ²University of Texas at San Antonio

10:20 AM

Enthalpy of Mixing of LaCl₃ – LiCl:KCl Pseudo Binary Molten Salt System: *Vitaliy Goncharov*¹; Jeffrey Eakin¹; Jiahong Li¹; Qiang Zhang¹; Cornelius Ivory¹; James Boncella¹; Jason Lonergan²; Hongwu Xu³; Xiaofeng Guo¹; ¹Washington State University; ²Pacific Northwest National Laboratory; ³Los Alamos National Laboratory

10:40 AM

Calorimetric Determination of Melting Point Temperatures, Heat Capacities, and Heats of Fusion of Binary NaCl–UCl₃ and MgCl₂ – UCl₃ Systems: *Vitaliy Goncharov*¹; Xiaofeng Guo¹; Jason Lonergan²; Kyle Makovsky²; Bruce McNamara²; ¹Washington State University; ²Pacific Northwest National Laboratory

11:00 AM

Density, Volatility, and Viscosity of Molten Sodium and Potassium Chloride Salts: *Michaela Swinhardt*¹; Jordan Barr²; Ralf Sudowe³; Scott Beckman²; Kyle Makovsky⁴; Bruce McNamara⁴; Charmayne Lonergan⁴; Jason Lonergan⁴; ¹Colorado State University/Pacific Northwest National Lab; ²Washington State University; ³Colorado State University; ⁴Pacific Northwest National Lab

ARTIFICIAL INTELLIGENCE

Uncertainty Quantification in Data-Driven Materials and Process Design — Data-driven Process-Structure-Property Surrogate Modeling

Sponsored by: TMS: Integrated Computational Materials Engineering Committee

Program Organizers: Yan Wang, Georgia Institute of Technology; Raymundo Arroyave, Texas A&M University; Anh Tran, Sandia National Laboratories; Dehao Liu, Binghamton University

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Session Chairs: Anh Tran, Sandia National Laboratories; Dehao Liu, Binghamton University; Ramin Bostanabad, University of California, Irvine; Sam Reeve, Oak Ridge National Laboratory

8:00 AM

Enabling the Fourth Paradigm of Multiscale ICME Models through Versatile Gaussian Process and Bayesian Optimization: *Anh Tran*¹; ¹Sandia National Laboratories

8:20 AM

Learning from Multi-source Scarce Data via Latent Map Gaussian Processes: Mehdi Shishehbor¹; Tammer Eweis-labolle¹; *Ramin Bostanabad*¹; ¹University of California, Irvine

8:40 AM

Bayesian Estimation and Active Learning of Data-driven Interatomic Potentials for Propagation of Uncertainty through Molecular Dynamics: *Dallas Foster*¹; ¹Massachusetts Institute of Technology

9:00 AM

Quantifying Uncertainty in Atomistic Exploration: *Thomas Swinburne*¹; ¹CNRS

9:20 AM

Solving Stochastic Inverse Problems for Property–structure Linkages Using Data-consistent Inversion and Machine Learning: *Tim Wildey*¹; Anh Tran¹; ¹Sandia National Labs

9:40 AM

Anisotropic Creep Modeling and Uncertainty Quantification of an Electron Beam Melted AM Ni-Based Superalloy: *Patxi Fernandez-Zelaia*¹; Yousub Lee¹; Sebastien Dryepondt¹; Michael Kirka¹; ¹Oak Ridge National Laboratory

10:00 AM Break

10:20 AM

Neural Network Surrogate Predictions with Uncertainties for Materials Science: *Sam Reeve*¹; Paul Laiu¹; Pei Zhang¹; Ying Yang¹; Dongwon Shin¹; Jong Youl Choi¹; Massimiliano Lupo Pasini¹; Dan Lu¹; ¹Oak Ridge National Laboratory

10:40 AM

Data-driven Modeling and Control for Temperature-controlled Shear Assisted Processing and Extrusion (SHAPE) using Koopman Operators: *Woongjo Cho*¹; Ethan King¹; Colby Wight¹; Zhao Chen¹; Erin Barker¹; Eric Smith¹; Jenna Pope¹; Keerti Kappagantula¹; ¹Pacific Northwest National Laboratory

11:00 AM

Active Learning for Density Functional Theory Simulations with DeepHyper: Amit Samanta¹; Prasanna Balaprakash²; Sylvie Aubry¹; Brian Lin³; ¹Lawrence Livermore National Laboratory; ²Argonne National Laboratory; ³ArceMittal Global R&D

11:20 AM

Data-driven Structure-property Mapping in Small Data Regime: Towards Increasing Generalizability: Baskar Ganapathysubramanian¹; Hao Liu²; Nirmal Baishnab¹; Balaji Pokuri¹; Olga Wodo²; ¹Iowa State University; ²University at Buffalo

SUSTAINABILITY, ENERGY, AND THE ENVIRONMENT

14th Symposium on Green and Sustainable Technologies for Materials Manufacturing and Processing — Application of Sustainable Materials for Functional Applications II

Sponsored by: ACerS Engineering Ceramics Division

Program Organizers: Surojit Gupta, University of North Dakota; Mritunjay Singh, Ohio Aerospace Institute; Tatsuki Ohji, National Institute of Advanced Industrial Science and Technology; Hisayuki Suematsu, Nagaoka University of Technology; Enrico Bernardo, University of Padova; Rajiv Asthana, University of Wisconsin; Yiquan Wu, Alfred University; Zhengyi Fu, Wuhan University of Technology; Allen Applebitt, Oklahoma State University

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Session Chairs: Monica Ferraris, Politecnico di Torino - Italy; Lan Li, Boise State University; Surojit Gupta, University of North Dakota

2:00 PM Invited

Glasses as Energy Materials for a Sustainable Development: Monica Ferraris¹; Milena Salvo¹; Francesco Baino¹; Federico Smeacetto¹; ¹Politecnico di Torino - Italy

2:30 PM

How to Start and Maintain a Low-cost Ceramic Water Filter Factory: Ian Nettleship¹; ¹University of Pittsburgh

2:50 PM Invited

On the Design of Radio Frequency Sensors Using Recyclable Materials: Sima Noghmanian¹; Ala Alemayeen²; Surojit Gupta³; ¹CommScope Ruckus Wireless; ²Tafila Technical University; ³University of North Dakota

3:20 PM Break

3:40 PM

Potential of Matter Organic Non-glycerol (MONG) from Soy Biodiesel Plants In 3D Printing: Sreesha Malayil¹; Athira Surendran¹; Jagannadh Satyavolu¹; Kunal Kate¹; ¹University of Louisville

4:00 PM Invited

Machine Learning-driven Studies of Carbon Capture and Storage: Lan Li¹; Surojit Gupta²; ¹Boise State University; ²University of North Dakota

4:30 PM

In-situ Observation of Evolution of Internal Structure of Alumina Slurry During Drying by Optical Coherence Tomography: Hiromasa Kuroda¹; Junichi Tatami¹; Motoyuki Iijima¹; Takuma Takahashi²; ¹Yokohama National University; ²Kanagawa Institute of Industrial Science and Technology

4:50 PM Invited

Mesoporous TiO₂ as an Alternative Anode for Fast Chargeable Lithium-ion Battery: Palani Balaya¹; ¹National University of Singapore

BIOMATERIALS

3D Printing of Biomaterials and Devices — Session II

Sponsored by: ACerS Bioceramic Division

Program Organizers: Sahar Vahabzadeh, Northern Illinois University; Susmita Bose, Washington State University; Amit Bandyopadhyay, Washington State University; Mukesh Kumar, LincoTek Medical; Mangal Roy, Indian Institute of Technology - Kharagpur (IIT-Kgp)

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Session Chairs: Candan Tamerler, University of Kansas; Syam Nukavarapu, University of Connecticut

2:00 PM Invited

3D Printing of Nanomaterials-based Biomedical Electronics: Yong Lin Kong¹; ¹University of Utah

2:30 PM Invited

3D Printing of Zonal-structured Scaffolds for Complex Tissue Engineering: Syam Nukavarapu¹; Aleksandra Golebiowska¹; ¹University of Connecticut

3:00 PM

Periodic Cellular Ceramic Structures by Replication of Additive Manufactured Templates: Swantje Simon¹; Maximilian Meyse¹; Tobias Fey¹; ¹Friedrich-Alexander-Universität Erlangen-Nürnberg Institute of Glass and Ceramics

3:20 PM Break

3:40 PM Invited

Laser-Based 3D Printing for Medical Applications: Roger Narayan¹; ¹University of North Carolina

4:10 PM Invited

Ultrasound-assisted Bioprinting using Composite Bioinks for Soft Tissue Engineering: Rohan Shirwaiker¹; Parth Chansoria²; ¹North Carolina State University; ²ETH Zurich

SPECIAL TOPICS

ACerS Richard M. Fulrath Award Session — Session I

Sponsored by: ACerS

Monday PM | October 10, 2022
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Session Chair: Jon-Paul Maria, The Pennsylvania State University

2:30 PM Invited

Elucidation of Dielectric Polarization Mechanism Using THz Spectroscopy: *Takuya Hoshina*¹; ¹Tokyo Institute of Technology

3:10 PM Invited

Material Development for High Performance and Miniaturization of Multilayer Ceramic Capacitors by Using Sn: *Shoichiro Suzuki*¹; ¹Murata Manufacturing Co., Ltd.

3:30 PM Invited

Additive Manufacturing of Ceramics Using Pre-ceramic Polymers: *Tobias Schaedler*¹; *Phuong Bui*¹; *Kayleigh Porter*¹; *Ekaterina Stonkevitch*¹; *Erin Wernick*¹; *Alex Yu*¹; *Mark O'Masta*¹; ¹HRL Laboratories, LLC

3:50 PM Break

4:10 PM Invited

Development of Ultra-thin Piezoelectric Type Loudspeaker for Mobile Phones: *Masatake Takahashi*¹; ¹NEC Corporation

4:30 PM Invited

Advancing Solid State Reaction Science Through In Situ X-ray Diffraction and Processing Control: *Jacob Jones*¹; *J. Corrado Harper*¹; *Leah Bellcase*¹; *Rachel Broughton*¹; *Jennifer Forrester*¹; ¹North Carolina State University

ADDITIVE MANUFACTURING

Additive Manufacturing and Cellular/Lattice Structures: Designs, Realization and Applications — Cellular/Lattice Structures II

Sponsored by: TMS Additive Manufacturing Committee, TMS Materials Characterization Committee

Program Organizers: Li Yang, University of Louisville; Allison Beese, Pennsylvania State University; John Carpenter, Los Alamos National Laboratory; Carolyn Seepersad, University of Texas at Austin; Miguel Aguilo, Morphorm LLC

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Session Chair: John Carpenter, Los Alamos National Laboratory

2:00 PM

Prediction of Mechanical Properties of Ceramic Honeycombs by Polarimetry Measurements of Epoxy Resin Prototypes: *David Köllner*¹; *Bastien Tolve-Granier*²; *Swantje Simon*¹; *Ken-ichi Kakimoto*³; *Tobias Fey*¹; ¹Friedrich-Alexander-Universität Erlangen-Nürnberg; ²Science and Technologies Faculty of Limoges; ³Nagoya Institute of Technology

2:20 PM

Specific Energy Absorption of 3D Printed Octet-Truss Lattice Structures with Hollow Struts: *Matthew Bolan*¹; *Alexander Bardelcik*¹; ¹University of Guelph

2:40 PM Invited

Performance of Titanium Alloy Lattice Structures in Quasi-static and High Strain Rate Environments: *John Carpenter*¹; *B. Brown*²; *N.S. Johnson*³; *Donald Brown*¹; *David Jones*¹; *Borys Drach*⁴; *Jonathan Pegues*⁵; *Manyalibo Matthews*⁶; ¹Los Alamos National Laboratory; ²Kansas City National Security Campus; ³SLAC National Accelerator Laboratory; ⁴New Mexico State University; ⁵Sandia National Laboratories; ⁶Lawrence Livermore National Laboratory

3:00 PM

Evaluation of Structural Robustness in Additively Manufactured Lattice Structures: *Mrinal Lorengo*¹; *Ji Ma*¹; ¹University of Virginia

3:20 PM Break

3:40 PM

Progressive Nature of Failure of 3D Lattices under Compressive, Shear and Hydrostatic Loads

: *Sahar Choukir*¹; *Chandra Veer Singh*¹; ¹University of Toronto

4:00 PM

The Effects of Powder Feedstock and Process Parameter on the Material Characteristics of Ti6Al4V Thin Wall Features Fabricated by Laser Powder Bed Fusion Additive Manufacturing: *Naresh Koju*¹; *Jonah Hermes*¹; *Sumit Paul*¹; *Li Yang*¹; ¹University of Louisville

ADDITIVE MANUFACTURING

Additive Manufacturing Modeling, Simulation, and Machine Learning: Microstructure, Mechanics, and Process — Microstructures & Defects I

Program Organizers: Jing Zhang, Indiana University – Purdue University Indianapolis; Brandon McWilliams, US Army Research Laboratory; Li Ma, Johns Hopkins University; Yeongil Jung, Changwon National University

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Session Chairs: Li Ma, Johns Hopkins University Applied Physics Laboratory; Jing Zhang, Indiana University – Purdue University Indianapolis; Brandon McWilliams, CCDC Army Research Laboratory; Yeon-Gil Jung, Changwon National University

2:00 PM

Quantitative Analysis of Computed Tomography Characterization of Porosity in AM Ti64 Using Serial Sectioning Ground Truth: *Bryce Jolley*¹; *Michael Uchic*¹; *Daniel Sparkman*¹; *Christine Henry*¹; *Michael Chapman*²; *Edwin Schwalbach*¹; ¹Air Force Research Laboratory; ²UES, Inc.

2:20 PM

Uncertainty Quantification in Process-Structure-Properties Simulations of Additive Manufactured Ti-6Al-4V: *Joshua Pribe*¹; *Brodan Richter*²; *Patrick Leser*²; *Saikumar Yeratapally*¹; *George Weber*²; *Andrew Kitahara*¹; *Edward Glaesgen*²; ¹National Institute of Aerospace; ²NASA Langley Research Center

2:40 PM

Analyzing Uncertainty in Modeled Additive Process-Microstructure-Property Relationships Using the ExaAM Framework: *Matthew Rolchigo¹; John Coleman¹; Robert Carson²; Gerry Knapp¹; Alex Plotkowski¹; Scott Wells³; Samuel Reeve¹; Lyle Levine⁴; Jim Belak²; John Turner¹; ¹Oak Ridge National Laboratory; ²Lawrence Livermore National Laboratory; ³Purdue University; ⁴National Institute of Standards and Technology*

3:00 PM

Thermal Modeling of Laser Powder Bed Fusion Additive Manufacturing of Refractory Materials: *Li Ma¹; Gianna Valentino¹; Mitra Taheri²; Morgana Trexler¹; ¹Johns Hopkins University Applied Physics Laboratory; ²Johns Hopkins University*

3:20 PM Break

3:40 PM

Parent Grain Reconstruction Using Orientation Imaging Microscopy and Deep Learning: *Patxi Fernandez-Zelaia¹; Andres Marquez Rossey¹; Quinn Campbell¹; Andrzej Nycz¹; Chris Ledford¹; Michael Kirka¹; ¹Oak Ridge National Laboratory*

4:00 PM

CFD Simulations of Spatter Removal in a Laser Powder Bed Fusion Machine: *Nicholas O'Brien¹; Syed Zia Uddin¹; Satbir Singh¹; Jonathon Malen¹; Jack Beuth¹; ¹Carnegie Mellon University*

4:20 PM

A Parametric Molecular Dynamics Study of Additive Nanomanufacturing: Effects of Size, Misorientation, and Temperature on Sintering Characteristics: *Dourna Jamshideasl¹; Shuai Shao¹; Masoud Mahjouri-Samani¹; Nima Shamsaei¹; ¹Auburn University*

4:40 PM

Additive Manufacturing Beyond the Gaussian Beam: Insights from Mesoscale Modeling Studies: *Daniel Moore¹; Theron Rodgers²; Heather Murdoch³; Fadi Abdeljawad¹; ¹Clemson University; ²Sandia National Laboratories; ³Army Research Laboratory*

5:00 PM

Increasing the Service Life of the Trimming Punch Using Nimonic Cutting Edge: *Miroslav Urbanek¹; ¹COMTES FHT a.s.*

ADDITIVE MANUFACTURING

Additive Manufacturing of Ceramic-based Materials: Process Development, Materials, Process Optimization and Applications — Additive Manufacturing of Ceramics-based Materials II

Sponsored by: ACerS Basic Science Division, ACerS Engineering Ceramics Division, ACerS Manufacturing Division

Program Organizers: Lei Chen, University of Michigan-Dearborn; Xuan Song, University of Iowa; Xiangyang Dong, Missouri University of Science and Technology; Yiquan Wu, Alfred University; Paolo Colombo, University of Padova; Rajendra Bordia, Clemson University; Long-Qing Chen, Pennsylvania State University

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Session Chairs: Doug Sassaman, University of Texas Austin; Jung-Ting Tsai, Argonne National Laboratory

2:00 PM Invited

Additive Manufacturing of Mullite Ceramic by Digital Light Processing: *Jung-Ting Tsai¹; Dileep Singh¹; ¹Argonne National Laboratory*

2:30 PM

Fabrication of Powder Components with Cooling Channels by Spark Plasma Sintering and Additive Manufacturing: *Elisa Torresani¹; Maricruz Carrillo¹; Chris Haines²; Darold Martin³; Eugene Olevsky¹; ¹San Diego State University; ²US Army DEVCOM - Army Research Laboratory; ³US Army DEVCOM - Armaments Center, Picatinny Arsenal*

2:50 PM

Mass Customization, Moving Forwards with Additive Manufacturing: *Cindy Schick¹; Richard Gaignon¹; Rouslan Svintsitski¹; ¹3DCERAM-SINTO*

3:10 PM

Multi-material Printing of Reaction Bonded Carbides by Robocasting: *Larissa Wahl¹; Michelle Weichert¹; Nahum Travitzky¹; ¹Friedrich-Alexander Universität Erlangen-Nürnberg*

3:30 PM Break

3:50 PM Invited

Bonding Mechanisms in Indirect Selective Laser Sintering: *Doug Sassaman¹; Matthew Ide²; Joseph Beaman¹; Desiderio Kovar¹; ¹University of Texas Austin; ²ExxonMobil Research and Engineering Company*

4:20 PM

Exploration of the Underlying Space in Microscopic Images via Deep Learning for Additively Manufactured Piezoceramics: *Wenhua Yang¹; Zhuo Wang²; Tiannan Yang³; Li He⁴; Xuan Song⁵; Yucheng Liu⁶; Lei Chen¹; ¹University of Michigan-Dearborn; ²University of Michigan; ³Pennsylvania State University; ⁴The University of Iowa; ⁵University of Iowa; ⁶South Dakota State University*

ADDITIVE MANUFACTURING

Additive Manufacturing of Metals: Microstructure, Properties and Alloy Development — Al-based Alloys

Program Organizers: Prashanth Konda Gokuldoss, Tallinn University of Technology; Jurgen Eckert, Erich Schmid Institute of Materials Science; Zhi Wang, South China University of Technology

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Session Chairs: Adriana Eres-Castellanos, Colorado School of Mines; Tim Gabb, NASA Glenn Research Center

2:00 PM

Regional Mechanical Performance and the Effects of Surface Defects in AM Al-10Si-Mg: *Thomas Ivanoff¹*; Nathan Heckman¹; Andrew Polonsky¹; Kyle Johnson¹; ¹Sandia National Laboratories

2:20 PM

Crystallographic Relationships between the Prior-beta Structure and Precipitate Phases in Additively Manufactured Nickel Aluminum Bronze: *Dillon Watring¹*; Colin Stewart²; Richard Fonda²; David Rowenhorst²; ¹National Research Council Research Associateship at Naval Research Laboratory; ²Naval Research Laboratory

2:40 PM

Laser-Stirred Powder Bed Fusion of High Strength Aluminum Alloys: *Alber Sadek¹*; ¹Edison Welding Institute

3:00 PM

Multi-scale Microstructural Characterization of Additively Manufactured 7050 Aluminum Alloy Subjected to Post-processing Treatments: *Rupesh Rajendran¹*; Crosby Owens²; Jeffrey Eisenhaure²; David Spain²; Preet Singh¹; ¹Georgia Institute of Technology; ²Northrop Grumman Corporation

3:20 PM Break

3:40 PM

Microstructure Development and Creep Resistance of Selective Laser Melted Al-Fe-Mn-Si-Zr Alloy: *Jovid Rakhmonov¹*; Nhon Vo²; Joseph Croteau²; Joshua Dorn²; David Dunand¹; ¹Northwestern University; ²NanoAL LLC

4:00 PM

Al Nanoparticle inside Si Grain of Al-Si Alloy by Powder Bed Fusion Using an Electron Beam: *Kenta Ishigami¹*; Kenta Aoyagi²; Huakang Bian²; Akihiko Chiba²; Yoshiki Hashizume³; Akie Tanaka³; ¹Toyo Aluminium K.K. and Tohoku University; ²Institute for Materials Research, Tohoku University; ³Toyo Aluminium K.K.

4:20 PM

The Effects of Post-Weld Processing on Friction Stir Welded Additive Manufactured AlSi10Mg: *Michael Eff¹*; Harvey Hack²; ¹EWI; ²Northrop Grumman

4:40 PM

Evaluation of a Quasicrystal-Reinforced Al Alloy as a Candidate for Additive Manufacturing: *Baris Yavas¹*; Cain J. Hung¹; Mingxuan X. Li¹; S. Pamir Alpay¹; Mark Aindow¹; ¹University of Connecticut

5:00 PM

Microstructure and Mechanical Properties of Laser Powder Bed Fusion Aluminum Matrix Composite Reinforced with Al₂O₃ Nanofibers: *Babak Alinejad¹*; Amir Mostafaei¹; ¹Illinois Institute of Technology

5:20 PM

Aluminum Matrix Composites Reinforced with Multi-walled Carbon Nanotubes and C60 Manufactured by Laser Powder Bed Fusion: *Sangmin Yoo¹*; Se-Eun Shin¹; ¹Sunchon National University

ADDITIVE MANUFACTURING

Additive Manufacturing of Metals: Microstructure, Properties and Alloy Development — Functional Materials and W-based Systems

Program Organizers: Prashanth Konda Gokuldoss, Tallinn University of Technology; Jurgen Eckert, Erich Schmid Institute of Materials Science; Zhi Wang, South China University of Technology

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Session Chair: James Zuback, National Institute of Standards and Technology

2:00 PM

Different Additive Manufacturing Routes for Magnetic Shape Memory Alloys: *Markus Chmielus¹*; Pierangeli Rodriguez de Vecchis¹; Erica Stevens¹; Aaron Acierno¹; Jakub Toman¹; ¹University of Pittsburgh

2:20 PM

Towards the Laser-based 4D Printing of Ni-Mn-Ga Magnetic Shape Memory Alloy Actuators: *Ville Laitinen¹*; Kari Ullakko¹; ¹LUT University

2:40 PM

Binder Jet Additive Manufacturing Process Parameters Effect on Magnetic Performance of Fe-50Ni Alloy: *Emrecan Soylemez¹*; Emre Sari²; Emre Durna³; Baris Kirim¹; ¹Istanbul Technical University; ²Core Electronics; ³Aselsan Inc.

3:00 PM

Embedding Information in Additively Manufactured Metals via Magnetic Property Grading for Traceability and Counterfeiting Prevention: *Deniz Ebeperi¹*; Daniel Salas Mula¹; Ibrahim Karaman¹; Raymundo Arroyave¹; Richard Malak¹; ¹Texas A&M University

3:20 PM Break

3:40 PM

Crack Mitigation Strategies In Laser Powder Bed Fusion of Pure Tungsten: *Philip Depond¹*; Maria Stranza¹; Shiqi Zheng²; Alberico Talignani²; Morris Wang²; Jianchao Ye¹; ¹Lawrence Livermore National Lab; ²UCLA

4:00 PM

LPBF of Tungsten Heavy Alloys: *Matthew Feurer¹*; Elias Jelis¹; ¹US Army DEVCOM AC

4:20 PM

Processing of High Quality Tungsten Through Electron Beam Melting: *Michael Kirka¹*; Chris Ledford¹; Patxi Fernandez-Zelaia¹; ¹Oak Ridge National Laboratory

ADDITIVE MANUFACTURING

Additive Manufacturing of Polymeric-based Materials: Challenges and Potentials — Modeling/Simulation and Innovation of Additive Manufacturing of Polymeric-based Materials

Program Organizers: Ola Rashwan, Pennsylvania State University-Harrisburg; Matt Caputo, Pennsylvania State University; Daudi Waryoba, Pennsylvania State University; Pedro Cortes, Youngstown State University

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Session Chairs: Matthew Caputo, Penn State Shenango; Ola Rashwan, Penn State Harrisburg

2:00 PM

Numerical Simulation of a Failed Large Area Additive Manufacturing Build to Determine Thermal, Stress, and Distortion History: *Brian Friedrich*¹; Kyosung Choo¹; ¹Youngstown State University

2:30 PM

Molecular Engineering and Additive Manufacturing of Polyisobutylene-Based Functional Elastomers: *Weinan Xu*¹; ¹University of Akron

2:50 PM

Understanding Print Stability in Material Extrusion Additive Manufacturing of Thermoset Composites: *Brett Compton*¹; Stian Romberg²; ¹University of Tennessee; ²National Institute of Standards and Technology

3:10 PM

Non-planar 3D Printing of Epoxy Using Freeform Reversible Embedding: *Neeha Dev Arun*¹; Humphrey Yang¹; Lining Yao¹; Adam Feinberg¹; ¹Carnegie Mellon University

3:30 PM Break

3:50 PM

Mixed Matrix Thermoset Casting with Thermoplastic Fused Filament Fabrication 3D Printing: *Saleh Khanjar*¹; Kunal Kate¹; Rajiv Malhotra²; ¹University of Louisville; ²Rutgers University

4:10 PM

An Object-oriented Implementation of Discrete Event Simulation of Temperature Evolution in Fused Deposition Modeling Process: *Bowen Deng*¹; Peter Lucon¹; Ronald White¹; ¹Montana Technological University

4:40 PM

Estimation of 3D Statistics For Synthetic Generation of AM Carbon Fiber Composite Structures: Andrew Abbott¹; Michael Chapman¹; Kenneth Clarke²; Mark Flores¹; Michael Groeber²; Michael Uchic¹; John Wert²; ¹Air Force Research Lab; ²Ohio State University

5:00 PM

Highly Cross-linking Hydrogels Obtained by Gamma-rays with pH Sensitivity for Biomedical Purposes: *Moisés Bustamante*¹; Emilio Bucio¹; ¹Universidad Nacional Autónoma de México

5:20 PM Question and Answer Period

ADDITIVE MANUFACTURING

Additive Manufacturing: Equipment, Instrumentation and In-Situ Process Monitoring — Standards in Additive Manufacturing Materials

Sponsored by: TMS Additive Manufacturing Committee

Program Organizers: Ulf Ackelid, Freemelt AB; Joy Gockel, Colorado School of Mines; Sneha Prabha Narra, Carnegie Mellon University; Ola Harrysson, North Carolina State University

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Session Chairs: Mark Stoudt, National Institute of Standards and Technology; Paul Mason, Thermo-Calc Software Inc.

2:00 PM Invited

Additive Manufacturing Standardization Landscape and Recent Initiatives Advancing Standards Development: *Richard Huff*¹; Mahdi Jamshidinia¹; Mohsen Seifi¹; ¹ASTM International

2:20 PM Invited

Scientific Foundations and Approaches for Qualification of Additively Manufactured Structural Components: *Charlotte Kramer*¹; Tyler LeBrun¹; Jonathan Pegues¹; ¹Sandia National Laboratories

2:40 PM Invited

Providing a Rigorous Benchmark Measurement Foundation for Modeling-Informed Qualification and Certification of Metal AM Components: *Lyle Levine*¹; Brandon Lane¹; ¹National Institute of Standards and Technology

3:00 PM Invited

Role of Interstitial Alloying Elements on Microstructural Evolution in Additively Manufactured Materials: *Todd Palmer*¹; ¹Pennsylvania State University

3:20 PM Invited

New Standardization Efforts to Collect, Correlate, and Identify Metrics of Reuse Powder with Functional Performance Data of Material Resultant of Additive Manufacturing Workflows: *Tyler LeBrun*¹; ¹Sandia National Laboratories

3:40 PM Break

4:00 PM Invited

AM Materials Data – Challenges and Opportunities: *Richard Huff*¹; ¹ASTM International

4:20 PM Invited

Additive Materials Data: Truths and Myths: *Amber Andreaco*¹; Mark Shaw¹; ¹GE Additive

4:40 PM Invited

An Intelligent Data Infrastructure for Additive Manufacturing: *Shengyen Li*¹; ¹Southwest Research Institute

5:00 PM Invited

Research and Standards Development Needs for AM Industrialization: *Brandon Ribic*¹; ¹America Makes

NUCLEAR ENERGY

Advanced Characterization of Materials for Nuclear, Radiation, and Extreme Environments III — Beamline/Scattering

Sponsored by: TMS Nanomechanical Materials Behavior Committee, TMS Nuclear Materials Committee

Program Organizers: Cody Dennett, Commonwealth Fusion Systems; Samuel Briggs, Oregon State University; Christopher Barr, Naval Nuclear Laboratory; Michael Short, Massachusetts Institute of Technology; Janelle Wharry, Purdue University; Cheng Sun, Idaho National Laboratory; Caitlin Taylor, Los Alamos National Laboratory; Khalid Hattar, Sandia National Laboratories; Yuanyuan Zhu, University of Connecticut

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Session Chairs: Caitlin Taylor, Los Alamos National Laboratory; Khalid Hattar, Sandia National Laboratories

2:00 PM Invited

Advanced Synchrotron Characterization of Fission and Fusion Energy Materials: *David Sprouster*¹; T Koyanagi²; B Cheng¹; D Bhardwaj¹; J Gentile¹; J Trelewicz¹; L Snead¹; ¹Stony Brook University; ²Oak Ridge National Laboratory

2:30 PM Invited

Neutron Imaging at LANSCE: Characterizing Materials for the Next Generation of Nuclear Reactor Designs: *Alexander Long*¹; Sven Vogel¹; Marisa Monreal¹; J. Jackson¹; S. Parker¹; Holly Trellue¹; Erik Luther¹; Aditya Shivprasad¹; Thilo Balke¹; James Torres¹; ¹Los Alamos National Laboratory

3:00 PM

Probing Short-Range Order in Disordered Crystalline Materials for Extreme Environments: *Eric O'Quinn*¹; Devon Drey¹; William Cureton²; Gianguido Baldinozzi³; Maik Lang¹; ¹University of Tennessee; ²Oak Ridge National Laboratory; ³Universit  Paris-Saclay

3:20 PM Invited

Three-dimensional Characterization of Multiple Phase Regions within a Neutron Irradiated U-Zr Fuel: *Maria Okuniewski*¹; Nicole Rodr guez P rez¹; Alejandro Figueroa Bengoa¹; Kezia Peck¹; Jonova Thomas²; ¹Purdue University; ²Argonne National Laboratory

3:50 PM Break

4:10 PM

Hydrogen Dynamics in Yttrium Hydride Moderator Material: *James Torres*¹; Alexander Long¹; Dale Carver¹; Sven Vogel¹; Aditya Shivprasad¹; Tyler Smith¹; Caitlin Taylor¹; Erik Luther¹; Holly Trellue¹; ¹Los Alamos National Laboratory

4:30 PM Invited

Elucidating Helium Induced Softening in Nanograin Tungsten Through Electron Microscopy Informed Synchrotron X-Ray Scattering: W. Cunningham¹; Cormac Killeen¹; Yang Zhang¹; David Sprouster¹; Osman ElAtwani²; *Jason Trelewicz*¹; ¹Stony Brook University; ²Los Alamos National Laboratory

MATERIALS-ENVIRONMENT INTERACTIONS

Advanced Coatings for Wear and Corrosion Protection — Session II

Program Organizers: Evelina Vogli, Lm Group Holdings Inc.; Virendra Singh, Schlumberger

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Session Chairs: Evelina Vogli, LM Group Holdings Inc.; Virendra Singh, Schlumberger

2:00 PM

Friction and Anti-galling Properties of Diamond-like Carbon Coating on Oil Field Parts: *Virendra Singh*¹; Alireza Zolfaghari¹; Manuel Marya¹; ¹Schlumberger

2:20 PM

PVD Coated Ceramics and Cubic-boron Nitride (cBN) for Metalcutting-Benefits and Challenges: *Abhijit Roy*¹; Debangshu Banerjee¹; Brittany Macshane¹; Joern Kohlscheen¹; Christian Bareiss¹; ¹Kenametal Inc.

2:40 PM

Development of Novel Wear and Impact Resistant Titanium-Boron Nitride Coatings for Lunar Structural Components: *Abhijith Sukumaran*¹; Cheng Zhang¹; Arvind Agarwal¹; ¹Florida International University

3:00 PM

Features of Increase Wearproofness Became Influence of Polymethylmethacrylat at a Contact: *Volodymyr Tsyganov*¹; Vadim Shalomeev¹; Sergei Sheyko²; ¹Zaporizhzhia Polytechnic National University; ²Zaporizhzhia National University

3:20 PM Break

3:40 PM

Improved Coating Performance of REACH Compliant Trivalent Chromium Plating Process for Functional Applications: *Andrew Moran*¹; Rajeswaran Radhakrishnan¹; Tim Hall¹; EJ Taylor¹; George Bokisa²; Mark Feathers³; Stanko Brankovic⁴; Kamyar Ahmadi⁴; ¹Faraday Technology Inc.; ²Coventry International; ³U.S. Army Aviation and Missile Command; ⁴University of Houston

4:00 PM

Novel Surface Treatment for Electrolytic Deposition of Chromium onto Zirconium: *Benjamin Aronson*¹; Patrick Fourspring²; Justin Reiss¹; Lucas Erich¹; Michael Ammendola¹; Ryan Romesberg¹; Jason Clobes²; Brendan Ensor²; Leslie Stubna²; Douglas Wolfe¹; ¹Pennsylvania State University; ²Naval Nuclear Laboratory

4:20 PM

High-performance Coatings with Exposure to High Temperatures Obtained under SHS Conditions: *Borys Sereda*¹; Dmytro Sereda¹; Dmytro Kiforuk¹; Anton Prolomov¹; Igor Beolzor¹; Darya Mukovska¹; ¹Dneprovsky State Technical University

MATERIALS-ENVIRONMENT INTERACTIONS

Advanced Materials for Harsh Environments — Session II

Sponsored by: ACerS Electronics Division

Program Organizers: Navin Manjooran, Chairman, Solve; Gary Pickrell, Virginia Tech

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Session Chairs: Gary Pickrell, Virginia Tech; Navin Manjooran, Chairman, Solve

2:00 PM Presentation Planned

2:40 PM

High Temperature Irradiation Resistant Thermocouples for In-Pile Temperature Sensing: *Scott Riley*¹; Kyle Holloway¹; Richard Skifton²; Brian Jaques¹; ¹Boise State University; ²Idaho National Laboratory

3:00 PM

Integrating Multimodal Corrosion with Correlative Microscopy Across Multiple Lengthscales: *Sridhar Niverty*¹; Rajib Kalsar¹; Lyndi Strange¹; Venkateshkumar Prabhakaran¹; Ramprasad Prabhakaran¹; Colin Campbell¹; Benjamin Legg¹; Vineet Joshi¹; ¹Pacific Northwest National Laboratory

3:20 PM

Investigation of Stress Corrosion Cracking in CMSX-4 Turbine Blade Alloys Using Deep Learning Assisted X-ray Microscopy: *Hrishikesh Bale*¹; Maadhav Kothari¹; Sebastian Krauss¹; Michael Phaneuf²; Johnathan Leggett³; Simon Gray⁴; ¹Carl Zeiss Microscopy; ²Fibics Incorporated; ³Rolls Royce; ⁴Cranfield University

3:40 PM Break

4:00 PM

Isothermal Oxidation Behavior of Pack-Cementation Coated Three-phase Mo-Nb-Si-B Alloys: *Liam Wood*¹; John Perepezko¹; ¹UW-Madison

4:20 PM

JHU/APL's Science of Extreme and Multifunctional Materials Program: Materials Research with Mission Intent: *Morgana Trexler*¹; Leslie Hamilton¹; Michael Brupbacher¹; Steven Storck¹; Erin LaBarre¹; Nicholas Pavlopoulos¹; ¹The Johns Hopkins University Applied Physics Laboratory

4:40 PM

New Strategies for Designing Colloidal Inks for Additive Manufacturing of UHTCs: *Julia Goyer*¹; Carolina Tallon¹; ¹Virginia Tech

CERAMIC AND GLASS MATERIALS

Advances in Dielectric Materials and Electronic Devices — Piezoelectrics, Microwave Materials, and Conductive Applications

Sponsored by: ACerS Electronics Division

Program Organizers: Amar Bhalla, University of Texas; Ruyan Guo, University of Texas at San Antonio; Rick Uvic, Boise State University; Matjaž Spreitzer, Jožef Stefan Institute

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Session Chair: Ruyan Guo, University of Texas San Antonio

2:00 PM

Carbon-based Glass Foam Composites for High Power Microwave Absorption: *Ratiba Benzergha*¹; Vincent Laur²; Laurent Le Gendre¹; Ronan Lebullenger³; Ala Sharaiha¹; ¹University of Rennes, IETR; ²Lab-STICC; ³Univ Rennes, ISCR

2:20 PM

TTB Strontium Tantalum Ceramics for Integration into Miniature Dielectric Resonator Antennas: *Matthew Julian*¹; Mouad Barzani¹; Mohamad Haydoura¹; Ratiba Benzergha¹; Laurent Le Gendre¹; Ala Sharaiha¹; Francois Chevre²; Claire Le Paven¹; ¹Université de Rennes, CNRS, IETR-UMR 6164, F-35000 Rennes, France; ²Université de Rennes, CNRS, ISCR-UMR 6226, F-35000 Rennes, France

2:40 PM

New Insights into Bismuth Sodium Titanate Ferroelectric Ceramics: *Zhongming Fan*¹; Clive Randall¹; ¹Penn State University

3:00 PM

Enhanced Piezocomposite Transducers with 3D Printed Piezoelectric PZT: *Shawn Allan*¹; Justin Tufariello²; Barry Robinson³; Nicholas Voellm¹; Nicole Ross¹; Ryan Fordham¹; Casey Corrado²; Alex Angilella²; Leslie Riesenhuber²; Brian Pazol³; ¹Lithoz America LLC; ²MITRE Corporation; ³MSI Transducers Corp.

3:20 PM Break

3:40 PM

Dielectric Behavior of Electronic Materials, Specifically Silicon, Solder and Conductive Thick Films: *Deborah Chung*¹; ¹State University of New York Buffalo

4:00 PM

Effects of β -Silicon Carbide Microstructure on the Electrical Response of PMMA Matrix Nanocomposites: *Roshaun Titus*¹; Rosario Gerhardt¹; ¹Georgia Institute of Technology

4:20 PM

Sensitivity Analysis of PZT-4 Material Properties Using the Complex Variable Finite Element Method: *Carlos Acosta*¹; Amar Bhalla¹; Ruyan Guo¹; ¹University of Texas at San Antonio

NANOMATERIALS

Advances in Emerging Electronic Nanomaterials: Synthesis, Enhanced Properties, Integration, and Applications — Graphene and Other Nanomaterials

Sponsored by: TMS: Nanomaterials Committee

Program Organizers: Chang-Yong Nam, Brookhaven National Laboratory; Jung-Kun Lee, University of Pittsburgh; Stephen McDonnell, University of Virginia

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Session Chairs: Chang-Yong Nam, Brookhaven National Laboratory; Jung-Kun Lee, University of Pittsburgh

2:00 PM Invited

Novel Dirac-source Cold Carrier Injection for Energy-efficient 2D Nanoelectronics: *Huamin Li¹; Fei Yao¹; ¹University at Buffalo*

2:30 PM Invited

How to Achieve State-of-the-art Heterostructures from Polymer-contaminated Graphene?: *Zhujun Huang¹; Suji Park²; Kevin Yager²; Davood Shahrjerdi¹; ¹New York University; ²Brookhaven National Laboratory*

3:00 PM Invited

Nanomaterials for Energy-efficient Memory Devices: *Jung-Kun Lee¹; ¹University of Pittsburgh*

3:30 PM

Solution Processible Carbon Precursors for 2D Amorphous Carbon Dielectric: *Congjun Wang¹; Viet Hung Pham¹; Fufei An²; Christopher Matranga¹; Qing Cao²; ¹National Energy Technology Laboratory; ²University of Illinois at Urbana-Champaign*

3:50 PM Break

4:05 PM

Correlative Analyses of Low-dimensional Materials: *Veronika Hegrova¹; Radek Dao¹; Jan Neuman¹; ¹NenoVision s.r.o.*

4:25 PM

Nanomolding of Topological Nanowires: *Mehrdad Kiani¹; Hyeuk Jin Han¹; Quynh Sam²; Judy Cha¹; ¹Yale University; ²Cornell University*

4:45 PM

Unique Molecular Approach to 2D Tin Chalcogenide Materials by Single-Source Precursor Design: *Fabian Hartl¹; Veronika Brune¹; Sanjay Mathur¹; ¹University of Cologne*

5:05 PM

Near-Band-Edge Enhancement in Perovskite Solar Cells via Tunable Surface Plasmons: *Yulin Liu¹; ¹University of Pittsburgh*

5:25 PM

Hybrid Liquid Metal Nanostructures for Electronics and Energy Applications: *Weinan Xu¹; ¹University of Akron*

5:45 PM

Stable Perovskite Solar Cells: *Seongha Lee¹; ¹University of Pittsburgh*

PROCESSING AND MANUFACTURING

Advances in Surface Engineering — Session I

Sponsored by: TMS Surface Engineering Committee

Program Organizers: Rajeswaran Radhakrishnan, Faraday Technology Inc; Timothy Hall, Faraday Technology Inc; Michael Roach, University of Mississippi Medical Center; Sandip Harimkar, Oklahoma State University; Tushar Borkar, Cleveland State University; Rajeev Gupta, North Carolina State University; Bharat Jasthi, South Dakota School of Mines & Technology

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Session Chairs: Rajeswaran Radhakrishnan, Faraday Technology, Inc; Andrew Moran, Faraday Technology, Inc

2:00 PM

Electrochemical Finishing of Mo Feedhorn Arrays: *Huong Le¹; Timothy Hall¹; Stephen Snyder¹; E. Jennings Taylor¹; Maria Inman¹; ¹Faraday Technology*

2:20 PM

Electrochemical Machining of Steel and Refractory Alloys: *Andrew Moran¹; Tim Hall¹; Stephen Snyder¹; Victor Alderman¹; Brian Skinn¹; ¹Faraday Technology Inc.*

2:40 PM

In Situ Formation of Titanium Carbide during Surface Modification of Steel via TIG Arcing: *Nilesh Paraye¹; Prakriti Ghosh¹; Sourav Das¹; ¹Indian Institute of Technology Roorkee*

3:00 PM

Surface Modification of Ti-6Al-4V for Dust Adhesion Mitigation in Lunar Environment: *Lopamudra Das¹; Samuel Hocker²; Brodan Richter²; Christopher Wohl²; ¹National Institute of Aerospace; ²NASA Langley Research Center*

3:20 PM Break

3:40 PM

Surface Modification of Low Carbon Steel via In Situ Formed Tantalum Carbide through Tungsten Inert Gas Arcing: *Sachin Balbande¹; Nilesh Paraye¹; Sourav Das¹; ¹IIT Roorkee*

IRON AND STEEL (FERROUS ALLOYS)

Advances in Zinc-coated Sheet Steel Processing and Properties — Advances in Zinc-coated Sheet Steel Processing and Properties

Sponsored by: AIST Metallurgy — Processing, Products & Applications Technology Committee

Program Organizers: Joseph McDermid, McMaster University; Daniel Baker, General Motors Corporation

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Session Chairs: Joseph McDermid, McMaster University; Daniel S. Baker, General Motors Corp.

2:00 PM

Alleviation of Zn-assisted Liquid Metal Embrittlement in Austenitic-TWIP/martensitic-HSLA Steel Multi-layered Sheet Additively Manufactured by Directed Energy Deposition: *Seok-Hyun Hong*¹; Du-Rim Eo²; Sunghak Lee¹; Jung-Wook Cho¹; Sung-Joon Kim¹; ¹POSTECH/GIFT; ²KITECH

2:20 PM

Microstructure Evolution during Early Stages of Liquid Metal Embrittlement in an Advanced High-strength-steel: Yuki Ikeda¹; Renliang Yuan²; Hassan Ghassemi-Armaki³; Anirban Chakraborty⁴; Jim Zuo²; *Robert Maass*¹; ¹Federal Institute for Materials Research and Testing (BAM); ²University of Illinois at Urbana-Champaign; ³General Motors R&D; ⁴Arcelor Mittal Global R&D

2:40 PM

The Interaction between Mn and Sn and Its Effects on the Selective Oxidation of Advanced High Strength Steels: *Jonas Wagner*¹; Joseph McDermid¹; ¹Steel Research Centre, McMaster University

3:00 PM

Leaching Zinc Ions from Industrial Waste Ashes a Kinetic Study and Development of a Semi-empirical Model: *Hilary Rutto*¹; Tumisan Seodigeng¹; ¹Vaal University of Technology

3:20 PM Break

3:40 PM

An Exploration of a Neural Network Approach for the On-line Prediction of Steel Strip Radiative Properties: *Nishant Narayanan*¹; Fatima Suleiman¹; Kyle Daun¹; ¹University of Waterloo

4:00 PM

Zinc Coatings and Their Control Using the New Integrated Indicator ECP-Zn: *Borys Sereda*¹; Iryna Kruhliak¹; Dmytro Sereda¹; ¹Dneprovsky State Technical University

FUNDAMENTALS AND CHARACTERIZATION

Alloy Phase Transformations at Elevated Temperatures — Session I

Sponsored by: TMS High Temperature Alloys Committee, TMS Phase Transformations Committee

Program Organizers: Dinc Erdeniz, University of Cincinnati; Benjamin Adam, Oregon State University; Jonah Klemm-Toole, Colorado School of Mines; Eric Lass, University of Tennessee-Knoxville; Ashley Paz y Puente, University of Cincinnati; Sophie Primig, University of New South Wales; Chantal Sudbrack, National Energy Technology Laboratory

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Session Chair: Dinc Erdeniz, University of Cincinnati

2:00 PM Invited

The Optimization of Local Phase Transformation Strengthening in Next Generation Superalloys: *Timothy Smith*¹; Nikolai Zarkevich²; Mikhail Mendeleev²; Valery Borovikov²; Ashton Egan³; Timothy Gabb¹; John Lawson²; Michael Mills³; ¹NASA Glenn Research Center; ²NASA Ames Research Center; ³The Ohio State University

2:30 PM Invited

Microstructure Evolution and Mechanical Properties of a/a-Strengthened Ferritic Superalloys: *Christopher Zenk*¹; Luis Morales¹; Andreas Bezold¹; Andreas Förner¹; Steffen Neumeier¹; Carolin Körner¹; ¹Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU)

3:00 PM

Single-step Aging Treatment on Cast Haynes 282 Ni-based Alloy – Microstructure and Mechanical Behavior: *Timothy Lach*¹; Xiang Chen¹; ¹Oak Ridge National Laboratory

3:20 PM

Effect of Grain Boundary Phases on Creep Properties of a Novel Ni-Co Based Superalloy: *Yoshiki Kumagai*¹; David Dunand²; ¹Daido Steel Co Ltd.; ²Northwestern University

3:40 PM Break

4:00 PM

Microstructure and Mechanical Properties of W-free + ' Co-based Superalloys with Ni, Cr, and Fe Additions: *Brandon Ohl*¹; Howard Stone²; David Dunand¹; ¹Northwestern University; ²University of Cambridge

4:20 PM

Concurrent Precipitation of Nb(C,N), M23C6, and Sigma Phases in Alloy 347H with and without Ancillary Additions of Boron and Nitrogen: *Michael Glazoff*¹; Jianguo Yu¹; Laurent Capolungo²; Michael Gao³; Gabriel Ilevbare¹; ¹Idaho National Laboratory; ²Los Alamos National Laboratory; ³National Energy Technology Laboratory

4:40 PM

Hyper Duplex Stainless Steel: A Study on the Sigma Phase Formation: *Andres Acuna*¹; Antonio Ramirez¹; ¹Ohio State University

5:00 PM

In-situ and Ex-situ Evaluation of Phase Transformation and Its Impact on the Hot Ductility of Steel during Continuous Casting Processes: *Alyssa Stubbers*¹; John Balk¹; ¹University of Kentucky

CERAMIC AND GLASS MATERIALS

Ceramics and Glasses Modeling by Simulations and Machine Learning — Simulation of Glass and Ceramics

Sponsored by: ACerS Glass & Optical Materials Division

Program Organizers: Mathieu Bauchy, University of California, Los Angeles; Peter Kroll, University of Texas at Arlington; N. M. Anoop Krishnan, Indian Institute of Technology Delhi

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Session Chairs: Mathieu Bauchy, UCLA; Peter Kroll, The University of Texas at Arlington; Anoop Krishnan, IIT Delhi

2:00 PM Invited

Machine Learning to Design and Discover Sustainable Cementitious Binders: Learning from Small Databases and Developing Closed-form Analytical Models: *Aditya Kumar*¹; ¹Missouri S&T

2:30 PM

Developing ReaxFF for Simulation of Silicon Carbonitride Polymer-derived Ceramics: *Shariq Haseen*¹; Peter Kroll¹; ¹University of Texas at Arlington

2:50 PM

Molecular Dynamics Simulation of Tellurite Glasses: *Amreen Jan*¹; N M Anoop Krishnan¹; ¹Indian Institute of Technology Delhi

3:10 PM

Molecular Dynamics Study of Domain Switching Dynamics in KNbO₃ and BaTiO₃: *Rajan Khadka*¹; Pawel Keblinski¹; ¹Rensselaer Polytechnic Institute

3:30 PM Break

4:00 PM

In-Silico Simulations of Polymer Pyrolysis: *Peter Kroll*¹; ¹University of Texas at Arlington

4:20 PM

Pore-resolved Simulations of Chemical Vapor Infiltration in 3D Printed Preforms and the Kinetic Regimes: *Mengnan Li*¹; Vimal Ramanuj¹; Ying She²; Ramanan Sankaran¹; ¹Oak Ridge National Laboratory; ²Raytheon Technologies Research Center

NUCLEAR ENERGY

Ceramics for a New Generation of Nuclear Energy Systems and Applications — Ceramic Nuclear Fuel

Sponsored by: TMS Nuclear Materials Committee, ACerS Energy Materials and Systems (EMSD) Division

Program Organizers: Ming Tang, Clemson University; Enrique Martinez Saez, Clemson University; Yongfeng Zhang, University of Wisconsin; Krista Carlson, University of Nevada, Reno; Yutai Katoh, Oak Ridge National Laboratory; Jean Paul Crocombette, CEA Saclay; Erofilii Kardoulaki, Los Alamos National Laboratory; Levi Gardner, Argonne National Laboratory; Jian Zhang, Xiamen University; Charmayne Lonergan, Pacific Northwest National Laboratory

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Session Chairs: Lingfeng He, Idaho National Laboratory; Kathy Lu, Virginia Polytechnic Institute and State University

2:00 PM Invited

Cluster Dynamics Simulations of Point Defects and Fission Gas Evolution in Irradiated Ceramic Nuclear Fuels: *David Andersson*¹; Christopher Matthews¹; Jason Rizk¹; Romain Perriot¹; Michael Cooper¹; Benjamin Liu¹; Christopher Stanek¹; ¹Los Alamos National Laboratory

2:30 PM Invited

Microstructural Evolution in Ceramic Nuclear Fuels and their Surrogates under Irradiation: *Lingfeng He*¹; Kaustubh Bawane¹; Pengyuan Xiu¹; Tiankai Yao¹; Chao Jiang¹; Marat Khafizov²; Miaomiao Jin³; Yi Xie⁴; Lin Shao⁵; ¹Idaho National Laboratory; ²The Ohio State University; ³The Pennsylvania State University; ⁴Purdue University; ⁵Texas A&M University

3:00 PM

Fabrication and Properties of Sintered Yttrium Hydride: *Aditya Shivprasad*¹; Vedant Mehta¹; Joshua White¹; Michael Cooper¹; Tarik Saleh¹; Joseph Wermer¹; Erik Luther¹; Holly Trelle¹; D.V. Rao¹; ¹Los Alamos National Laboratory

3:20 PM Break

3:40 PM Invited

SIC Oxidation and Irradiation Resistance in Advanced Nuclear Reactor TRISO Fuel: *Kathy Lu*¹; Yi Je Cho²; ¹Virginia Polytechnic Institute and State University; ²Virginia Polytechnic Institute and State University; Sunchon National University

4:10 PM Invited

Integration of Nuclear Fuel and Embedded Sensors within Additively Manufactured SiC Components: *Christian Petrie*¹; ¹Oak Ridge National Laboratory

4:40 PM

Comparison of ZrC-TZM Mechanical and Structural Properties Before and After Extended Carbon Exposure: *Peyton McGuire*¹; Erofilii Kardoulaki²; Ming Tang¹; ¹Clemson University; ²Los Alamos National Laboratory

NANOMATERIALS

Controlled Synthesis, Processing, and Applications of Structural and Functional Nanomaterials — Nanostructure Synthesis & Mechanisms

Sponsored by: ACerS Basic Science Division, ACerS Electronics Division, ACerS Engineering Ceramics Division

Program Organizers: Haitao Zhang, University of North Carolina at Charlotte; Gurpreet Singh, Kansas State University; Kathy Lu, Virginia Polytechnic Institute and State University; Edward Gorzkowski, Naval Research Laboratory; Jian Shi, Rensselaer Polytechnic University; Michael Naguib, Tulane University; Sanjay Mathur, University of Cologne

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Session Chairs: Haitao Zhang, University of North Carolina at Charlotte; Sanjay Mathur, University of Cologne

2:00 PM Invited

Manipulating Material Synthesis Using Electromagnetic Fields: *B. Reesha Jayan*¹; ¹Carnegie Mellon University

2:30 PM Invited

Out-of-oven Rapid Fabrication of Entropy Stabilized Oxides Patterned on Carbonaceous Nanomaterials Using Radio Frequency Heating: Jared Rapp¹; Lalith Kumar Bhaskar²; Ravi Kumar²; *Aniruddh Vashisth*¹; ¹University of Washington; ²Indian Institute of Technology-Madras

3:00 PM

Synthesis and Growth Mechanism Study of Metalloid Nanostructures: Ahmed Abdelazeez¹; Shifat Us Sami¹; Tom Schmedake¹; Yong Zhang¹; *Haitao Zhang*¹; ¹University of North Carolina at Charlotte

3:20 PM Break

3:40 PM

Molten Salt Synthesis of Inorganic Nanomaterials: *Yuanbing Mao*¹; ¹Illinois Institute of Technology

4:00 PM

Enhancing the Low-temperature Consolidation of Nanosilver Materials: *Henry Young*¹; Jared McCoppin²; ¹Wright State University; ²University of Dayton

4:20 PM

Thermo-Chemical Reduction Controlled Exsolution of Metal Nanoparticles (NPs) From Perovskite Lattice: Synthesis to Application: *Aman Bhardwaj*¹; Shital Kale²; Benedict Witulski¹; Anna Verma¹; Sanjay Mathur¹; ¹University of Cologne; ²Chonnam National University

4:40 PM

Mechanistic Investigation of the Formation of Transition Metal Nanocrystallites Embedded in Amorphous Silicon Nitride Nanocomposites: Norifumi Asakuma¹; Shotaro Tada¹; Erika Kawaguchi¹; Motoharu Terashima¹; Sawao Honda¹; Samuel Bernard²; *Yuji Iwamoto*¹; ¹Nagoya Institute of Technology; ²University of Limoges, CNRS, IRCER, UMR 7315

EDUCATION

Curricular Innovations and Continuous Improvement of Academic Programs (and Satisfying ABET along the Way): The Elizabeth Judson Memorial Symposium — What Should We Teach and How Should We Teach it?

Sponsored by: TMS Accreditation Committee, TMS Education Committee

Program Organizers: Alison Polasik, Campbell University; Jeffrey Fergus, Auburn University; Assel Aitkaliyeva, University of Florida; Kester Clarke, Colorado School of Mines

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Session Chairs: Gregg Janowski, The University of Alabama at Birmingham; Kester Clarke, Colorado School of Mines

2:00 PM

Machine Learning and Data Science in the MSE Undergraduate Program: *Elizabeth Holm*¹; ¹Carnegie Mellon University

2:20 PM

The Material Science Core: A Need to Align Worldviews?: *Robert Heard*¹; ¹Carnegie Mellon University

2:40 PM

Introducing Students to the Importance of Materials in Sustainability: *Jeffrey Fergus*¹; ¹Auburn University

3:00 PM

Teaching Glass across Disciplines at Alfred University: Alexis Clare¹; Jessica Domino¹; *Doris Möncke*¹; Angus Powers¹; Darren Stohr¹; S.K. Sundaram¹; ¹Alfred University

3:20 PM

Investigating the Effects of Different Instructional Methods on Student Performance and Satisfaction in Online Learning: *Michael Roberts*¹; Charles D'Ambra¹; Aroba Saleem¹; ¹University of Florida

3:40 PM Break

4:00 PM

Assisting Curation of Open-Source Textbook with Natural Language Processing: *Amit Verma*¹; Benjamin Glaser¹; Robin Kuo¹; Jason Zhang¹; Nicholas David¹; Zhisong Zhang¹; Emma Strubell¹; Anthony Rollett¹; ¹Carnegie Mellon University

4:20 PM Panel Discussion: Developing an Open Source Introductory Textbook for the Materials Community

LIGHTWEIGHT ALLOYS

Development in Light Weight Alloys and Composites — Processing and Mechanical Performance

Sponsored by: TMS Composite Materials Committee, TMS Materials Characterization Committee

Program Organizers: Ramasis Goswami, Naval Research Laboratory; Nikhil Gupta, New York University; Aashish Rohatgi, Pacific Northwest National Laboratory; Tanjore Jayaraman, University of Michigan-Dearborn

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Session Chair: Ramasis Goswami, US Naval Research Laboratory

2:00 PM Invited

Delayed Aging in Aluminum Alloys: *Ramachandra Canumalla*¹; Samuel Meyer²; ¹Weldaloy Specialty Forgings

2:40 PM Invited

Correlations between Ultrasonic Processing, Reinforcement Morphology, and Multi-scale Mechanical Performance of Metal Matrix Composites: *Tanaji Paul*¹; Riddhi Joshi¹; Cheng Zhang¹; Benjamin Boesl¹; Arvind Agarwal¹; ¹Florida International University

3:10 PM

Development and Research of a Scandium-containing Filler for Welding Aircraft Products from an Alloy of the Mg-Zr-Nd System: Volodymyr Tsyganov¹; *Vadim Shalomeev*²; Sergei Sheyko²; ¹"Zaporizhzhia Polytechnic" National University; ²Zaporizhzhia National University

3:30 PM Break

3:50 PM Invited

Investigating Solid Solution Formation in High Entropy Carbide-based Ceramics: *Lavina Backman*¹; Heonjune Ryou¹; James Wollmershauser¹; Syed Qadri¹; Edward Gorzkowski¹; Jesse Maxwell¹; ¹U.S. Naval Research Laboratory

4:20 PM Invited

Ultrasonically-Induced Microstructural Refinement to Improve Strength of an Al-Si-Mg Casting: *Katherine Rader*¹; Jens Darsell¹; Jon Helgeland¹; Timothy Roosendaal¹; Ethan Nickerson¹; Aashish Rohatgi¹; ¹Pacific Northwest National Laboratory

SUSTAINABILITY, ENERGY, AND THE ENVIRONMENT

Energy Materials for Sustainable Development — Radiative and Electrochemical Conversion/Storage Batteries

Sponsored by: ACerS Energy Materials and Systems Division

Program Organizers: Krista Carlson, University of Nevada, Reno; Armin Feldhoff, Leibniz University Hannover; Kyle Brinkman, Clemson University; Eva Hemmer, University of Ottawa; Nikola Kanas, BioSense Institute; Kjell Wiik, Norwegian University of Science and Technology; Lei Zuo, Virginia Tech; Joshua Tong, Clemson University; Danielle Benetti, Institut National de la Recherche Scientifique; Katherine Develos-Bagarinao, National Institute of Advanced Industrial Science and Technology; Soumi Chatterjee, Aditya Birla Science & Technology Company, Ltd

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Session Chairs: Jake Amoroso, Savannah River National Laboratory; Dhruva Panthi, Kent State University; Zhezhen Fu, The Pennsylvania State University

2:00 PM Keynote

Highly Stable and Efficient Perovskite Solar Cells with Functional Nanocomposites: *Yoon-Bong Hahn*¹; Jeonbuk National University

2:40 PM

Sustainable Bio-Engineered Magnetoelectric Nanogenerator to Convert Ambient Stray Magnetic Noise to Electricity: *Ojodomo Achadu*¹; ¹University of Warwick

3:00 PM

Low-temperature Integration of Oxide-based All-solid-state Batteries Using a Ceramic Binder: *Junteng Du*¹; Angel Burgos¹; Jae Chul Kim¹; ¹Stevens Institute of Technology

3:20 PM Break

3:40 PM

Molecular Precursors for Li₂S as Cathode Material for Sustainable Energy Storage: *Veronika Brune*¹; Sanjay Mathur¹; Michael Wilhelm¹; ¹University of Cologne

4:00 PM

Iron Oxide Redox Cycling for Low-cost Iron-air Batteries: *Samuel Pennell*¹; Jacob Mack¹; David Dunand¹; ¹Northwestern University

CERAMIC AND GLASS MATERIALS

Engineering Ceramics: Microstructure-Property-Performance Relations and Applications — Advanced Processing and Properties of Engineering Ceramics

Sponsored by: ACerS Engineering Ceramics Division

Program Organizers: Young-Wook Kim, University of Seoul; Hua-Tay Lin, Guangdong University of Technology; Junichi Tatami, Yokohama National University; Michael Halbig, NASA Glenn Research Center

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Session Chairs: Young-Wook Kim, University of Seoul; Soshu Kiriha, Osaka University

2:00 PM Invited

Influence of Inversion Level of Ti:MgGa₂O₄ Ceramics on the Optical Absorption: *Guangran Zhang*¹; *Yiquan Wu*¹; *Alexander Shemes*²; *Adrian Goldstein*³; ¹Alfred University; ²Ben-Gurion University of the Negev; ³Israel Ceramic and Silicate Institute

2:30 PM Invited

Transparent and Fluorescent Rare-earth-doped α -SiAlON Ceramics: *Junichi Tatami*¹; *Kohei Aminaka*¹; *Motoyuki Iijima*¹; *Takuma Takahashi*²; *Tsukaho Yahagi*²; ¹Yokohama National University; ²Kanagawa Institute of Industrial Science and Technology

3:00 PM

Novel Gel-casting Route for Radially Graded All-ceramic Structures for Microwave Metamaterial Antenna Applications: *Abhijeet Sarangi*¹; *Dmitry Isakov*¹; *Claire Dancer*¹; ¹University of Warwick

3:20 PM

Effect of Initial α -phase Content on Mechanical, Thermal, and Electrical Properties of Pressureless Sintered SiC Ceramics: *Young-Wook Kim*¹; *Shynar Kultayeva*¹; *Rohit Malik*¹; ¹University of Seoul

3:40 PM Break

4:00 PM

Mechanical Properties and Fragmentation Mechanisms of Si/SiC Core-shell Nanoparticles: *Kevin Kayang*¹; *Alexey Volkov*¹; ¹The University of Alabama

4:20 PM

The Role of Micro-Scale Analysis Tools in Industrial Problem Solving: *Jeanette Vass*¹; ¹Auto and Materials

4:40 PM

Modular Piezoceramic/Polymer Composites with Locally Adjustable Piezoelectric Properties: *Patrizia Hoffmann*¹; *David Köllner*¹; *Tobias Fey*¹; ¹Friedrich-Alexander-Universität Erlangen-Nürnberg Institute Glass and Ceramics

CERAMIC AND GLASS MATERIALS

Glasses and Optical Materials: Current Issues and Functional Applications — Non-silicate Glasses

Sponsored by: ACerS Basic Science Division, ACerS Glass & Optical Materials Division

Program Organizers: Doris Möncke, Alfred University; Mathieu Hubert, Corning Incorporated

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2:00 PM

Intermediate-range Order in Organic Glasses: *Fnu Spoogmay*¹; *Gang Chen*¹; ¹Ohio University

2:20 PM

A Review of Head-up Display (HUD) Coating Technologies for Commercial Vehicle Applications: *Sadella Santos*¹; *Chetali Gupta*¹; *Hilda Buss*¹; ¹Exponent

2:40 PM

The Problem with Lead: *Elizabeth Tsekrekas*¹; *Alexis Clare*¹; ¹Alfred University

3:00 PM

Structural Relaxation Mechanism of Anisotropic Alkali Metaphosphate Glass: *Jun Endo*¹; *Seiji Inaba*¹; *Settsuro Ito*¹; ¹AGC Inc.

3:20 PM Break

3:40 PM Invited

Ionic Glasses: An Emerging Separate Class of Amorphous Materials with Unique Topology and Dynamic Properties: *Courtney Calahoo*¹; *Lothar Wondraczek*²; ¹University of Alberta; ²Otto Schott Institute for Materials Research

4:10 PM

The Dissolution of Lithium Disilicate Glass under Ultrasonic Cavitation: *Ben Dillinger*¹; *Carlos Suchicital*¹; *David Clark*¹; ¹Virginia Polytechnic Institute and State University

FUNDAMENTALS AND CHARACTERIZATION

Grain Boundaries, Interfaces, and Surfaces: Fundamental Structure-Property-Performance Relationships — Mechanics at Interfaces

Sponsored by: ACerS Basic Science Division

Program Organizers: Shen Dillon, University of California, Irvine; Wolfgang Rheinheimer, Julich Research Center; Catherine Bishop, University of Canterbury; Ming Tang, Rice University; John Blendell, Purdue University; Wayne Kaplan, Technion - Israel Institute Of Technology; Melissa Santala, Oregon State University

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Session Chairs: Shen Dillon, University of California, Irvine; John Blendell, Purdue University

2:00 PM Invited

Alteration of Microstructures by Stressing Surfaces and Interfaces: *Klaus van Benthem*¹; ¹University of California, Davis

2:30 PM

Grain-boundary Energy Variation and Evolution during Dislocation-assisted Grain-boundary Sliding in Polycrystalline Mg₂SiO₄ – Linking Earth and Materials Sciences: *Katharina Marquardt*¹; Alexandra Austin¹; Marina Sedlak¹; Filippa Ferreira²; Lars Hansen³; Sanae Koizumi⁴; ¹Imperial College; ²University of Heidelberg; ³University of Minnesota; ⁴University of Tokyo

2:50 PM Invited

Atomistic Dynamics of Deformation, Fracture and GB Migration in Oxides: *Yuichi Ikuhara*¹; ¹Univ.Tokyo, JFCC, Tohoku University

3:20 PM Break

3:40 PM Invited

The Role of Grain Boundaries in Nucleation-controlled Plasticity of Metal Nanoparticles: *Eugen Rabkin*¹; Amit Sharma²; Jonathan Amodeo³; Tatyana Fedyaev¹; Anuj Bisht¹; Olivier Thomas³; ¹Technion; ²Empa; ³Aix Marseille Univ., Université de Toulon, CNRS

4:10 PM

Cracking in a Reacted Layer Material: *C. Barry Carter*¹; Chanchal Ghosh¹; Manish Singh¹; Matthew Janish¹; Shayani Parida¹; Arthur Doble¹; Avinash Dongare¹; ¹University of Connecticut

4:40 PM

Characteristics of Steady State and a Scale Law of Plastic Deformation: *Yan Huang*¹; ¹Brunel University London

FUNDAMENTALS AND CHARACTERIZATION

High Entropy Materials: Concentrated Solid Solutions, Intermetallics, Ceramics, Functional Materials and Beyond III — Theory and Modeling

Sponsored by: TMS: Nanomaterials Committee

Program Organizers: Yu Zhong, Worcester Polytechnic Institute; Michael Gao, National Energy Technology Laboratory; Xingbo Liu, West Virginia University; Peter Liaw, University of Tennessee; Jian Luo, University of California, San Diego; Yiquan Wu, Alfred University; Mitra Taheri, Johns Hopkins University; Amy Clarke, Colorado School of Mines

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Session Chairs: Songge Yang, Worcester Polytechnic Institute; Guangchen Liu, Worcester Polytechnic Institute

2:00 PM Invited

Modeling of Oxidation Resistance in Ni-containing High Entropy Alloys: A Combined First-principles and Machine Learning Study: *Shun-Li Shang*¹; Yi Wang¹; Zi-Kui Liu¹; Michael Gao²; ¹Pennsylvania State University; ²National Energy Technology Laboratory

2:20 PM

Revisit the VEC Criterion with High-throughput Ab Initio Calculations: A Case Study With Al-Co-Cr-Fe-Ni System: *Songge Yang*¹; Guangchen Liu¹; Yu Zhong¹; ¹Worcester Polytechnic Institute

2:40 PM

An Automated, Machine Learning-driven Framework for Predicting High Temperature Oxidation Properties in Refractory Complex, Concentrated Alloys: Sharmila Karumuri¹; Saswat Mishra¹; Vincent Mika¹; Collin Scott¹; Nimish Awalganekar¹; Austin Hernandez¹; Kenneth Sandhage¹; Ilias Bilionis¹; Alejandro Strachan¹; *Michael Titus*¹; ¹Purdue University

3:00 PM

First Principles Prediction of Mechanical Properties of High Entropy Alloys: *Guofeng Wang*¹; Siming Zhang¹; ¹University of Pittsburgh

3:20 PM Break

3:40 PM Invited

Machine Learning Guided High Entropy Alloy Discovery: *John Sharon*¹; Ken Smith¹; Soumalya Sarkar¹; Ryan Deacon¹; Anthony Ventura¹; GV Srinivasan¹; ¹Raytheon Technologies Research Center

4:00 PM

High-entropy Materials Design by Integrating the First-principles Calculations and Machine Learning: A Case Study in the Al-Co-Cr-Fe-Ni System: *Guangchen Liu*¹; Songge Yang¹; Yu Zhong¹; ¹Worcester Polytechnic Institute

4:20 PM

Mechanical Properties And Deformation Mechanisms In TiMoNbZr Medium Entropy Alloys: A Molecular Dynamics Study: *Avinash Chavan*¹; Mangal Roy¹; ¹IIT Kharagpur

4:40 PM

Phonon Broadening and Thermal Conductivity in High Entropy Ceramic Carbide: *Linu Malakkal¹; Kaustubh Bhawane¹; Cody Dennett¹; Zilong Hua²; Lingfeng He¹; Yongfeng Lu²; Bai Cui²; ¹Idaho National Lab; ²University of Nebraska*

MATERIALS-ENVIRONMENT INTERACTIONS

High Temperature Oxidation of Metals and Ceramics – Corrosion

Sponsored by: TMS Corrosion and Environmental Effects Committee

Program Organizers: Kenneth Kane, Oak Ridge National Laboratory; Elizabeth Sooby, University of Texas at San Antonio; Patrick Brennan, General Electric Research; Lavina Backman, U.S. Naval Research Laboratory; Kinga Unocic, Oak Ridge National Laboratory; Richard Oleksak, National Energy Technology Laboratory; David Shifler, Office of Naval Research; Raul Rebak, GE Global Research

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Session Chairs: Patrick Brennan, General Electric; Raul Rebak, General Electric

2:00 PM Invited

Factors Affecting Deposit-Induced Corrosion of Aero-Turbine Components at Elevated Temperatures: *Brian Gleeson¹; ¹University of Pittsburgh*

2:30 PM

Advanced Characterization of Hot Stress Corrosion Cracking in CMSX-4 Turbine Blade Alloys Using Deep Learning-assisted 3D X-ray Microscopy to Reveal High Temperature Fracture and Crack Arrest Mechanisms: *Andy Holwell¹; Maadhav Kothari¹; Hrishikesh Bale¹; Simon Gray²; Jonathan Leggett³; ¹Carl Zeiss Microscopy LLC; ²Cranfield University; ³Rolls Royce*

2:50 PM

Obtaining Surface Coatings Providing Protection Against High Temperatures in the Production of Coke: *Borys Sereda¹; Iryna Kruhliak¹; Dmytro Sereda¹; Aleksandr Gaydaenko¹; ¹Dneprovsky State Technical University*

3:10 PM

Effects of Secondary Additions to Na₂SO₄ Deposits on High-Temperature Hot Corrosion: *Preston Nguyen¹; Brian Gleeson¹; ¹University of Pittsburgh*

3:30 PM

Environmentally Assisted Cracking of Nickel and Iron Based Alloys in Te-containing Molten Salts: *Mohammad Umar Farooq Khan¹; Miranda Mazza¹; Lesley Frame²; Stephen Raiman¹; ¹Texas A&M University; ²University of Connecticut*

3:50 PM Break

4:10 PM

Understanding Mixed Sulfate-oxide Induced Hot Corrosion of Alumina-forming Alloys: *David Poerschke¹; Atharva Chikhalikar¹; ¹University of Minnesota*

4:30 PM

Analysis and Simulation of Alkoxide Corrosion Occurring in Automotive Metals with Biofuels: *Visheet Arya¹; Rüdiger Reitz¹; Matthias Oechsner¹; Eugen Gazenbiller²; Daniel Höche²; ¹MPA-IfW TU Darmstadt; ²Helmholtz-Zentrum Hereon*

4:50 PM

Materials Compatibility of Automotive Alloys in Synthetic Fuels - Test Method Development to Evaluate the Corrosion Behavior of Aluminum Materials in Oxygenates(OMEs): *Rüdiger Reitz¹; Visheet Arya¹; Matthias Oechsner¹; ¹MPA-IfW TU Darmstadt*

LIGHTWEIGHT ALLOYS

ICME-based Titanium Alloys and Processes Design – ICME-Based Titanium Alloys and Processes Design

Sponsored by: TMS Titanium Committee

Program Organizers: Zhi Liang, QuesTek Innovations LLC; Carelyn Campbell, National Institute of Standards and Technology

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Session Chair: Zhi Liang, QuesTek Innovations LLC

2:00 PM Invited

Microstructure Design in Titanium Alloys Using 3D Computational Simulation and 3D Experimental Characterization: *Dian Li¹; Rongpei Shi²; Yufeng Zheng¹; ¹University of Nevada-Reno; ²Harbin Institute of Technology*

2:30 PM

Physics Based ICME for Similar and Dissimilar Ti-alloy Linear Friction Welding: *Jerry Gould¹; Michael Eff¹; ¹Edison Welding Institute*

2:50 PM

A Modular Framework for the Simulation of Texture Evolution during Thermomechanical Processing of Ti Alloys: *Benjamin Begley¹; Victoria Miller¹; ¹University of Florida*

PROCESSING AND MANUFACTURING

Innovative Process Design and Processing for Advanced Structural Materials – Mechanics and Modeling

Program Organizers: Ju-Young Kim, UNIST; Jae-il Jang, Hanyang University; Sung-Tae Hong, University of Ulsan; Rongshan Qin, The Open University

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Session Chairs: Sukbin Lee, UNIST; Ju-Young Kim, UNIST

2:00 PM Invited

Enhancement of Mechanical Properties in Nanoporous Gold: *Ju-Young Kim¹; ¹UNIST*

2:20 PM Invited

Recent Nanoindentation Studies on Innovative Process Design for Advanced Structural Materials: Zhe Gao¹; A-Hyun Jeon¹; *Jae-il Jang*¹; ¹Hanyang University

2:40 PM

Residual Stress in Steel H-beam Produced by Hot-rolling and QST Investigated by Instrumented Indentation Testing: *Sohyeon Lee*¹; Eunji Song¹; Gyeong-Seok Hwang¹; Ju-Young Kim¹; ¹UNIST (Ulsan National Institute of Science and Technology)

3:00 PM Invited

Manufacture of Advanced 3D Composites Using a New 3D Weaving Technique and Their Design Using a Neural Network: Hyun Joon Yang¹; Kyeong Mo Kang¹; Heung-Nam Han¹; *Woong-Ryeol Yu*¹; ¹Seoul National University

3:20 PM Break

3:40 PM Invited

Monte Carlo Simulations for Microstructure Evolution via Diffusion: *Sukbin Lee*¹; Youngkyun Son¹; Ju-young Kim¹; ¹Ulsan National Institute of Science and Technology

4:00 PM Invited

Improvement of Mechanical Properties of Metallic Materials by Multilayered Structure: *Shoichi Nambu*¹; ¹University of Tokyo

4:20 PM

Mechanical Properties and Reliability of Nanolayered Stretchable Interconnect with Nanocrystalline Copper and Ternary Metallic Glass: *Gyeong-Seok Hwang*¹; Eunji Song¹; Sohyeon Lee¹; Ju-Young Kim¹; ¹UNIST (Ulsan National Institute of Science and Technology)

MODELING

Integration between Modeling and Experiments for Crystalline Metals: From Atomistic to Macroscopic Scales IV — Session II

Sponsored by: TMS Advanced Characterization, Testing, and Simulation Committee, TMS Materials Characterization Committee, TMS: Nanomaterials Committee

Program Organizers: Mariyappan Arul Kumar, Los Alamos National Laboratory; Irene Beyerlein, University of California, Santa Barbara; Levente Balogh, Queen's University; Caizhi Zhou, University of South Carolina; Lei Cao, University of Nevada; Josh Kacher, Georgia Institute of Technology

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Session Chairs: Yue Fan, University of Michigan; Siddhartha Pathak, Iowa State University

2:00 PM Invited

Evolution of Metastable Grain Boundaries and Their Tunability under Extreme Conditions: *Yue Fan*¹; Zhitong Bai¹; ¹University of Michigan

2:30 PM

A Grain Boundary Dislocation-density-based Crystal Plasticity Model for FCC Nanocrystalline Metals: *Jonathan Cappola*¹; Jian Wang²; Lin Li¹; ¹University of Alabama; ²University of Nebraska-Lincoln

2:50 PM

Continuum Dislocation Dynamics-based Full Field Crystal Plasticity Modeling for Characterizing Dislocation Distribution and Boundary Transmission in Polycrystalline Materials: Navid Kermanshahimonfared¹; *Georges Ayoub*²; Ioannis Mastorakos³; ¹Clarkson University ; ²University of Michigan; ³Clarkson University

3:10 PM

Motions in Cylindrical Grain Boundaries: *Anqi Qiu*¹; Ian Chesser²; Elizabeth Holm¹; ¹Carnegie Mellon University; ²George Mason University

3:30 PM Break

3:50 PM Invited

In Situ Studies on Room Temperature Deformability of Nanolaminates and Nanocrystalline Intermetallics: *Xinghang Zhang*¹; Ruizhe Su¹; Dajla Neffati²; Yashashree Kulkarni²; ¹Purdue University; ²University of Houston

4:20 PM

Slip Transmission and Voiding during Slip Band Intersections in Fe70Ni10Cr20 Stainless Steel: *Xiaowang Zhou*¹; Richard Skelton¹; Ryan Sills²; Christopher San Marchi¹; ¹Sandia National Laboratories; ²Rutgers University

SPECIAL TOPICS

K-12 Educators Forum — Session II

Sponsored by: ACerS

Program Organizers: Kathleen Richardson, University of Central Florida; Adelle Schade, Albright College

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Session Chair: Adelle Schade, Albright College

2:00 PM Panel Discussion

CERAMIC AND GLASS MATERIALS

Manufacturing and Processing of Advanced Ceramic Materials — New Advances in Ceramic Processing I: Sintering

Sponsored by:

Program Organizers: Bai Cui, University of Nebraska-Lincoln; James Hemrick, Oak Ridge National Laboratory; Mike Alexander, Allied Mineral Products; Eric Faierson, Quad City Manufacturing Laboratory/Western Illinois University; Keith DeCarlo, Blasch Precision Ceramics

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Session Chairs: Richard Todd, University of Oxford; Clive Randall, Pennsylvania State University

2:00 PM Invited

Flash Sintering of Ceramics: Towards Homogeneous Components with Improved Mechanical Properties: *Richard Todd¹, Y. Kubota¹, Yinsheng Li¹, Riccardo Torchio², Simone Falco¹, Piergiorgio Alotto²*; ¹University of Oxford; ²University of Padua

2:30 PM Invited

Ultrafast Sintering with and without Electric Fields and Electrochemically Controlled Microstructural Evolution: *Jian Luo¹*; ¹University of California, San Diego

3:00 PM

Doping Alumina with Carbon?: Li-or Cohen¹; Priyadarshini Ghosh¹; Rachel Marder¹; *Wayne Kaplan¹*; ¹Technion - Israel Institute of Technology

3:20 PM Break

3:40 PM Invited

Utilizing Cold Sintering in the Design and Integration of New Functional Composite Materials: *Clive Randall¹*; ¹Pennsylvania State University

4:10 PM Invited

High Throughput, Ultra-fast Laser Sintering of Alumina Sample Array for Establishing the Machine-learning-based Mapping Between Microstructure and Hardness: *Fei Peng¹, Hai Xiao¹, Dongsheng Li¹, Rajendra Bordia¹, Jianhua Tong¹, Jianan Tang¹, Xiao Geng¹, Siddhartha Sarkar¹, Bridget Sheridan¹*; ¹Clemson University

4:40 PM

Cold and Flash Sintering of Metal-doped LLZO for Solid-State Battery Applications: Gareth Jones¹; Christopher Green²; Dinesha Dabera¹; Parinaz Tabrizian¹; Scott Gorman³; Sherry Ghanizadeh²; Sandra Fisher John²; David Pearmain²; Geoff West¹; Emma Kendrick³; *Claire Dancer¹*; ¹University of Warwick; ²Lucideon Ltd; ³University of Birmingham

5:00 PM

Processing of High Entropy Garnet Optical Ceramics: *Jiao Li¹, Yiquan Wu¹*; ¹Alfred University

ARTIFICIAL INTELLIGENCE

Materials Processing and Fundamental Understanding Based on Machine Learning and Data Informatics — AI-guided Processing Study

Program Organizers: Kathy Lu, Virginia Polytechnic Institute and State University; Jian Luo, University of California, San Diego; Xian-Ming Bai, Virginia Polytechnic Institute and State University; Yi Je Cho, Sunchon National University

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Session Chair: Xian-Ming Bai, Virginia Polytechnic Institute and State University

2:00 PM Invited

Unraveling the Process Fundamentals of Additive Friction Stir Deposition by Integrating Physics Simulation with Data-driven Approaches: *Hang Yu¹*; ¹Virginia Polytechnic Institute and State University

2:30 PM

Comparison of Data Driven and Physics-informed Machine Learning Models for Temperature Prediction of Shear Assisted Processing and Extrusion: *Ethan King¹, Colby Wight¹, WoongJo Choi¹, Zhao Chen¹, Keerti Kappagantula¹, Shenyang Hu¹, Yulan Li¹, Tegan Emerson¹, Sarah Akers¹, Henry Kvinge¹, Eric Machorro¹, Jenna Pope¹, Erin Barker¹, Eric Smith¹*; ¹Pacific Northwest National Laboratory

2:50 PM

Composition and Property Prediction of Polymer-derived Silicon Oxycarbides: *Yi Je Cho¹, Harrison Chaney², Kathy Lu²*; ¹Sunchon National University; ²Virginia Tech

3:10 PM

Computational and Machine Learning Studies of DNA-templated Dye Aggregate Design: *Lan Li¹*; ¹Boise State University

3:30 PM Break

3:50 PM Invited

Data-Driven Study of Shape Memory Behavior of Multi-component Ni-Ti Alloys: *Shreyas Honrao¹, Othmane Benafan², John Lawson¹*; ¹NASA Ames Research Center; ²NASA Glenn Research Center

4:20 PM

Machine Learning for Joint Quality Performance-determining Relationship between Intermetallic Properties and weld Microstructure of Al/steel Resistance Spot Welds: *Moses Yeboah Obiri¹, Alejandro Ojeda¹, Deborah Fagan¹, Keerti Kappagantula¹, Hassan Ghassemi-Armaki¹, Blair Carlson¹*; ¹Pacific Northwest National Laboratory

4:40 PM

Addressing Data Needs for High Temperature Material Processing with Natural Language Processing: *Amit Verma¹, Benjamin Glaser¹, Robin Kuo¹, Jason Zhang¹, Nicholas David¹, Zhisong Zhang¹, Emma Strubell¹, Anthony Rollett¹*; ¹Carnegie Mellon University

5:00 PM

Machine Learning Based Prediction of Cation Distribution in Complex Spinel Oxides as a Function of Processing Temperature: *Ying Fang*¹; Siming Zhang¹; Guofeng Wang¹; ¹University of Pittsburgh

BIOMATERIALS

Next Generation Biomaterials — Next Generation Biomaterials II

Sponsored by: ACerS Bioceramics Division

Program Organizers: Roger Narayan, University of North Carolina; Sanjiv Lalwani, Lynntech, Inc.

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Session Chairs: Jonathan Massera, Tampere University; Anthony Wren, Alfred University

2:00 PM Invited

Next Generation Models for Bone Metastasis of Cancer: *Kalpna Katti*¹; Haneesh Jasuja¹; Farid Solaymani¹; Sharad Jaswandkar¹; Jiha Kim¹; Anu Gaba¹; Dinesh Katti¹; ¹North Dakota State University

2:20 PM Invited

Synthesis of Hierarchical TiO₂ Nanowire Architectures for Drug Delivery and Cell Carrier Applications: Song Chen¹; Akiyoshi Osaka²; ¹Taiyuan University of Technology; ²Okayama University

2:40 PM Invited

Luminescent Bioactive Glass Scaffolds: *Jonathan Massera*¹; ¹Tampere University

3:00 PM Invited

Mineralized Biomaterials from Extrinsically-Controlled Freeze-casting: *Steven Naleway*¹; Tony Yin¹; Josh Fernquist¹; Maddie Schmitz¹; Debora Lyn Porter¹; Elise Hotz¹; ¹University of Utah

3:20 PM Break

3:40 PM Invited

Copper Containing Glass-Based Bone Adhesives for Orthopaedic Applications: Glass Characterization, Antimicrobial Efficacy and Mechanical Suitability: Sahar Mokhtari¹; Anthony Wren¹; ¹Alfred University

4:00 PM

Acetone Sensing with a Chemo-mechanical Actuating Polyaniline-cellulose Acetate Composite: *Anthony Annerino*¹; Perena Gouma¹; ¹The Ohio State University

4:20 PM

A Novel Glass-based Material for Vital Pulp Therapy: Biocompatibility and Physiochemical Properties: *Jerry Howard*¹; John Colombo²; Kirsta Carlson¹; ¹University of Nevada, Reno; ²University of Nevada, Las Vegas

SPECIAL TOPICS

Resisting Degradation from the Environment: A Symposium Honoring Carolyn M. Hansson's Research and Pioneering Experiences as a Woman in STEM — Talks to Introduce Posters II

Sponsored by: TMS: Corrosion and Environmental Effects Committee, TMS: Steels Committee

Program Organizers: Jenifer Locke, Ohio State University; Brendy Rincon Troconis, University of Texas at San Antonio; Ashley Paz y Puente, University of Cincinnati; George Gray, Los Alamos National Laboratory; Suveen Mathaudhu, Colorado School of Mines; David Shifler, Office of Naval Research

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Funding support provided by: Office of Naval Research

Session Chair: Jenifer Locke, Ohio State University

2:00 PM

Liquid Metal Embrittlement: Cracking Open the Disparate Mechanisms: Justin Norkett¹; Victoria Miller¹; ¹University of Florida

2:20 PM

Relating Microstructure to Environmental Degradation in Al-Mg Alloys: *Josh Kacher*¹; ¹Georgia Institute of Technology

2:40 PM

Quantifying the Environmentally Assisted Cracking Initiation and Short Crack Behavior in New Generation 7xxx Aluminium: *Tim Burnett*¹; Ryan Euesden¹; Yasser Aboura¹; Al Garner¹; Thomas Jailnin¹; Zak Barrett²; Christian Engel²; Phil Prangnell¹; ¹University of Manchester; ²Airbus

3:00 PM

Correlating Crack Tip pH to Environment Assisted Cracking Performance in Al Alloys: *Jenifer Locke*¹; Katrina Catledge¹; Gabby Montiel¹; Gabriella Marino¹; ¹Ohio State University

3:20 PM Break

3:40 PM

The Multi-dimensional Impact of Corrosion on Sustainability: *Christopher Taylor*¹; ¹Dnv GL

BIOMATERIALS

Society for Biomaterials: Biological Response to Materials and Material's Response to Biological Environments — Session II

Program Organizers: Thomas Dziubla, University of Kentucky; Christopher Siedlecki, Penn State College of Medicine; Jeffrey Capadona, Case Western Reserve University; Lynne Jones, Johns Hopkins Orthopaedics

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Session Chairs: Christopher Siedlecki, Penn State University; Jeffrey Capadona, Case Western Reserve University

2:00 PM Invited

Silicone-aided Advanced Additive Manufacturing of Glass and Glass-ceramic Scaffolds: *Enrico Bernardo*¹; Hamada Elsayed¹; Jozef Kraxner²; Franco Stabile³; ¹University of Padova; ²University of Treviso; ³CETMIC, Centro de Tecnología de recursos Minerales y Cerámica

2:30 PM Invited

Nanoceria as an Enzyme Mimic (NEM): *Sudipta Seal*¹; ¹University of Central Florida

3:00 PM

Modeling the Reliability and Proof Testing of Bioceramics: *Osama Jadaan*¹; Eric Baker²; ¹University of North Florida; ²Connecticut Reserve Technologies

3:20 PM

Effects of Debinding Temperature of Carbonate Apatite Honeycomb on Osteoconductivity: *Kunio Ishikawa*¹; Keigo Shibahara¹; Koichiro Hayashi¹; Yasuhiro Nakashima¹; ¹Kyushu University

3:40 PM Break

4:00 PM

Architected Biomaterials for Multifunctional Medical Implants: Kaveh Barri¹; Qianyun Zhang¹; *Amir Alavi*¹; ¹University of Pittsburgh

4:20 PM Invited

Biodegradable Magnesium-based Bone Fixation Implants: Alloy Design, Post-fabrication Processes, and Biocompatibility: *Hamdy Ibrahim*¹; ¹University of Tennessee Chattanooga

4:40 PM

Scalable Green Electrospinning of an Environmentally Safe Nanofibrous Fish Skin Gelatin Material for a Sustainable Tissue Replacement Bank: *Amanda Kennell*¹; Olivia Shivers¹; Ma Halog¹; Ranoah Holcomb¹; Courtney Severino¹; Andrei Stanishevsky¹; ¹University of Alabama in Birmingham

BIOMATERIALS

Society for Biomaterials: Biomaterial Applications — Biomaterials for Healing and Regeneration

Program Organizers: Jessica Jennings, University of Memphis; Guillermo Ameer, Northwestern University; Danielle Benoit, University of Rochester; Jordon Gilmore, Clemson University

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Session Chair: Jessica Jennings, University of Memphis

2:00 PM Invited

Bioactive Glass and Its Role in Healing: *Steven Jung*¹; ¹Mo-Sci Corporation

2:30 PM

Magnesium-Based Nanocomposites for Bone Fracture Repair: Shelby Hash¹; Mary Jia²; Wendy Reynoso-Diaz¹; Mostafa Elsaadany²; *Hamdy Ibrahim*¹; ¹University of Tennessee Chattanooga; ²University of Arkansas

2:50 PM

Development of Natural Polymer-based Hydrogels for Corneal Tissue Engineering Applications: Prashant Kumta¹; *Sangeetha Kunjukunju*¹; John Ohodnicki¹; Joe Candiello¹; ¹University of Pittsburgh

3:10 PM

Next Generation Nanosurfaces for Drugfree Antibiofilm Applications: *Tolou Shokuhfar*¹; ¹University of Illinois at Chicago

3:30 PM Break

3:50 PM

Plant Polymer for Climate and Health Management: *Khawaja Hossain*¹; ¹Mayville State University

4:10 PM

Biodegradable Magnesium Fixation Wires for Bone Healing: *Karel Tesar*¹; Anezka Jancova¹; Margit Žaloudková²; Radka Vrbova³; Martin Bartoš³; Štefan Juhás⁴; Jitka Lunackova³; Karel Balík²; ¹Czech Technical University in Prague; ²Institute of Rock Structure and Mechanics of The Czech Academy of Sciences; ³Charles University; ⁴Institute of Animal Physiology and Genetics of The Czech Academy of Sciences

4:30 PM

Electrospraying Chitosan on Co-electrospun PCL/PVA Composite with Mesoporous Silica Particles to Release Curcumin for Skin Tissue Engineering Application: *Ali Sadeghianmaryan*¹; Saman Naghieh²; Joel D. Bumgardner¹; ¹The University of Memphis; ²University of Saskatchewan

CERAMIC AND GLASS MATERIALS

Solid-state Optical Materials and Luminescence Properties — Processing and Study of Advanced Optical Materials II

Sponsored by: ACerS Basic Science Division

Program Organizers: Yiquan Wu, Alfred University; Jas Sanghera, Naval Research Laboratory; Akio Ikesue, World-Lab. Co., Ltd; Rong-Jun Xie, Xiamen University; Mathieu Allix, Laboratoire CEMHTI; Kiyoshi Shimamura, National Institute for Materials Science; Liangbi Su, Shanghai Institute of Ceramics; Dariusz Hreniak, Institute of Low Temperature and Structure Research

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Session Chair: Guangran Zhang, Corning Incorporated

2:00 PM Invited

High-entropy Rare-earth Aluminates: Crystal Growth and Ceramics: Mariya Zhuravleva¹; Kaden Anderson¹; Matheus Pianassola¹; Charles Melcher¹; Yimin Wang²; Jaroslaw Glodo²; ¹University of Tennessee; ²Radiation Monitoring Devices, Inc.

2:20 PM Invited

UV and UVB Dual-band Persistent Luminescent Phosphor: Yuanbing Mao¹; Xianli Wang¹; ¹Illinois Institute of Technology

2:40 PM Invited

Optical Ceramic Window Materials at NRL: Woohong (Rick) Kim¹; Shyam Bayya¹; Colin Baker¹; Brandon Shaw¹; Lynda Busse¹; Jesse Frantz¹; Bryan Sadowski²; Tony Zhou³; Adam Floyd³; Joshua Gild³; Jasbinder Sanghera¹; ¹Naval Research Laboratory; ²Jacobs; ³University Research Foundation

3:00 PM

Advanced Spinel Ceramics with Highest VUV-vis Transparency: Akio Ikesue¹; ¹World-Lab. Co., Ltd

3:20 PM Break

3:40 PM Invited

Yb Doped MgO Transparent Ceramics Sintered through the SPS Method: Guangran Zhang¹; Xuan Chen¹; Yiquan Wu¹; Robert Tomala²; Dariusz Hreniak³; ¹Alfred University; ²Polish Academy of Sciences; ³Polish Academy of Sciences

4:00 PM

Application of La₂Zr₂O₇:Pr³⁺ Nanoparticles for Luminescence Thermometry: Forough Jahanbazi¹; Yuanbing Mao¹; ¹Illinois Institute of Technology

4:20 PM

Manipulable Persistent Luminescence of Pr³⁺-Activated Phosphors: Yuanbing Mao¹; Xianli Wang¹; ¹Illinois Institute of Technology

FUNDAMENTALS AND CHARACTERIZATION

Synthesis, Characterization, Modeling and Applications of Functional Porous Materials — Porous Materials II

Sponsored by: ACerS Basic Science Division

Program Organizers: Lan Li, Boise State University; Winnie Wong-Ng, National Institute of Standards and Technology; Kevin Huang, University of South Carolina

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Session Chair: Winnie Wong-Ng, National Institute of Standards and Technology (NIST)

2:00 PM Invited

Crystal Packing and Porosity in Molecular Co-crystals Based on C₆₀ Fullerene: Lawrence Cook¹; Greg Brewer¹; Winnie Wong-Ng²; ¹Catholic University of America; ²National Institute of Standards and Technology

2:30 PM

Mesoscopic Simulations of Tension and Compression of Cross-Linked Carbon Nanotube Films: Effects of the Nanotube Chirality: Kevin Kayang¹; Abu Banna¹; Alexey Volkov¹; ¹The University of Alabama

2:50 PM Invited

Porous Solids with Nanostructured Surfaces for Environmental Applications: Sharmila Mukhopadhyay¹; Wenhui Wang¹; Mallikarjuna Nadagouda²; ¹University of Maine; ²USEPA

3:10 PM

Carbon Fibers Loaded Epoxy Foam: From Dielectric Characterization to Electromagnetic Absorption Application: Ratiba Benzerga¹; Chloé Méjean¹; Laura Pometcu¹; Philippe Pouliguen²; Ala Sharaiha¹; ¹University of Rennes, IETR; ²DGA/DS

3:30 PM Break

3:50 PM Invited

New Ceramic-Carbonate Membranes for Direct and Selective Capture of Low Concentration CO₂: Kevin Huang¹; Shichen Sun¹; Kangkang Zhang¹; ¹University of South Carolina

4:20 PM Invited

Integrated Multi-characterization Approach to Understand Pore Size Distributions in Ceramic Composite Membranes: V. V. Rohit Bukka¹; Christine Brockman¹; Pankaj Sarin¹; ¹Oklahoma State University

4:50 PM

Modeling Transport Characteristics of RO Membranes Using Macrovoid Resolved Simulations: Vimal Ramanuj¹; Ramanan Sankaran¹; Luka Malenica¹; Kyle Cole¹; Marc Day²; Jeffrey McCutcheon³; ¹Oak Ridge National Laboratory; ²National Renewable Energy Laboratory; ³University of Connecticut

5:10 PM

Optimizing Surfactant Templating of Yttria-Stabilized Zirconia Aerogels for High-temperature Applications: Effect of Anionic, Nonionic Surfactants: Rebecca Walker¹; Jamesa Stokes²; Frances Hurwitz²; Haiquan Guo³; James Ferri¹; ¹Virginia Commonwealth University; ²NASA Glenn Research Center; ³Universities Space Research Association

NUCLEAR ENERGY

Tackling Structural Materials Challenges for Advanced Nuclear Reactors — Molten Salt Systems

Sponsored by: TMS Corrosion and Environmental Effects Committee, TMS Nuclear Materials Committee, TMS: Advanced Characterization, Testing, and Simulation Committee

Program Organizers: Miaomiao Jin, Pennsylvania State University; Xing Wang, Pennsylvania State University; Karim Ahmed, Texas A&M University; Jeremy Bischoff, Framatome; Adrien Couet, University of Wisconsin-Madison; Kevin Field, University of Michigan; Lingfeng He, North Carolina State University; Raul Rebak, GE Global Research

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Session Chairs: Weiyue Zhou, Massachusetts Institute of Technology; Adrien Couet, University of Wisconsin-Madison

2:00 PM Invited

Interfacial Interactions between Molten Salt and Structural Materials: *Jinsuo Zhang*¹; ¹Virginia Polytechnic Institute and State University

2:30 PM Invited

Elucidating Interfacial Phenomena in Molten Salt Corroded Nickel-Chromium Alloys using Analytical Transmission Electron Microscopy: *Kaustubh Bawane*¹; Ruchi Gakhar¹; Michael Woods¹; Panayotis Manganaris¹; Yachun Wang¹; Jagadeesh Sure²; Arthur Ronne³; Phillip Halstenberg⁴; Simerjeet Gill²; Kotaro Sasaki²; Yu-chen Karen Chen-Wiegart³; Sheng Dai⁴; Shannon Mahurin⁴; Simon Pimblott¹; James Wishart²; Lingfeng He¹; ¹Idaho National Laboratory; ²Brookhaven National Laboratory; ³Stony Brook University; ⁴Oak Ridge National Laboratory

3:00 PM

Quantifying Cr and Fe Dissolution to Understand Stainless Steel Molten Salt Compatibility: *Bruce Pint*¹; Dino Sulejmanovic¹; Cory Parker¹; Yi-Feng Su¹; Rishi Pillai¹; ¹Oak Ridge National Laboratory

3:20 PM Break

3:40 PM

Assessing Materials Susceptibility to Environmentally-assisted Cracking in Advanced Reactor Coolant Environments: *Samuel Briggs*¹; Peter Beck¹; Dustin Mangus¹; Jake Quincey¹; Xavier Quintana¹; Guillaume Mignot¹; Julie Tucker¹; ¹Oregon State University

4:00 PM Invited

Imaging Local Vacancy Supersaturation in Metals After Corrosion in Molten Salt: *Yang Yang*¹; Weiyue Zhou²; Sheng Yin³; Qin Yu³; Robert Ritchie³; Mark Asta³; Ju Li²; Michael Short²; Andrew Minor³; ¹The Pennsylvania State University; ²MIT; ³LBL

4:30 PM

Electrochemical Determination Kinetic Properties of Ni²⁺ and Cr³⁺ / Cr²⁺ in FLiNaK Molten Salt: *Nathan Smith*¹; Stephen Lombardo¹; Hojong Kim¹; Shunli Shang¹; Zi-Kui Liu¹; ¹Pennsylvania State University

4:50 PM

Correlated Characterization of Ni-based Superalloys Corroded in Uranium-containing Molten Salt Systems: *Trishelle Copeland-Johnson*¹; Daniel Murray¹; Guoping Cao¹; ¹Idaho National Laboratory

ARTIFICIAL INTELLIGENCE

Uncertainty Quantification in Data-Driven Materials and Process Design — Materials Design under Uncertainty

Sponsored by: TMS: Integrated Computational Materials Engineering Committee

Program Organizers: Yan Wang, Georgia Institute of Technology; Raymundo Arroyave, Texas A&M University; Anh Tran, Sandia National Laboratories; Dehao Liu, Binghamton University

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Session Chairs: Edwin Garcia, Purdue University; Wei Xiong, University of Pittsburgh; Aaron Tallman, Florida International University

2:00 PM

Machine Learning of Phase Diagrams: Jarrod Lund¹; Haoyue Wang¹; Edwin Garcia¹; Richard Braatz²; ¹Purdue University; ²MIT

2:20 PM

Thermodynamic Modeling with Uncertainty Quantification and its Implications for Intermetallic Catalysts Design: Application to Pd-Zn-Based Gamma-Brass Phase: *Rushi Gong*¹; Shun-Li Shang¹; Griffin Canning¹; Robert Rioux¹; Michael Janik¹; Zi-Kui Liu¹; ¹The Pennsylvania State University

2:40 PM

Efficient Phase Diagram Determination via Sequential Learning: *Theresa Davey*¹; Brandon Bocklund²; Zi-Kui Liu³; Ying Chen¹; ¹Tohoku University; ²Lawrence Livermore National Lab; ³Pennsylvania State University

3:00 PM

A Feature-rich Approach to the Characterization of High Temperature, Sulfate-induced Corrosion of Advanced Alloys: *David Poerschke*¹; Atharva Chikhalikar¹; ¹University of Minnesota

3:20 PM Break

3:40 PM

Bayesian Calibrated Yield Strength Model for High-entropy Alloys: *Xin Wang*¹; Wei Xiong¹; ¹University of Pittsburgh

4:00 PM

Using Scalable Multi-Objective Bayesian Optimization to Develop Aluminum Scandium Nitride Molecular Dynamics Force Fields: *Jesse Sestito*¹; Michaela Kempner²; Tequila Harris²; Eva Zarkadoulas³; Yan Wang²; ¹Valparaiso University; ²Georgia Institute of Technology; ³Oak Ridge National Laboratory

4:20 PM

Uncertainty Quantification of Constitutive Models in Crystal Plasticity Finite Element Method: *Anh Tran*¹; Hojun Lim¹; ¹Sandia National Laboratories

4:40 PM

Uncertainty Quantification of a High-throughput Local Plasticity Test: Profilometry-based Indentation Plastometry of Al 7075 T6 Alloy: *Aaron Tallman*¹; Denny John¹; Tanaji Paul¹; Arvind Agarwal¹; ¹Florida International University

SUSTAINABILITY, ENERGY, AND THE ENVIRONMENT

14th Symposium on Green and Sustainable Technologies for Materials Manufacturing and Processing — Sustainable Processing of Ceramics and Composites I/Novel Processing of Coatings and Metals

Sponsored by: ACerS Engineering Ceramics Division

Program Organizers: Surojit Gupta, University of North Dakota; Mritunjay Singh, Ohio Aerospace Institute; Tatsuki Ohji, National Institute of Advanced Industrial Science and Technology; Hisayuki Suematsu, Nagaoka University of Technology; Enrico Bernardo, University of Padova; Rajiv Asthana, University of Wisconsin; Yiquan Wu, Alfred University; Zhengyi Fu, Wuhan University of Technology; Allen Applett, Oklahoma State University

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Session Chairs: Manabu Fukushima, National Institute of Advanced Industrial Science and Technology (AIST); Daniel Kopp, Rutgers, The State University of New Jersey; Surojit Gupta, University of North Dakota; Valerie Wiesner, NASA Langley Research Center

8:00 AM Invited

Sustainable Processing of Composite Materials: *Daniel Kopp*¹; Paniz Foroughi¹; Paul Antonick¹; Noemie Denis¹; Richard Riman¹; ¹Rutgers, The State University of New Jersey

8:30 AM

Thermal Insulators Prepared by Gelation Freezing Route and Their Energy Efficiency in Prototype Furnace: *Manabu Fukushima*¹; ¹National Institute of Advanced Industrial Science and Technology (AIST)

8:50 AM

The Effect of Sawdust Particle Size Distribution on the Hydraulic Conductivity of Low-cost Ceramic Water Filters: *Ian Nettleship*¹; Chuyuan Zheng¹; ¹University of Pittsburgh

9:10 AM

Preparation of Inorganic Green Pigments via a Green Process: *Allen Applett*¹; Travis Reed¹; ¹Oklahoma State University

9:30 AM Invited

SiOCN Corrosion Resistant Coatings on Stainless Steel: *HyeonJoon Cho*¹; Kathy Lu¹; ¹Virginia Tech

10:00 AM Break

10:20 AM Keynote

Protective Coatings for Lunar Dust Tolerant Applications: *Valerie Wiesner*¹; Glen King¹; Keith Gordon¹; Christopher Wohl¹; Lopamudra Das²; Jonathan Hernandez²; ¹NASA Langley Research Center; ²National Institute of Aerospace

10:50 AM

Selective Eliminate the Risk of High Toxicity Mercury from Valuable Selenium-enriched Material Using Vacuum Volatilization: *Yunke Wang*¹; *Guozheng Zha*¹; ¹Kunming University of Science and Technology

BIOMATERIALS

3D Printing of Biomaterials and Devices — Session III

Sponsored by: ACerS Bioceramic Division

Program Organizers: Sahar Vahabzadeh, Northern Illinois University; Susmita Bose, Washington State University; Amit Bandyopadhyay, Washington State University; Mukesh Kumar, LincoTek Medical; Mangal Roy, Indian Institute of Technology - Kharagpur (IIT-Kgp)

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Session Chair: Kalpana Katti, North Dakota State University

8:00 AM Invited

Interlocked Bone Scaffolds with BMP Induced Osteogenesis with Use of 3D Printed Molds: *Kalpana Katti*¹; Krishna Kundu¹; Sharad Jaswandkar¹; Dinesh Katti¹; ¹North Dakota State University

8:30 AM Invited

Sheet Lamination Additive Manufacturing (SLAM) – A Viable Approach to Resorbable 3D Constructs for Bone Tissue Engineering: *Prashant Kumta*¹; *Matthew Criado*¹; Abhijit Roy¹; John Ohodnicki¹; Nick Tondravi¹; Hannah Fischer¹; Howard Kuhn¹; ¹University of Pittsburgh

9:00 AM Invited

Implant Optimization Guided by Biomimetic Insight: *Malcolm Sneed*¹; ¹University of Southern California

9:30 AM Invited

3D Printing Strategies to Fabricate Complex Scaffolds for Tissue Engineering Applications: *Murat Guvendiren*¹; *Alperen Abaci*¹; ¹New Jersey Institute of Technology

10:00 AM Break

10:20 AM

Mechanical and Electrical Properties of 3D Printed Wearable Structures: *Jose Gonzalez-Garcia*¹; Bhargavi Mummareddy¹; Gina Morrison¹; Vamsi Borra¹; Pedro Cortes¹; Byung-Wook Park¹; ¹Youngstown State University

10:40 AM

Effect of Printing Parameters on 3D-printed Biodegradable Biopolymer-metal Composite Material: *Prashant Kumta*¹; *John Ohodnicki*¹; Abhijit Roy¹; Matthew Criado¹; Howard Kuhn¹; ¹University of Pittsburgh

SPECIAL TOPICS

ACerS Richard M. Fulrath Award Session — Session II

Sponsored by: ACerS

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Session Chairs: Junichi Tatami, Yokohama National University;
 Michael Halbig, NASA Glenn Research Center

9:00 AM Invited

Fabrication and Morphology Control of Advanced Glass-Ceramics for Next-generation All-Solid-State Batteries: *Tsuyoshi Honma*¹;
¹Nagaoka University of Technology in Niigata

9:40 AM Invited

Development of New Process for Mass-producing Nanoparticles and Industrialization of Quantum Dots Materials for Display: *Hirokazu Sasaki*¹;
¹Shoei Chemical Inc.

10:00 AM Invited

Displays Having FETs with Crystalline Oxide Semiconductor Materials: *Kenichi Okazaki*¹;
¹Semiconductor Energy Laboratory Co., Ltd. (SEL)

10:20 AM Break

10:40 AM Invited

Design Paradigm for Sustainable Manufacturing of Ceramics by Analyzing Different Case Studies: *Surojit Gupta*¹;
¹University of North Dakota

ADDITIVE MANUFACTURING

Additive Manufacturing Modeling, Simulation, and Machine Learning: Microstructure, Mechanics, and Process — Machine Learning and Artificial Intelligence

Program Organizers: Jing Zhang, Indiana University – Purdue University Indianapolis; Brandon McWilliams, US Army Research Laboratory; Li Ma, Johns Hopkins University; Yeongil Jung, Changwon National University

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Session Chairs: Jing Zhang, Indiana University - Purdue University Indianapolis; Li Ma, Johns Hopkins University Applied Physics Laboratory; Yeon-Gil Jung, Changwon National University; Brandon McWilliams, CCDC Army Research Laboratory

8:00 AM

Embracing Variability: Machine Learning-based Sequential Optimization of Additive Manufacturing Processes: *Maher Alghalayini*¹;
 Surya Kalidindi²; Christiaan Paredis¹; Fadi Abdeljawad¹;
¹Clemson University; ²Georgia Institute of Technology

8:20 AM

Generating Novel Porosity Distributions Produced by Metal Additive Manufacturing via Deep Learning: *Odinakachukwu Ogoke*¹; Chris Laursen²; Kyle Johnson²; Michael Glinsky²; Charlotte Kramer²; Amir Barati Farimani¹;
¹Carnegie Mellon University; ²Sandia National Laboratories

8:40 AM

Machine Learning Segmentation Methods for Fatigue Fracture Surface Defect Analyses: *Austin Ngo*¹; David Scannapieco¹; Shuheng Zhang¹; Shuyue Bian¹; Collin Sharpe¹; John Lewandowski¹;
¹Case Western Reserve University

9:00 AM

Prediction of Microstructure Formation Under Rapid Solidification Using a Deep Learning Approach: *Anindya Bhaduri*¹; Chen Shen¹; Alex Kitt²; Lee Kerwin²; Siyeong Ju¹; Luke Mohr²; Yang Jiao¹; Marissa Brennan¹; Shenyang Huang¹; Sreekar Karnati¹; Monica Soare¹; Arushi Dhakad²; Hamedreza Seyyedhosseinzadeh³; Liping Wang¹; Changjie Sun¹; Lang Yuan³;
¹GE Research; ²EWI; ³University of South Carolina

9:20 AM

Using Generative Adversarial Networks for the Design of Metamaterials to Reach New Property Spaces: *Chandra Veer Singh*¹; Sahar Choukir¹;
¹University of Toronto

9:40 AM

Using Machine Learning to Characterize Powder Behavior and Surface Roughness in Powder Bed Fusion AM: *Srujana Rao Yaras*¹; Elizabeth Holm¹; Anthony Rollett¹;
¹Carnegie Mellon University

ADDITIVE MANUFACTURING

Additive Manufacturing of Metals: Microstructure, Properties and Alloy Development — Fe-based Alloys II

Program Organizers: Prashanth Konda Gokuldoss, Tallinn University of Technology; Jurgen Eckert, Erich Schmid Institute of Materials Science; Zhi Wang, South China University of Technology

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Session Chairs: Marissa Brennan, GE Research; Evan Handler, Naval Surface Warfare Center Carderock Division

8:00 AM

Aging Response of Laser Powder Bed Fusion 17-4PH Stainless Steel: Evan Handler¹; *Katherine Fowler*¹; Aidan Cowhig¹; Caroline Vail¹;
¹Naval Surface Warfare Center

8:20 AM

The Effect of Build Height on the Metallurgical Characteristics of 17-4 PH Stainless Steel Manufactured through DED: *Ipfi Mathoho*¹; Powel Tshikalange¹; Nana Arthur¹;
¹CSIR Pretoria

8:40 AM

Laser Powder Bed Fusion of 14YWT Oxide Dispersion Strengthened Steel Produced Using Gas Atomized Reaction Synthesis Precursor Powder: *Sourabh Saptarshi*¹; Timothy Horn¹; Christopher Rock¹; Djamal Kaoumi¹; Matthew DeJong¹; Iver Anderson²; Jennifer Forrester¹; Timothy Prost²; Ralph Napolitano³; Emma White⁴;
¹North Carolina State University; ²AMES Laboratory; ³Iowa State University; ⁴DECHEMA Forschungsinstitut

9:00 AM

Laser Powder Bed Fusion of Ultra-High Strength Steel from Gas Atomized Powders: *Thinh Huynh*¹; Kevin Graydon¹; Nemanja Klejstan²; Marko Knezevic²; Brandon McWilliams³; Kyu Cho³; Yongho Sohn¹; ¹University of Central Florida; ²University of New Hampshire; ³DEVCOM US Army Research Laboratory

9:20 AM

Mechanical and Microstructure Analysis of 4130 Steel Alloy Produced Using Laser Powder Bed Fusion: *Joy Forsmark*¹; Eric Poczek¹; Yun Bai¹; Emily Wolbeck¹; ¹Ford Motor Company

9:40 AM

Effect of Post-heat Treatment on the Microstructure and Mechanical Properties of High-carbon High-chromium Tool Steel Manufactured by Direct Energy Deposition: *Jung-Hyun Park*¹; Kyu-Sik Kim²; Jin-Young Kim³; Yong-Mo Koo⁴; Jong-Bae Jeon⁵; Kee-Ahn Lee¹; ¹Inha University; ²Agency for Defense Development; ³Fusiontech. Corp.; ⁴Changsung Corp; ⁵Dong-A University

10:00 AM Break

10:20 AM

Microstructure and Mechanical Property Stability of Wire Arc Additive Manufactured Stainless Steels after Long-Term Thermal Aging: *Juan Gonzalez*¹; Luc Hagen¹; Stephen Tate¹; Jonah Klemm-Toole¹; ¹Colorado School of Mines

10:40 AM

The Development of a Directed Energy Deposition (DED) Printability Framework for Improving Part Density and Performance in High Strength Martensitic Steels: *Matthew Vaughan*¹; Michael Elverud¹; Jiahui Ye¹; Raiyan Seede¹; Sean Gibbons²; Philip Flater²; Alaa Elwany¹; Raymundo Arroyave¹; Ibrahim Karaman¹; ¹Texas A&M University; ²Air Force Research Laboratory

11:00 AM

L-DED Processability of AISI 410L Stainless Steel: *Jeferson Pacheco*¹; Ana Sofia De Oliveira¹; Marcelo Veiga¹; Vitor Meura¹; Paulo Bloemer¹; ¹Federal University of Parana

ADDITIVE MANUFACTURING

Additive Manufacturing of Metals: Microstructure, Properties and Alloy Development — Ni-based Alloys II

Program Organizers: Prashanth Konda Gokuldoss, Tallinn University of Technology; Jurgen Eckert, Erich Schmid Institute of Materials Science; Zhi Wang, South China University of Technology

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Session Chair: Jeferson Pacheco, Federal University of Parana

8:00 AM

Material Qualification of IN625 for Binder Jet Printing: *Katerina Kimes*¹; Kyle Myers¹; ¹Desktop Metal / ExOne

8:20 AM

Origin and Evolution of Defects during Sintering in Binder-Jet Printed 625 Alloy: Chuyuan Zheng¹; *Markus Chmielus*¹; Ian Nettleship¹; ¹University of Pittsburgh

8:40 AM

Thermal and Microstructural Characterizations of GRCop-84/In718 Composite Structure Fabricated by DED Machine: *Zexiao Wang*¹; Nicholas O'Brien¹; Nicholas Jones¹; Jack Beuth¹; Sheng Shen¹; ¹Carnegie Mellon University

9:00 AM

An Investigation into the Effects of CoAl₂O₄ Oxide Addition on Melt Pool Geometry and Microstructure in Alloy 718 Processed by Laser Powder Bed Fusion: *I-Ting Ho*¹; Kai-Chun Chang²; Dhruv Tiparti¹; An-Chou Yeh²; Sammy Tin³; ¹Illinois Institute of Technology; ²National Tsing Hua University; ³The University of Arizona

9:20 AM

Electron Beam Powder Bed Fused Haynes-282 Builds Containing Thin Wall Struts of Varying Thicknesses: *Bryan Lim*¹; Hansheng Chen¹; Keita Nomoto¹; Zibin Chen²; Amy Clarke³; Sophie Primig⁴; Xiaozhou Liao¹; Sudarsanam Babu⁵; Andrew Breen¹; Simon Ringer¹; ¹The University of Sydney; ²The Hong Kong Polytechnic University; ³Colorado School of Mines; ⁴The University of New South Wales; ⁵University of Tennessee, Knoxville

9:40 AM

Optimizing the High Temperature Mechanical Performance of Haynes 282 Printed via Laser Powder Bed Fusion: *Nicholas Lamprinakos*¹; Anthony Rollett¹; ¹Carnegie Mellon University

10:00 AM Break

10:20 AM

Post-heat Treatment Design of Haynes 282 Alloys Processed by Wire-arc Additive Manufacturing: *Luis Ladinos Pizano*¹; Soumya Sridar¹; Wei Xiong¹; ¹University of Pittsburgh

10:40 AM

Solving Solidification Cracking in Laser Powder Bed Fusion Haynes 230: *Jonah Klemm-Toole*¹; Ruben Ochoa¹; Benjamin Rafferty¹; Amy Clarke¹; Jeremy Iten¹; ¹Colorado School of Mines

ADDITIVE MANUFACTURING

Additive Manufacturing of Polymeric-based Materials: Challenges and Potentials — Characterization and Novel Approaches to Mitigate the Challenges of Polymeric-based Materials in Additive Manufacturing

Program Organizers: Ola Rashwan, Pennsylvania State University-Harrisburg; Matt Caputo, Pennsylvania State University; Daudi Waryoba, Pennsylvania State University; Pedro Cortes, Youngstown State University

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Session Chairs: Matt Caputo, Penn State Shenango; Ola Rashwan, Penn State Harrisburg

8:00 AM

Effects of Ironing on the Surface and Thermo-Mechanical Properties of 3D Printed PLA via Material Extrusion: *Matt Caputo*¹; Ola Rashwan²; Daudi Waryoba³; Kevin McDade⁴; ¹Penn State Shenango; ²Penn State Harrisburg; ³Penn State DuBois

8:20 AM

Characterization of Additive Manufactured Carbon Fiber Composite Using an Original Fracture Toughness Measurement Approach: *Allison Rea*¹; Constantin Solomon¹; ¹Youngstown State University

8:40 AM

3D Printing of Highly Stretchable Shape Memory Polymer Composites (SMPCs): *Kavish Sudan*¹; Kunal Kate¹; Rajiv Malhotra²; ¹University of Louisville; ²Rutgers University

9:00 AM

Extrusion and Characterization of Compounded rPET 3D Printing Filament: *Ola Rashwan*¹; Zachary Koroneos¹; Matthew Caputo²; ¹Pennsylvania State University- Harrisburg; ²Penn State Shenango

9:20 AM

Direct Ink Writing of Multi-layered Sensors Embedded Using 3D Printing for Soft Robotics: *Akshay Kakar*¹; Derrick Banerjee¹; Konstantinos Sierros¹; Edward Sablosky¹; ¹West Virginia University

9:40 AM

Polymeric Composite of Magnetite Iron Oxide Nanoparticles and Their Application in Biomedicine: A Review: *Estefani Chichande*¹; Moises Bustamante²; Emilio Bucio³; ¹Universidad Central del Ecuador; ²Universidad Autónoma de México; ³Universidad Autónoma de México

10:00 AM Break

10:20 AM

Fused Deposition Modeling of Natural Carbon-enhanced Composite Filaments for Structural Applications: *Logan Veley*¹; Yahya Al-Majali¹; Jason Tremblay¹; ¹Ohio University

10:40 AM Question and Answer Period

ADDITIVE MANUFACTURING

Additive Manufacturing of Titanium-based Materials: Processing, Microstructure and Material Properties — Ti6Al4V

Program Organizers: Ulf Ackelid, Freemelt AB; Ola Harrysson, North Carolina State University

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Session Chair: Ola Harrysson, NCSU

8:00 AM Invited

Powder Bed Processing of Ti6Al4V: Comprehensive Process-Microstructure-Properties Analysis: *Leila Ladani*¹; ¹Arizona State University

8:40 AM

Controlling Aluminum Vaporization in EBM Ti-6Al-4V through Scan Strategy: *Katie O'Donnell*¹; Maria Quintana¹; Christopher Ledford²; Michael Kirka²; Peter Collins¹; ¹Iowa State University; ²Oak Ridge National Laboratory

9:00 AM

Effect of Interlayer Delays on the Microstructure and Properties of As-built Ti64 Parts in Direct Energy Deposition Process: *Rajib Halder*¹; Rigved Sardey¹; Amit Verma¹; Zhening Yang¹; Anthony Rollett¹; ¹Carnegie Mellon University

9:20 AM

Effect of Processing Parameters on Texture Evolution of Laser Powder Bed Fusion Processed Hydride-Dehydride Ti-6Al-4V Powder: *Mohammadreza Asherloo*¹; Muktesh Paliwal²; Anthony Rollett³; Amir Mostafaei¹; ¹Illinois Institute of Technology; ²Kymera International; ³Carnegie Mellon University

9:40 AM

Application of Extreme Value Analysis to Defect Size Distributions for Fatigue Life Prediction of Laser Powder Bed Fusion Processed Ti-6Al-4V: *Tharun Reddy*¹; David Scannapieco²; Austin Ngo²; John Lewandowski²; Anthony Rollett¹; Sneha Narra¹; ¹Carnegie Mellon University; ²Case Western Reserve University

10:00 AM Break

10:20 AM

Effects of Process Parameters on Fatigue Behavior and Defect Characteristics in LPBF Ti-6Al-4V: *Austin Ngo*¹; David Scannapieco¹; Francisco Medina²; Christian Gobert³; Anthony Rollett³; Jack Beuth³; John Lewandowski¹; ¹Case Western Reserve University; ²University of Texas at El Paso; ³Carnegie Mellon University

10:40 AM

Modeling and Characterizing the Effects of Keyhole Porosity on Simulated Ti-6Al-4V Powder-Bed Fusion Microstructures: *Brodan Richter*¹; Joshua Pribe²; Samuel Hocker¹; Joseph Zalameda¹; ¹National Aeronautics and Space Administration; ²National Institute of Aerospace

11:00 AM

Effects of Scan Strategies on Residual Stresses in Laser Powder Bed Fusion Ti-6Al-4V: Courtney Morgan-Barnes¹; Brad Sampson¹; Ryan Stokes¹; Haley Doude¹; Matthew Priddy¹; Linkan Bian¹; ¹Mississippi State University

11:20 AM

Stress State Dependent Fracture Behavior of Additively Manufactured Ti-6Al-4V Containing Internal Flaws: Alexander Wilson-Heid¹; Erik Furton¹; Allison Beese¹; ¹Penn State University

ADDITIVE MANUFACTURING

Additive Manufacturing: Equipment, Instrumentation and In-Situ Process Monitoring — Equipment, Instrumentation and In-Situ Process Monitoring I

Sponsored by: TMS Additive Manufacturing Committee

Program Organizers: Ulf Ackelid, Freemelt AB; Joy Gockel, Colorado School of Mines; Sneha Prabha Narra, Carnegie Mellon University; Ola Harrysson, North Carolina State University

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Session Chair: Sneha Prabha Narra, Carnegie Mellon University

8:00 AM Invited

Wire DED Process Monitoring and Controls: Andrzej Nycz¹; Chris Masuo¹; William Carter¹; Derek Vaughan¹; ¹Oak Ridge National Laboratory

8:40 AM

Design of a Glovebox for In Situ Monitoring of a Directed Energy Deposition Process: Marwan Haddad¹; Hui Wang¹; Ethan Weinberg¹; Ronald Sellers¹; Karan Kankaria¹; Mahsa Valizadeh¹; Sarah Wolff¹; ¹Texas A&M University

9:00 AM

Identifying Melt Pool Dimensions and Melt Pool Variability in Laser Powder Feed Directed Energy Deposition Additive Manufacturing: Ryan Utz¹; Jose Loli¹; Brandon Abranovic¹; Jack Beuth¹; Sneha Narra¹; ¹Carnegie Mellon University

9:20 AM

Melt Pool-Scale Process Monitoring of Laser Powder Bed Fusion: Christian Gobert¹; Guadalupe Quirarte¹; Syed Zia Uddin¹; David Guirguis¹; Jonathan Malen¹; Conrad Tucker¹; Jack Beuth¹; ¹Carnegie Mellon University

9:40 AM Invited

In-situ Monitoring of the EBM Process: From Powder Bed Homogeneity to Thermal Signatures: Marco Grasso¹; Bianca Colosimo¹; ¹Politecnico di Milano

10:20 AM Break

10:40 AM

Process Monitoring of Melt Pool Spatter at Melt Pool, Layer and Part Scales: Christian Gobert¹; Syed Zia Uddin¹; Brandon Abranovic¹; Jack Beuth¹; ¹Carnegie Mellon University

11:00 AM

Automated Detection and Quantification of Spatter Generated During Laser Powder Bed Fusion Using Infrared Imaging and Computer Vision: Syed Zia Uddin¹; Nicholas O'Brien¹; Satbir Singh¹; Jack Beuth¹; ¹Carnegie Mellon University

11:20 AM

Several Ways Ultrasound Can Be Used during Powder Bed Fusion: Christopher Kube¹; Nathan Kizer¹; Corey Dickman¹; Edward Reutzel¹; ¹Penn State University

ADDITIVE MANUFACTURING

Additive Manufacturing: Mechanisms and Mitigation of Aqueous Corrosion and High-temperature Oxidation — Corrosion Behavior of Additively Manufactured Metals and Alloys

Sponsored by: TMS Corrosion and Environmental Effects Committee, TMS: Additive Manufacturing Committee

Program Organizers: Amir Mostafaei, Illinois Institute of Technology; Yashar Behnamian, University of Alberta; Mohsen Mohammadi, University of New Brunswick; Bryan Webler, Carnegie Mellon University; Kinga Unocic, Oak Ridge National Laboratory

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Session Chairs: Amir Mostafaei, Illinois Institute of Technology; Bryan Webler, Carnegie Mellon University

8:00 AM

Corrosion Evaluation of Additively Manufactured Al-Cu-X Alloys: Jiheon Jun¹; Alex Plotkowski¹; Amit Shyam¹; J. Haynes¹; Yi Feng Su¹; ¹Oak Ridge National Laboratory

8:20 AM

Effect of Aging Treatment on Stress Corrosion Cracking Response of Cold Sprayed Al 6061 Alloy: Ryan Cochran¹; Shiraz Mujahid¹; Aulora Rusk¹; YubRaj Paudel¹; Marc Pepi²; Peter Czech³; Hongjoo Rhee¹; ¹Center for Advanced Vehicular Systems at Mississippi State University; ²Army Research Laboratory; ³American Lightweight Materials Manufacturing Innovation Institute

8:40 AM

Electrochemical Behavior of Additively Manufactured Non-spherical Ti-6Al-4V in Saline Water: Melody Delpazir¹; Mohammadreza Asherloo¹; Muktesh Paliwal²; Amir Mostafaei¹; ¹Illinois Institute of Technology; ²Kymera International

9:00 AM

Electrochemical Performance of Additively Manufactured 8620 Low Alloy Steel: Effect of Acetic Acid: Ezazul Haque Sabuz¹; Ishraq Shabib¹; ¹Central Michigan University

9:20 AM

Leveraging Additive Manufacturing to Co-design Mechanical Properties and Environmental Resistance: Rishi Pillai¹; Rebecca Kurfess¹; Yi Feng Su¹; QQ Ren¹; Soumya Nag¹; ¹Oak Ridge National Laboratory

9:40 AM

Microstructural Characterization and High-Temperature Oxidation of Laser Powder Bed Fusion Processed Inconel 625: *Emily Lewis*¹; Nick Cruchley²; Moataz Attallah¹; Sam Cruchley¹; ¹University of Birmingham; ²Manufacturing Technology Centre (MTC)

NUCLEAR ENERGY

Advanced Characterization of Materials for Nuclear, Radiation, and Extreme Environments III — In Situ Microscopy

Sponsored by: TMS Nanomechanical Materials Behavior Committee, TMS Nuclear Materials Committee

Program Organizers: Cody Dennett, Commonwealth Fusion Systems; Samuel Briggs, Oregon State University; Christopher Barr, Naval Nuclear Laboratory; Michael Short, Massachusetts Institute of Technology; Janelle Wharry, Purdue University; Cheng Sun, Idaho National Laboratory; Caitlin Taylor, Los Alamos National Laboratory; Khalid Hattar, Sandia National Laboratories; Yuanyuan Zhu, University of Connecticut

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Session Chairs: Samuel Briggs, Oregon State University; Cheng Sun, Idaho National Laboratory

8:00 AM Invited

Utilizing In-situ Microscopy Techniques to Decipher the Micro-scale Dynamics of Materials in Extreme Environments: *Eric Lang*¹; Samuel Briggs¹; Nathan Heckman¹; Anthony Monterrosa¹; Trevor Clark¹; Christopher Barr¹; Daniel Buller¹; Brad Boyce¹; Khalid Hattar¹; ¹Sandia National Laboratories

8:30 AM Invited

In Situ Irradiation of TiO₂ Nanotubes: *Hui Xiong*¹; Chao Yang²; Tristan Olsen¹; Miu Lun Lau¹; Kassiopeia Smith³; Janelle Wharry²; Khalid Hattar⁴; Yongqiang Wang⁵; Wei-Ying Chen⁶; Yaqiao Wu¹; Badri Narayanan⁷; Min Long¹; Dewen Hou¹; ¹Boise State University; ²Purdue University; ³Fifth Gait Technologies; ⁴Sandia National Laboratory; ⁵Los Alamos National Laboratory; ⁶Argonne National Laboratory; ⁷University of Louisville

9:00 AM Invited

Radiation Resistance of Metallic Glass Coatings of Crystalline Nanostructures: *Mehrdad Kiani*¹; Khalid Hattar²; Wendy Gu³; ¹Yale University; ²Sandia National Laboratories; ³Stanford University

9:30 AM

High-temperature Stable Nanolamellar Transition Metal Carbides Derived from Two-dimensional MXenes for Extreme Environments: *Brian Wyatt*¹; Kartik Nemani¹; Annabelle Harding¹; Wyatt Highland¹; Babak Anasori¹; ¹Indiana University - Purdue University Indianapolis

9:50 AM Break

10:10 AM Invited

Machine Learning Algorithms for High-throughput Characterization of Structure and Microstructure of Metals for Extreme Environments: Nishan Senanayake¹; Thaddeus Rahn²; Nathaniel Tomczak¹; Assel Aitkaliyeva²; *Jennifer Carter*¹; ¹Case Western Reserve University; ²University of Florida

10:40 AM

Microstructural Evolution of Alloy 718 under High Temperature In-situ Ion Irradiation with Machine Learning: *Stephen Teller*¹; Timothy Lach¹; Kai Sun²; ¹Oak Ridge National Laboratory; ²University of Michigan

11:00 AM Invited

Recent Innovations in Machine Learning-based Techniques for In-situ Microscopy Data Analysis

: *Kevin Field*¹; Priyam Patki¹; Matthew Lynch¹; Ryan Jacobs²; T.M. Kelsy Green¹; Robert Renfrow¹; Wei-Ying Chen³; Dane Morgan²; Christopher Field⁴; ¹University of Michigan; ²University of Wisconsin; ³Argonne National Laboratory; ⁴Theia Scientific, LLC

PROCESSING AND MANUFACTURING

Advanced Joining Technologies for Automotive Lightweight Structures — Self-piercing Riveting (SPR)

Sponsored by: ACerS Manufacturing Division, TMS Aluminum Committee

Program Organizers: Yan Huang, Brunel University London; Carla Barbatti, Constellium; Yingchun Chen, Dura Automotive Systems

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Session Chairs: Carla Barbatti, Constellium; Yan Huang, Brunel University London

8:00 AM Introductory Comments

8:05 AM Keynote

Self-Pierce Riveting of Aluminium and Mixed Material Car Body Structures: *Paul Briskham*¹; ¹Atlas Copco IAS Ltd

8:45 AM Keynote

Development of Solid-state Resistance Spot Joining Method: *Hidetoshi Fujii*¹; ¹Osaka University

9:05 AM

Investigation into the Effect of Interlock Area on the Strength of Self-Pierce Rivets: *Lewis Jepps*¹; Paul Briskham²; ¹University of Sheffield; ²Atlas Copco

9:25 AM

Influence of Process Parameters on Joint Formation and Load-bearing Capacity for a Versatile Self-piercing Riveting Process: *Fabian Kappe*¹; Mathias Bobbert¹; Gerson Meschut¹; ¹Paderborn University

9:45 AM

Effect of Processing Parameters on the Mechanical Performance of High Velocity Riveted (HVR) Joints through Finite Element Modeling: *Daniel Ramirez Tamayo*¹; Lei Li¹; Benjamin Schuessler¹; Vineet Joshi¹; Ayoub Soulami¹; ¹Pacific Northwest National Laboratories

10:05 AM Break

10:25 AM

Solid Phase Joining of AA6061-T6 Joints via High Velocity Riveting: *Benjamin Schuessler*¹; Daniel Ramirez Tamayo¹; Sridhar Niverty¹; Lei Li¹; Ayoub Soulami¹; Vineet Joshi¹; ¹Pacific Northwest National Laboratory

MATERIALS-ENVIRONMENT INTERACTIONS

Advanced Materials for Harsh Environments — Session III

Sponsored by: ACerS Electronics Division

Program Organizers: Navin Manjooran, Chairman, Solve; Gary Pickrell, Virginia Tech

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Session Chairs: Gary Pickrell, Virginia Tech; Navin Manjooran, Chairman, Solve

8:00 AM Presentation Planned

8:40 AM

Root Cause Spectroscopic Failure Investigation Aided by High Resolution SEM/EDS, FT-IR, XPS Instruments: *Jeanette Vass¹*; ¹Auto and Materials

9:00 AM

Stress Corrosion Mitigation in Al-Mg via Zn-Rich Primers and Long-Term Performance Stability: Matthew McMahon¹; *Eric Dau¹*; Allison Akman¹; Fatou Cisse¹; ¹Naval Surface Warfare Center, Carderock Division

9:20 AM

Titanium Coatings on Materials for Harsh Environments and Corrosion in Interaction with the Environment in Coke Production: *Borys Sereda¹*; Iryna Kruhliak¹; Dmytro Sereda¹; Dmytro Kruhliak¹; ¹Dneprovsky State Technical University

9:40 AM

Understanding Hydration-induced Cracking, Corrosion and Self-healing Mechanisms in Advanced Concrete Using Electron Microscopy and Quantitative Non-destructive 3D Mineral Characterization: *Andy Holwell¹*; Maadhav Kothari¹; Edward Hill¹; Tanvir Qureshi¹; ¹Carl Zeiss Microscopy LLC

10:00 AM Concluding Comments

IRON AND STEEL (FERROUS ALLOYS)

Advancements in Steel Structural Refinement — Session I

Sponsored by: AIST Metallurgy — Processing, Products & Applications Technology Committee

Program Organizers: Emmanuel De Moor, Colorado School of Mines; Jose Rodriguez-Ibabe, CEIT and TECNUN; Charles Enloe, CBMM North America

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Session Chairs: Emmanuel De Moor, Colorado School of Mines; Charles Enloe, CBMM

8:00 AM

Effect of Nb Microalloying on the HAZ Grain Growth Kinetics and Precipitation Dissolution during Welding: Iñigo Iturriz¹; Nerea Isasti¹; Jose Rodriguez-Ibabe¹; *Pello Uranga¹*; Nobuyuki Ishikawa²; Daichi Izumi²; Douglas Stalheim³; David Jarreta⁴; David Martin⁴; ¹CEIT and TECNUN (University of Navarra); ²JFE Steel Corporation; ³DGS Metallurgical Solutions, Inc.; ⁴CBMM Asia

8:20 AM

Phase Transformation Behavior of Fe-10wt.% Ni Steel Weld Metal: *Daniel Bechetti¹*; Jennifer Semple¹; Matthew Sinfield¹; ¹Naval Surface Warfare Center, Carderock Division

8:40 AM

Intercritical Annealing of HY Steel to Improve Impact Toughness: *Jack Galuard¹*; Emmanuel De Moor¹; Kip Findley¹; ¹Colorado School of Mines

9:00 AM

The Effect of Adding Minor Alloying Elements in Reducing the Prior Austenite Grain Size in High Yield Strength (HY) Steels: *Aphrodite Strifas¹*; Matthew Frichtl¹; Sreeramamurthy Ankem¹; ¹University of Maryland

9:20 AM

High Cycle Fatigue Behavior of Nano-bainitic Steels: A Detailed Crack Initiation and Grain Boundary Study: *Blessto B¹*; Avanish Kumar²; Aparna Singh¹; ¹Indian Institute of Technology, Bombay; ²Indian Institute of Technology (ISM) Dhanbad

9:40 AM

In-situ Measurement of Surface Relief Effect during Displacive Transformation of Low-carbon Steel: *Ruogu Hou¹*; Junya Inoue¹; ¹The University of Tokyo

CERAMIC AND GLASS MATERIALS

Advances in Dielectric Materials and Electronic Devices — Capacitors, Relaxors, Electrostriction, and Energy Applications

Sponsored by: ACerS Electronics Division

Program Organizers: Amar Bhalla, University of Texas; Ruyan Guo, University of Texas at San Antonio; Rick Uvic, Boise State University; Matjaz Spreitzer, Jožef Stefan Institute

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Session Chair: Matjaz Spreitzer, Jožef Stefan Institute

8:00 AM

Lead-free and Antiferroelectric Ceramics for Novel Energy and Heat-management Technologies: Brigita Rozic¹; Zouhair Hanani¹; Soukaina Merselmiz²; Daoud Mezzane²; Mimoun El Marssi³; Hana Ursic¹; Rasa Pirc¹; Matjaz Spreitzer¹; Zdravko Kutnjak¹; ¹Jožef Stefan Institute; ²University Cadi Ayyad; ³University of Picardie Jules Verne

8:20 AM

Survey of Simple Halide Perovskites Using NSMM: Steven Tidrow¹; ¹Alfred University

8:40 AM

Remote Sensing Powered by a Stacked Piezoelectric Transducer Harvesting Vibrational Energy: Wasim Hafiz Dipon¹; Bryan Gamboa¹; Ruyan Guo¹; Amar Bhalla¹; ¹University of Texas at San Antonio

9:00 AM

Structure and Electrical Properties of Metrically Cubic PMN-PT Thin Films around the Morphotropic Phase Boundary: Matjaz Spreitzer¹; Urška Trstenjak¹; Nina Daneu¹; Igor Rafalovskiy²; Jamal Belhadi¹; Aleksander Matavž¹; Vid Bobnar¹; Jiri Hlinka²; ¹Jožef Stefan Institute; ²Institute of Physics of the Czech Academy of Sciences

9:20 AM

Determining the Effect of Burn-in Process on Reliability of X7R Multilayer Ceramic Capacitors: Pedram Yousefian¹; Clive Randall¹; ¹Penn State University

NANOMATERIALS

Advances in Emerging Electronic Nanomaterials: Synthesis, Enhanced Properties, Integration, and Applications — Atomic Layer Processing: In-Situ Characterization, Modeling, Area-Selective Deposition, and Microelectronics Applications

Sponsored by: TMS: Nanomaterials Committee

Program Organizers: Chang-Yong Nam, Brookhaven National Laboratory; Jung-Kun Lee, University of Pittsburgh; Stephen McDonnell, University of Virginia

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Session Chairs: Chang-Yong Nam, Brookhaven National Laboratory; Christophe Vallee, SUNY Polytechnic Institute; Jiyoung Kim, University of Texas at Dallas

8:00 AM Keynote

From Atomic-scale Characterization to Atomic-scale Control of Thin Film Deposition Processes: James Engstrom¹; ¹Cornell University

8:40 AM Invited

Resolving the Evolution of Atomic Layer Deposited Thin Film Growth by Continuous In Situ X-ray Absorption Spectroscopy: Mingzhao Liu¹; ¹Brookhaven National Laboratory

9:10 AM Invited

Molecular Modeling of Atomic Layer Etching: Shenli Zhang¹; Yihan Huang²; Gulcin Tetiker³; Saravanapriyan Sriraman³; Roland Faller²; ¹University of Chicago; ²University of California Davis; ³Lam Research

9:40 AM

First-Principles Studies of Atomic Layer Deposition: Lan Li¹; ¹Boise State University

10:00 AM Break

10:15 AM Invited

Meta-Stable Phase Ferroelectric HfZrO₂ Films: Jiyoung Kim¹; ¹University of Texas at Dallas

10:45 AM Invited

Microelectronics Application of Vapor-phase infiltration – Atomic Layer Deposition Derived Organic-Inorganic Hybridization Technique: Chang-Yong Nam¹; ¹Brookhaven National Laboratory

11:15 AM Invited

Area Selective Atomic Layer Deposition of Silicon Oxide Using an Oxygen Plasma or Ozone with Copper as the Nongrowth Surface: Sumit Agarwal¹; ¹Colorado School of Mines

11:45 AM Invited

Ions in PEALD Processes: from Material Modification to Selective Deposition: Christophe Vallee¹; Marceline Bonvalot²; ¹SUNY POLY; ²LTM - UGA

12:15 PM Invited

Area Selective Deposition of TaN for Back End of the Line Applications: Rudy Wojtecki¹; ¹IBM Research | Almaden

IRON AND STEEL (FERROUS ALLOYS)

Advances in Ferrous Metallurgy — AHSS and Steelmaking Process Innovation

Sponsored by: AIST Metallurgy — Processing, Products & Applications Technology Committee

Program Organizers: Siddhartha Biswas, Big River Steel; Daniel Baker, General Motors Corporation; Lijia Zhao, Northeastern University

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Session Chair: Daniel Baker, General Motors Corporation

8:00 AM

Difference in Deformation-induced Martensitic Transformation Behavior at Tensile and Compressive Deformations of High-carbon Bainitic Steel Investigated by In Situ Neutron Diffraction: *Rintaro Uejii¹; Wu Gong²; Stefanus Harjo²; Takuro Kawasaki²; Akinobu Shibata¹; Yuuji Kimura¹; Tadanobu Inoue¹; Noriyuki Tsuchida³*; ¹National Institute for Materials Science; ²Japan Atomic Energy Agency; ³University of Hyogo

8:20 AM

Effects of Cyclic Inter-critical Annealing on Retained Austenite in Medium Manganese Steels: *Dawn Van Iderstine¹; Matthew Cagle¹; Shiraz Mujahid¹; YubRaj Paudel¹; Sven Vogel²; Zackery McClelland³; Robert Moser³; Haitham El Kadiri⁴; Hongjoo Rhee¹*; ¹Mississippi State University, Center for Advanced Vehicular Systems; ²Los Alamos National Laboratory, Materials Science and Technology Division; ³U.S. Army Engineer Research and Development Center, Geotechnical and Structures Laboratory; ⁴Mississippi State University, Department of Mechanical Engineering

8:40 AM

Mechanical Behavior and Plasticity Mechanisms of Ultrahigh Strength-high Ductility 1 GPa Low Density Austenitic Steel with Ordered Precipitation Strengthening Phase: *Craig Guerrero¹; Devesh Misra¹*; ¹University of Texas at El Paso

9:00 AM

Relationship between Hardness Distribution and Microstructure Formation Process during Martensitic Transformation in Steels: *Jiro Okumo¹; Shoichi Nambu¹*; ¹University of Tokyo

9:20 AM

Structure-property Relationship of High Mn Steel and Bi-metallic Hammers for Clinker Crusher Application: *Abhinav Karanam¹; Arnab Sarkar²; Erik Nenzen²; Lukas Bichler²*; ¹Unicast Inc; ²University of British Columbia

9:40 AM

Novel Tough Ultrahigh Strength Steels Through Direct Quenching and Partitioning Route – A Status Report: *Mahesh Soman¹; Sumit Ghosh¹; Pekka Kantanen¹; Devesh Misra²; Jukka Kömi¹*; ¹University of Oulu; ²University of Texas at El Paso

10:00 AM

Flow Optimization for Steel Refining Process in an EAF: *Neel Busa¹; Yuchao Chen¹; Armin Silaen¹; Bikram Konar²; Chenn Zhou¹*; ¹Purdue University Northwest; ²EVRAZ NA

PROCESSING AND MANUFACTURING

Advances in Surface Engineering — Session II

Sponsored by: TMS Surface Engineering Committee

Program Organizers: Rajeswaran Radhakrishnan, Faraday Technology Inc; Timothy Hall, Faraday Technology Inc; Michael Roach, University of Mississippi Medical Center; Sandip Harimkar, Oklahoma State University; Tushar Borkar, Cleveland State University; Rajeev Gupta, North Carolina State University; Bharat Jasthi, South Dakota School of Mines & Technology

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Session Chair: Rajeswaran Radhakrishnan, Faraday Technology, Inc

8:00 AM

Control of Tin Coating Properties Using Pulse and Pulse Reverse Electrodeposition: *Holly Garich¹; Tim Hall¹; Brian Skinn¹; Danny Liu¹*; ¹Faraday Technology, Inc.

8:20 AM

Graded Coatings of IN 625 Alloy Reinforced with Ni₃Al Precipitates Processed In-situ: *Viviane Mazur¹; Ana Sofia d'Oliveira²; Maurício Mazur³*; ¹Universidade Tecnológica Federal do Paraná; ²Universidade Federal do Paraná; ³Universidade Estadual de Ponta Grossa

8:40 AM

Irreversible Bonding of Polymer-based Microfluidic Systems to Support Biological Experiments on the International Space Station (ISS): *Annaliza Perez-Torres¹; Paul Kuehl¹; Shelby Giza¹; Molly Sullivan¹*; ¹Space Tango

9:00 AM

Multiscale Surface Structure Formation on Fused Silica by Ultrafast Lasers: *Kewei Li¹; Xin Zhao¹*; ¹Clemson University

9:20 AM

The Impact of Viscosity on Coating Atomization Patterns and Paint Lay Down: *Michael Bonner¹*; ¹Saint Clair Systems, Inc.

ARTIFICIAL INTELLIGENCE

AI for Big Data Problems in Advanced Imaging, Materials Modeling and Automated Synthesis — AI and ML for Imaging and Characterization

Sponsored by: TMS Advanced Characterization, Testing, and Simulation Committee

Program Organizers: Mathew Cherukara, Argonne National Laboratory; Subramanian Sankaranarayanan, University of Illinois-Chicago; Badri Narayanan, University of Louisville

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Session Chairs: Mathew Cherukara, Argonne National Laboratory; Subramanian Sankaranarayanan, University of Illinois Chicago

8:00 AM

Deep Learning-based Algorithms for X-ray Microtomography Analysis: Unravelling Challenges for 4D Experiments: Hamid Torbatarraf¹; Nikhilesh Chawla¹; ¹Purdue University

8:20 AM

Deep Neural Networks for Laser Absorptivity Prediction from Synchrotron X-ray Images: Runbo Jiang¹; Joseph Aroh¹; Brian Simonds²; Tao Sun³; Anthony Rollett¹; ¹Carnegie Mellon University; ²National Institute of Standards and Technology; ³University of Virginia

8:40 AM

Estimation of Sub-micron Carbide Sizes and Morphologies in Dual-Phase Steels from Light Optical Micrographs Using Generative Adversarial Networks: Bo Lei¹; Martin Müller²; Dominik Britz²; Frank Mücklich²; Elizabeth Holm¹; ¹Carnegie Mellon University; ²Saarland University

9:00 AM

Machine Learning Enabled Stacking Fault Energy Prediction in Concentrated Alloys: Dipuneet Aidhy¹; Gaurav Arora¹; ¹University of Wyoming

9:20 AM

Phase Identification by Neural Networks Trained from Experimental and Theoretical Structure Data: Nam Le¹; Michael Pekala¹; Alexander New¹; Eddie Gienger¹; Janna Domenico¹; Christine Piatko¹; Elizabeth Pogue¹; Tyrel McQueen²; Christopher Stiles¹; ¹Johns Hopkins University Applied Physics Laboratory; ²Johns Hopkins University

9:40 AM

Physics-informed Machine Learning for Selected Area Electron Diffraction Data Analysis: Yu Lin¹; Nestor Zaluzec²; Xiaoting Zhong³; Jiadong Gong¹; ¹QuesTek Innovations LLC; ²Argonne National Laboratory; ³Lawrence Livermore National Laboratory

10:00 AM Break

10:20 AM

Real-time and Large FOV Ptychography through AI@Edge: Anakha Babu¹; Tao Zhou¹; Saugat Kandel¹; Yi Jiang¹; Yudong Yao¹; Sinisa Veselli¹; Zhengchun Liu¹; Tekin Bicer¹; Martin Holt¹; Antonino Miceli¹; Mathew Cherukara¹; ¹Argonne National Laboratory

10:40 AM

Neural Network Prediction of Dynamical Electron Back-Scattered Diffraction Patterns Based on Kinematical Patterns: Clement Lafond¹; Marc De Graef²; ¹CEA Saclay; ²Carnegie Mellon University

11:00 AM Question and Answer Period

FUNDAMENTALS AND CHARACTERIZATION

Alloy Phase Transformations at Elevated Temperatures — Session II

Sponsored by: TMS High Temperature Alloys Committee, TMS Phase Transformations Committee

Program Organizers: Dinc Erdeniz, University of Cincinnati; Benjamin Adam, Oregon State University; Jonah Klemm-Toole, Colorado School of Mines; Eric Lass, University of Tennessee-Knoxville; Ashley Paz y Puente, University of Cincinnati; Sophie Primig, University of New South Wales; Chantal Sudbrack, National Energy Technology Laboratory

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Session Chair: Sophie Primig, University of New South Wales

8:00 AM Invited

Impact of Manufacturing Processes on Phase Transformations in High-temperature Alloys: Some Thoughts Based on Representative Case Studies: Wei Xiong¹; ¹University of Pittsburgh

8:30 AM Invited

Examining the Influence of Nitride Precipitation on the Performance of Additively Manufactured Nickel Superalloys: Mark Stoudt¹; James Zuback¹; Andrew Iams¹; ¹National Institute of Standards and Technology

9:00 AM

Solidification Modelling With CALPHAD: Process Applications of Equilibrium and Non-equilibrium Models and When to Use Them: Adam Hope¹; Ben Sutton¹; ¹Thermo-Calc Software Inc

9:20 AM

In-situ Neutron Characterization of Thermomagnetic Processes Utilizing Direct Induction Heating: Zachary Tener¹; Dante Quirinale¹; Cory Fletcher¹; Elijah Stevens¹; Bart Murphy¹; Gerry Ludtka²; Michael Kesler¹; ¹Oak Ridge National Laboratory; ²University of Florida

9:40 AM Invited

Metallic Alloy Microstructure Prediction and Control with Processing: Amy Clarke¹; ¹Colorado School of Mines

10:10 AM Break

10:30 AM Invited

Tracking Changes in Microstructure and Mechanical Properties of Electron Powder Bed Fusion Produced Inconel-738: Andrew Breen¹; Bryan Lim¹; Felix Theska²; Alec Day¹; Sophie Primig²; Simon Ringer¹; ¹University of Sydney; ²University of New South Wales

11:00 AM

Phase Stability in Cast and Additively Manufactured Al-9 wt%Cu-6 wt%Ce Alloy: Alice Perrin¹; Sumit Bahl¹; Donovan Leonard¹; Alex Plotkowski¹; Amit Shyam¹; Ryan DeHoff¹; Ying Yang¹; ¹Oak Ridge National Laboratory

MATERIALS-ENVIRONMENT INTERACTIONS

Computation Assisted Materials Development for Improved Corrosion Resistance — Session I

Program Organizers: Rishi Pillai, Oak Ridge National Laboratory; Laurence Marks, Northwestern University

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Session Chairs: Rishi Pillai, ORNL; Laurence Marks, Northwestern University

8:00 AM Introductory Comments

8:10 AM Keynote
Computational Approaches to Designing and Predicting the High-Temperature Oxidation Behavior of Alloys: *Brian Gleeson*¹; ¹University of Pittsburgh

8:50 AM
Solute Effects on High Temperature Oxidation of Graphitic Cast Iron in Automotive Environments: *Christopher Taylor*¹; Ngan Huynh¹; ¹The Ohio State University

9:10 AM
Oxidation Lifetime Modeling of FeCr and NiCr Foils in Hydrogen-fired Microturbines: *Marie Romedenne*¹; Rishi Pillai¹; Bruce Pint¹; ¹Oak Ridge National Laboratory

9:30 AM
A PRISMS-PF Based Application for Simulating Microgalvanic/Galvanic Corrosion in Alloys: *Vishwas Goel*¹; Yanjun Lyu¹; David Montiel¹; Katsuyo Thornton¹; ¹University of Michigan

9:50 AM
Water-Metal Interactions: Insights from Atomistic Simulations: *Susan Sinnott*¹; ¹Pennsylvania State University

10:10 AM Break

10:30 AM
The Effect of Solute Capture on Chlorine Chemisorption: *John Cavin*¹; James Rondinelli¹; ¹Northwestern University

10:50 AM
Predicting Hydrogen Diffusivity in Amorphous Titania Using Markov Chain Kinetic Monte Carlo Simulations: *James Chapman*¹; Kyoung Kweon¹; Nir Goldman¹; Nathan Keilbart¹; Tae Heo¹; Brandon Wood¹; ¹Lawrence Livermore National Laboratory

11:10 AM
Multi-objective Optimization of CALPHAD and Empirical Models to Discover New High-temperature Metallic Glasses: *Jerry Howard*¹; Leslie Mushongera¹; Devicharan Chidambaram¹; Krista Carlson¹; ¹University of Nevada, Reno

11:30 AM
Phase Identification and Characterization in a Mo-Si-B-Ti Alloy: *Qingshan Dong*¹; John Perepezko²; Laurence Marks¹; ¹Northwestern University; ² University of Wisconsin-Madison

NANOMATERIALS

Controlled Synthesis, Processing, and Applications of Structural and Functional Nanomaterials — Nanostructured Films & Properties

Sponsored by: ACerS Basic Science Division, ACerS Electronics Division, ACerS Engineering Ceramics Division

Program Organizers: Haitao Zhang, University of North Carolina at Charlotte; Gurpreet Singh, Kansas State University; Kathy Lu, Virginia Polytechnic Institute and State University; Edward Gorzkowski, Naval Research Laboratory; Jian Shi, Rensselaer Polytechnic University; Michael Naguib, Tulane University; Sanjay Mathur, University of Cologne

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Session Chairs: Edward Gorzkowski, Naval Research Laboratory; Haitao Zhang, University of North Carolina at Charlotte

8:00 AM Invited
Ferroelectricity in Hf_{0.5}Zr_{0.5}O₂ Films – Processing Options to Achieve Better Ferroelectric Performance: *Jacob Jones*¹; Alex Hsain¹; Youghwan Lee¹; Gregory Parsons¹; ¹North Carolina State University

8:30 AM Invited
Quantifying the Electrode Clamping Effect and Its Role on Phase Stability in Ferroelectric Hafnium Zirconium Oxide: *Jon Ihlefeld*¹; Shelby Fields¹; Truong Cai²; Samantha Jaszewski¹; Kyle Kelley³; Helge Heinrich¹; M. Henry⁴; Brian Sheldon²; ¹University of Virginia; ²Brown University; ³Oak Ridge National Laboratory; ⁴Sandia National Laboratories

9:00 AM
Structural and Magnetic Properties of Fe-Ga-Zr Nanocrystalline Alloys: *Mohammad Tauhidul Islam*¹; Ria Nandwana¹; Jonathan Healy¹; Jenna Jaklich¹; Bowen Dong¹; Matthew Willard¹; Alexander Yu²; Yumi Ijiri²; Emily Moore³; Scott McCall³; ¹Case Western Reserve University; ²Oberlin College; ³Lawrence Livermore National Laboratory

9:20 AM
Optimizing Magnetostriction Coefficients in (FeGa)_B Nanocrystalline Alloys: *Jenna Jaklich*¹; Mohammad Tauhidul Islam¹; Matthew Willard¹; Bowen Dong¹; Alexander Yu²; Yumi Ijiri²; Emily Moore³; Scott McCall³; ¹Case Western Reserve University; ²Oberlin College; ³Lawrence Livermore National Laboratory

9:40 AM Invited
Eliminating Artifactual Indentation Size Effects in Nanoindentation of Hard Ceramics: *James Wollmershauser*¹; Boris Feigelson¹; John Drazin²; Edward Gorzkowski¹; Heonjune Ryou¹; ¹U.S. Naval Research Laboratory; ²UES, Inc.

10:10 AM Break

10:30 AM Invited
Nanomechanical Behavior of Nanocrystalline Spinel at Elevated Temperature: *Corinne Packard*¹; ¹Colorado School of Mines

11:00 AM
Reduced Pressure Nanosintering during Environmentally-Controlled Pressure-Assisted Sintering: *Kevin Anderson*¹; James Wollmershauser¹; Boris Feigelson¹; ¹U.S. Naval Research Laboratory

11:20 AM

Plateau-Rayleigh Instability with a Grain Boundary Twist: *Omar Hussein¹; Keith Coffman²; Khalid Hattar³; Eric Lang³; Shen Dillon⁴; Fadi Abdeljawad¹; ¹Clemson University; ²University of Illinois Urbana-Champaign; ³Sandia National Laboratories; ⁴University of California Irvine*

11:40 AM

Effect of Strain on the Thermoelectric Properties of Epitaxial La_{0.8}Sr_{0.2}CoO₃ Thin Films: *Mohammad El Loubani¹; Gene Yang¹; David Hill¹; Dongkyu Lee¹; ¹University of South Carolina*

12:00 PM

Superior Mechanical and Functional Properties of Thin Film Materials with Terrace-defect Interface Induced Nanostructures: *Jian Song¹; Yue Liu¹; Xinghang Zhang²; ¹Shanghai Jiao Tong University; ²Purdue University*

LIGHTWEIGHT ALLOYS

Development in Light Weight Alloys and Composites – Data Processing and Performance

Sponsored by: TMS Composite Materials Committee, TMS Materials Characterization Committee

Program Organizers: Ramasis Goswami, Naval Research Laboratory; Nikhil Gupta, New York University; Aashish Rohatgi, Pacific Northwest National Laboratory; Tanjore Jayaraman, University of Michigan-Dearborn

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Session Chair: Tanjore Jayaraman, University of Michigan-Dearborn

8:00 AM Invited

Single and Double Core-Shell Nanocomposite Bulk Ceramics in the Y₂O₃-ZrO₂-Al₂O₃ System: *Kevin Anderson¹; Benjamin Greenberg¹; James Wollmershauser¹; Boris Feigelson¹; ¹U.S. Naval Research Laboratory*

8:30 AM Invited

A Data-driven Search and Analysis for Selection of Ti-containing High Entropy Alloys for Aeroengine Applications: *Tanjore Jayaraman¹; Ramachandra Canumalla²; ¹University of Michigan-Dearborn; ²Weldaloy Specialty Forgings*

9:00 AM Invited

Novel Materials Discovery on Li-Based Compounds Using Machine Learning: *Suchismita Goswami¹; V. Stanev²; H. Liang²; I. Takeuchi²; ¹MEST; ²University of Maryland*

9:20 AM

Selective Reinforcement of Structures Using Fiber Reinforced Aluminum: *Brandon Coates¹; ¹Touchstone Research Laboratory*

9:40 AM

Effect of Tin Addition on Mechanical and Corrosion Behavior of Mg-Zn-Si Alloy: *Gaurav Gupta¹; Saurav Ganguly²; Jayant Jain³; Sudhanshu Singh¹; ¹IIT Kanpur; ²CSIR-Institute of Minerals & Materials Technology (CSIR-IMMT); ³IIT Delhi*

10:00 AM Break

10:20 AM

Laser Powder Bed Fusion of Highly-reinforced Aluminum Composite Powders Produced by Mechanical Alloying: *Ethan Parsons¹; ¹MIT Lincoln Laboratory*

SUSTAINABILITY, ENERGY, AND THE ENVIRONMENT

Energy Materials for Sustainable Development – Fuel Cells and Electrolyzers

Sponsored by: ACerS Energy Materials and Systems Division

Program Organizers: Krista Carlson, University of Nevada, Reno; Armin Feldhoff, Leibniz University Hannover; Kyle Brinkman, Clemson University; Eva Hemmer, University of Ottawa; Nikola Kanas, BioSense Institute; Kjell Wiik, Norwegian University of Science and Technology; Lei Zuo, Virginia Tech; Joshua Tong, Clemson University; Danielle Benetti, Institut National de la Recherche Scientifique; Katherine Delvos-Bagarin, National Institute of Advanced Industrial Science and Technology; Soumi Chatterjee, Aditya Birla Science & Technology Company, Ltd

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Session Chairs: Armin Feldhoff, Leibniz University Hannover; Yu Zhong, Worcester Polytechnic Institute; Brigita Rožic, Jožef Stefan Institute

8:00 AM Invited

Experimental and Computational Investigations of the Multiple Impurities Effects on the SOFC Cathode Materials: *Rui Wang¹; Lucas Parent²; Srikanth Gopalan³; Yu Zhong¹; ¹Worcester Polytechnic Institute; ²University of Connecticut; ³Boston University*

8:20 AM Invited

Fabrication Strategies for Lightweight and High-performance Tubular Solid Oxide Fuel Cells: *Dhruba Panthi¹; Yanhai Du¹; ¹Kent State University*

8:40 AM Invited

Machine Learning Methods for Predicting Microstructural Changes in Solid Oxide Cell Electrodes: *Anna Sciazko¹; Rena Yamagishi¹; Yosuke Komatsu¹; Zhufeng Ouyang¹; Junya Ohnishi¹; Katsuhiko Nishimura¹; Naoki Shikazono¹; ¹The University of Tokyo*

9:00 AM

Effect of Infiltrates on Cr-poisoning in Solid Oxide Fuel Cell Cathode Using Microstructurally Resolved HPC Simulations of Electrochemistry: *Hokon Kim¹; Jerry Mason²; William Epting²; Harry Abernathy²; Gregory Hackett²; Anthony Rollett¹; Paul Salvador¹; ¹Carnegie Mellon University; ²National Energy Technology Laboratory*

9:20 AM

Non-precious Metal Catalysts with Core@shell Structure for AEM Electrolyzers: *Manjodh Kaur¹; James McKone¹; ¹University of Pittsburgh*

9:40 AM

Computational Study of Iron/Nitrogen Doped Carbon Electrocatalysts for Sustainable Energy Technology: *Boyang Li¹; Guofeng Wang¹; ¹University of Pittsburgh*

10:00 AM Break

10:20 AM Invited

Detection of Proton Incorporation and Diffusion in Electrolyte Materials for SOFCs: *Takuya Yamaguchi*¹; Tomohiro Ishiyama¹; Haruo Kishimoto¹; Katherine Develos-Bagarinao¹; Katsuhiko Yamaji¹; ¹National Institute of Advanced Industrial Science and Technology (AIST)

10:40 AM

Metal Composite Nano-Catalyst Enhanced Solid Oxide Fuel Cell Anodes for Increased Stability within Hydrocarbon Containing Fuels: *Saad Waseem*¹; Edward Sabolsky¹; Katarzyna Sabolsky¹; Richard Hart¹; Seunghyuck Hong¹; ¹West Virginia University

11:00 AM

Probing $\text{BaCo}_{0.4}\text{Fe}_{0.4}\text{Zr}_{0.2-x}\text{Y}_x\text{O}_{3-\delta}$ Triple-Conductors as Cathode Materials for Protonic Ceramic Fuel Cells: *Jack Duffy*¹; Yuqing Meng²; Harry Abernathy³; Kyle Brinkman¹; ¹National Energy Technology Laboratory, Clemson University; ²Idaho National Laboratory, Clemson University; ³National Energy Technology Laboratory

CERAMIC AND GLASS MATERIALS

Engineering Ceramics: Microstructure-Property-Performance Relations and Applications — Mechanical Properties of Engineering Ceramics

Sponsored by: ACerS Engineering Ceramics Division

Program Organizers: Young-Wook Kim, University of Seoul; Hua-Tay Lin, Guangdong University of Technology; Junichi Tatami, Yokohama National University; Michael Halbig, NASA Glenn Research Center

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Session Chairs: Junichi Tatami, Yokohama National University; Eita Tochigi, University of Tokyo

8:00 AM Invited

Mechanical Properties of MAX Phases: *Miladin Radovic*¹; Ankit Srivastava¹; Rogelio Benitez²; Hemant Rathod¹; Zhiqiang Zhan¹; ¹Texas A&M University; ²University of Texas at Rio Grande Valley

8:30 AM

Tunable Self-Assembly of 2D Carbide MXenes with Bulk Ultra High Temperature Ceramics: *Nithin Chandran B S*¹; Yooran IM²; Srinivasa Kartik Nemani²; Ravi Kumar³; Babak Anasori²; ¹IIT Madras, Chennai; ²Indiana University-Purdue University Indianapolis; ³IIT Madras

8:50 AM

Deviations from Hall-Petch Relationships in Nanocrystalline Ceramics: *Heonjune Ryou*¹; Kevin Anderson¹; John Drazin²; Edward Gorzkowski¹; Boris Feygelson¹; James Wollmershauser¹; ¹U.S. Naval Research Laboratory; ²UES Inc.

9:10 AM

Advanced WC-Al₂O₃-ZrO₂ Composites with Improved Metal-cutting Performance for Super Alloys: *Zhenyu Liu*¹; ¹Kennametal Inc

9:30 AM

A Simple Constitutive Law for Comminuted Ceramics under Multi-axial Loading: *Bryan Love*¹; ¹DEVCOM Army Research Laboratory

9:50 AM Break

10:10 AM

Electrochemical Fabrication of Microstructure Engineered, Highly textured, Ultra-thick Ceramic Oxide Films for High Volumetric Energy Density Electrochemical Energy Storage: *Arghya Patra*¹; Paul Braun¹; ¹University of Illinois Urbana Champaign

10:30 AM

The Ball-on-Three-Balls-Test: Improving Accuracy and Simplifying Stress Evaluation: *Maximilian Staudacher*¹; Tanja Lube¹; Peter Supancic¹; ¹Montanuniversität Leoben

CERAMIC AND GLASS MATERIALS

Glasses and Optical Materials: Current Issues and Functional Applications — Cooper Distinguished Lecture

Sponsored by: ACerS Basic Science Division, ACerS Glass & Optical Materials Division

Program Organizers: Doris Möncke, Alfred University; Mathieu Hubert, Corning Incorporated

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Session Chair: Steve Martin, Iowa State University

8:00 AM Invited

Uncovering Hidden Glasses: *Liping Huang*¹; ¹Rensselaer Polytechnic Institute

8:40 AM Invited

Lithium-iron Silicate Glasses as Simulations of High-Fe Nuclear Waste Glass: *Jessica Sly*¹; John McCloy¹; ¹Washington State University

9:00 AM Invited

Utilizing Electrical Impedance Spectroscopy (E.I.S.) to Observe In-situ Phase Changes in Lithium Diborate Glass Undergoing Thermal Relaxation: *William Guthrie*¹; Caio Bragatto¹; ¹Coe College

9:20 AM Invited

Multispectroscopic Study of Lead Borate Glasses: *Ian Slagle*¹; ¹Coe College

9:40 AM Invited

Structure-property Relationship in Mixed Oxy-sulfide Glassy Solid Electrolyte Material: $0.58\text{Li}_2\text{S} + 0.42 [(1-y)\text{SiS}_2 + y\text{LiPO}_3]$: *Presley Philipp*¹; Victor Torres III¹; Steve Martin¹; ¹Iowa State University

FUNDAMENTALS AND CHARACTERIZATION

Grain Boundaries, Interfaces, and Surfaces: Fundamental Structure-Property-Performance Relationships — Segregation

Sponsored by: ACerS Basic Science Division

Program Organizers: Shen Dillon, University of California, Irvine; Wolfgang Rheinheimer, Julich Research Center; Catherine Bishop, University of Canterbury; Ming Tang, Rice University; John Blendell, Purdue University; Wayne Kaplan, Technion - Israel Institute Of Technology; Melissa Santala, Oregon State University

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Session Chairs: Shen Dillon, University of California, Irvine; Ming Tang, Rice University

8:00 AM

Computational Modeling of Surface Segregation Dynamics in Cu-Au Alloys: *Guofeng Wang*¹; *Siming Zhang*¹; ¹University of Pittsburgh

8:20 AM Invited

Predicting Grain Boundary States in Ferroelectrics: *K.S.N. Vikrant*¹; *R. Edwin Garcia*²; *Catherine Bishop*³; ¹IIT Delhi; ²Purdue University; ³University of Canterbury

8:50 AM

Surface Thermochemistry of TiO₂ Doped with Alkaline Earth Metal Ions and Its Relationship with Nanostructure: *Andre Da Silva*¹; *Bruno Ramos*¹; *Jefferson Bettini*²; *Ricardo Castro*³; *Douglas Gouvêa*¹; ¹University of São Paulo; ²Brazilian Nanotechnology National Laboratory; ³University of California, Davis

9:10 AM

Atomic Structure Analysis of Inversion Domain Boundary in MgO-doped AlN: *Daiji Kato*¹; *Bin Feng*²; *Yasunobu Noritake*¹; *Tomoko Hishida*¹; *Naoya Shibata*²; *Yuichi Ikuhara*²; ¹NGK SPARK PLUG CO.,LTD.; ²The University of Tokyo

9:30 AM Invited

Understanding Grain Boundary Properties and Transitions in Multiple Dimensions: *Jian Luo*¹; ¹University of California, San Diego

10:00 AM Break

10:20 AM Invited

Vacancies and Other Grain-boundary Surfactants and Their Effect on Grain Growth: *W Craig Carter*¹; *Arun Baskaran*²; *Daniel Lewis*³; *Catherine Bishop*³; ¹Massachusetts Institute of Technology; ²Argonne National Laboratory; ³Rensselaer Polytechnic Institute

10:50 AM

Atomistic and Gaussian Process Modeling of Solute Segregation in Metastable Grain Boundaries: *Yasir Mahmood*¹; *Maher Alghalayini*¹; *Enrique Martinez*¹; *Christiaan Paredis*¹; *Fadi Abdeljawad*¹; ¹Clemson University

11:10 AM

Effects of Interdiffusion on Cu/Ni Semi-coherent Interface Properties: *Alex Selimov*¹; *Kevin Chu*¹; *David McDowell*¹; ¹Georgia Institute of Technology

FUNDAMENTALS AND CHARACTERIZATION

High Entropy Materials: Concentrated Solid Solutions, Intermetallics, Ceramics, Functional Materials and Beyond III — Materials Discovery and Design

Sponsored by: TMS: Nanomaterials Committee

Program Organizers: Yu Zhong, Worcester Polytechnic Institute; Michael Gao, National Energy Technology Laboratory; Xingbo Liu, West Virginia University; Peter Liaw, University of Tennessee; Jian Luo, University of California, San Diego; Yiquan Wu, Alfred University; Mitra Taheri, Johns Hopkins University; Amy Clarke, Colorado School of Mines

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Session Chairs: Bai Cui, University of Nebraska-Lincoln; Kun Wang, Alfred University

8:00 AM Keynote

High Entropy Alloys and NSF: *Jonathan Madison*¹; ¹National Science Foundation

8:30 AM Invited

Design of Multicomponent Rare-earth Sesquioxides for Thermal/Environmental Barrier Coatings: *Kristyn Ardrey*¹; *Mahboobe Jassas*¹; *Mukil Ayyasamy*¹; *Kang Wang*¹; *Kevin Reuwer*²; *Jonathan Laurer*³; *Carolina Tallon*²; *Bi-Cheng Zhou*¹; *Prasanna Balachandran*¹; *Patrick Hopkins*¹; *Elizabeth Opila*¹; ¹University of Virginia; ²Virginia Tech; ³Commonwealth Center for Advanced Manufacturing

9:00 AM

Accelerated Discovery of Refractory High Entropy Materials by Machine Learning and High Throughput Experiments: *Kun Wang*¹; *Yonggang Yan*¹; ¹Alfred University

9:20 AM

An Experimentally Driven High-throughput Approach to Design Refractory High-entropy Alloys: *Chanho Lee*¹; *Dongyue Xie*¹; *Benjamin Derby*¹; *Jon Baldwin*¹; *Christopher Tandoc*²; *Osman Atwani*¹; *Yong-Jie Hu*²; *Nan Li*¹; *Saryu Fensin*¹; ¹Los Alamos National Laboratory; ²Drexel University

9:40 AM

Development of Ni-based Medium Entropy Alloys Using THERMOCALC Software: *Elyorjon Jumaev*¹; *Amir Abidov*¹; *Ulugbek Ruziev*¹; *Ki Buem Kim*²; ¹Almalyk Mining and Metallurgical Combine JSC; ²Sejong University

10:00 AM Break

10:20 AM Invited

Computationally Guided Design of FCC-based High Entropy Alloys: *Kenneth Smith*¹; *John Sharon*¹; *Ryan Deacon*¹; *Soumalya Sarkar*¹; *Michael Gao*²; ¹Raytheon Technologies Research Center; ²National Energy Technology Laboratory

10:40 AM Invited

High-Entropy Carbide Ceramics: Transformative Materials for Extreme Environments: *Bai Cui*¹; *Fei Wang*¹; *Xueliang Yan*¹; *Yongfeng Lu*¹; ¹University of Nebraska-Lincoln

11:00 AM

Effect of Short-range Ordering on Diffusion Properties in Complex Concentrated Alloys: Anus Manzoor¹; Yongfeng Zhang¹; ¹University of Wisconsin-Madison

11:20 AM

Hardness of Thin Film High Entropy Transition Metal Ceramics: Nathaniel McIlwaine¹; ¹Penn State University

11:40 AM

High-throughput Design of High-performance Lightweight High-entropy Alloys: Rui Feng¹; Chuan Zhang²; Michael Gao³; Zongrui Pei³; Fan Zhang²; Yan Chen¹; Dong Ma⁴; Ke An¹; Jonathan Poplawsky¹; Lizhi Ouyang⁵; Yang Ren⁶; Jeffrey Hawk³; Michael Widom⁷; Peter Liaw⁷; ¹Oak Ridge National Laboratory; ²Computherm, LLC; ³National Energy Technology Laboratory; ⁴Songshan Lake Materials Laboratory; ⁵Tennessee State University; ⁶Argonne National Laboratory; ⁷Carnegie Mellon University

MATERIALS-ENVIRONMENT INTERACTIONS

High Temperature Oxidation of Metals and Ceramics — Oxidation of Metals and Accident Tolerant Fuel

Sponsored by: TMS Corrosion and Environmental Effects Committee

Program Organizers: Kenneth Kane, Oak Ridge National Laboratory; Elizabeth Sooby, University of Texas at San Antonio; Patrick Brennan, General Electric Research; Lavina Backman, U.S. Naval Research Laboratory; Kinga Unocic, Oak Ridge National Laboratory; Richard Oleksak, National Energy Technology Laboratory; David Shifler, Office of Naval Research; Raul Rebak, GE Global Research

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Session Chairs: Richard Oleksak, National Energy Technology Laboratory; Elizabeth Sooby, University of Texas - San Antonio

8:00 AM Invited

GE's Accident Tolerant Fuel Cladding: An Overview of Accident Scenario Testing: Andrew Hoffman¹; Raul Rebak¹; Evan Dolley¹; Rajnikant Umretiya¹; Michael Worku¹; ¹GE Research

8:30 AM

Burst Behavior and Oxidation Resistance of Cr-coated Zircaloy-4 Accident Tolerant Fuel Cladding: Mackenzie Ridley¹; Samuel Bell²; Ben Garrison¹; Tim Graening¹; Kenneth Kane³; Nathan Capps¹; ¹Oak Ridge National Laboratory; ²University of Tennessee; ³Formerly ORNL, currently Applied Physics Laboratory

8:50 AM Invited

Material Compatibility in Supercritical CO₂ at 450°-650°C: Bruce Pint¹; Rishi Pillai¹; Michael Lance¹; James Keiser¹; ¹Oak Ridge National Laboratory

9:20 AM

The Effect of Pressure on the Oxidation of Steels in Direct-fired Supercritical CO₂ Power Cycle Environments: Casey Carney¹; Richard Oleksak¹; Joseph Tylczak²; Ömer Dogan³; ¹LRST; ²NETL (retired); ³NETL

9:40 AM

Effect of Pressure on High-temperature Corrosion of Ni Alloys in Supercritical CO₂ Containing Impurities: Richard Oleksak¹; Casey Carney¹; Joseph Tylczak¹; Ömer Dogan¹; ¹National Energy Technology Laboratory

10:00 AM Break

10:20 AM

Atomic Scale Dynamics of Initial Stage Copper Oxidation Using In Situ ETEM and Correlated DFT Simulations: Meng Li¹; Matthew Curnan¹; Richard Garza¹; Stephen House¹; Wissam Saidi¹; Judith Yang¹; ¹University of Pittsburgh

10:40 AM Invited

High Temperature Oxidation Behavior of Fe- and Ni-Based Alloys Fabricated by Additive Manufacturing: Sebastien Dryepondt¹; Marie Romedenne¹; Rishi Pillai¹; Kinga Unocic¹; Bruce Pint¹; ¹Oak Ridge National Laboratory

11:10 AM

Study of the Pre-oxidation Effect on Long-term Oxidation Properties of Porous Fe22Cr Alloy: Damian Koszellow¹; Sebastian Molin¹; Agnieszka Drewniak¹; Piotr Jasinski¹; ¹Gdansk University of Technology

11:30 AM

Alumina-scale Establishment Behavior on Ni-6Al-yCr-2X (y = 4, 6, 8; X = Nb, Ta, Re) Model Alloys during High-temperature Oxidation: Rafael Rodriguez De Vecchis¹; Rishi Pillai²; Brian Gleeson¹; ¹University of Pittsburgh; ²Oak Ridge National Laboratory

PROCESSING AND MANUFACTURING

Innovative Process Design and Processing for Advanced Structural Materials — Advanced Structural Materials

Program Organizers: Ju-Young Kim, UNIST; Jae-il Jang, Hanyang University; Sung-Tae Hong, University of Ulsan; Rongshan Qin, The Open University

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Session Chairs: Ju-Young Kim, UNIST; Jae-il Jang, Hanyang University

8:00 AM Break

8:20 AM

Uniaxial Tensile Behavior After Baking Treatment in a Low Carbon Steel Accompanying Inhomogeneous Plastic Yielding: Woojin Cho¹; Byeong-Seok Jeong¹; Eunjo Shin²; Siwook Park¹; Hyuntaek Na³; Heung Nam Han¹; ¹Seoul National University; ²Korea Atomic Energy Research Institute; ³POSCO Technical Research Laboratories

8:40 AM

On the Micromechanical Response of a Mild Steel during Abrupt Strain Path Changes (SPCs): Anastasia Vrettou¹; Hiroto Kitaguchi¹; Biao Cai¹; Thomas Connolly²; David Collins¹; ¹University of Birmingham; ²Diamond Light Source Ltd

9:00 AM

A Study on Migrating Boundary Induced Plasticity Using Molecular Dynamics Simulation for Pure Iron: *Simoon Sung*¹; Jaehoon Jang²; Yanghoo Kim³; Heung Nam Han¹; ¹Seoul National University; ²Korea Institute of Materials Science; ³Korea Institute of Industrial Technology

9:20 AM

Mechanisms Driving Defect Formation in High Power Laser Welding of Nickel Alloys: *Mingze Gao*¹; Barnali Mondal¹; Todd Palmer¹; Tarasankar Debroy¹; ¹Penn State University

9:40 AM Invited

Microstructure-based Fatigue Life Modeling Methodology for Ferritic-pearlitic Hypo-eutectoid Steels: *Yoon Suk Choi*¹; Minwoo Park¹; Hyunki Kim²; Minwoo Kang²; Seunghyun Hong²; Dae-Geun Nam³; ¹Pusan National University; ²Hyundai Motor Group; ³Korea Institute of Industrial Technology

10:00 AM Break

10:20 AM Invited

Modern Supercomputing for Accelerating the Design of High-temperature Aluminum Alloys
*: Dongwon Shin*¹; ¹Oak Ridge National Laboratory

10:40 AM

Atomic-scale Unique Interface Observation of η /Al in Al-Zn-Mg Alloy: *Hwangsun Kim*¹; Howook Choi¹; Juhyun Oh¹; Ho Kwon¹; Eun Soo Park¹; Sungwoo Lee¹; Gun-Do Lee¹; Miyoung Kim¹; Heung Nam Han¹; ¹Seoul National University

11:00 AM

Virtual Thermo-mechanical Process Design of Metallic Materials by Integrating Crystal Plasticity and Phase Field Model: *Kyung Mun Min*¹; Hyuk Jae Lee¹; Heung Nam Han¹; Myoung-Gyu Lee¹; ¹Seoul National University

MODELING

Integration between Modeling and Experiments for Crystalline Metals: From Atomistic to Macroscopic Scales IV — Session III

Sponsored by: TMS Advanced Characterization, Testing, and Simulation Committee, TMS Materials Characterization Committee, TMS: Nanomaterials Committee

Program Organizers: Mariyappan Arul Kumar, Los Alamos National Laboratory; Irene Beyerlein, University of California, Santa Barbara; Levente Balogh, Queen's University; Caizhi Zhou, University of South Carolina; Lei Cao, University of Nevada; Josh Kacher, Georgia Institute of Technology

Tuesday AM | October 11, 2022

401 | David L. Lawrence Convention Center

Session Chairs: Ridwan Sakidja, Missouri State University; Michael Sangid, Purdue University

8:00 AM Invited

Direct Comparison of Microstructure-sensitive Fatigue Modeling Results to Situ High-energy X-ray Experiments: Veerappan Prithivirajan¹; Priya Ravi¹; Diwakar Naragani¹; *Michael Sangid*¹; ¹Purdue University

8:30 AM

Crystal Plasticity Modeling of Ultrasonic Softening Effect Considering Anisotropy in the Softening of Slip Systems: *Jiarui Kang*¹; Xun Liu¹; Stephen Niezgoda¹; ¹Ohio State University

8:50 AM

Atomistic Modeling of Twin Size Effect on the Localization of Cyclic Strain and Fatigue Crack Initiation in CrCoNi Medium-entropy Alloy: *Veronika Mazanova*¹; Milan Heczko¹; Mulaine Shih¹; Connor Slone²; Easo George³; Jaroslav Polak⁴; Maryam Ghazisaeidi¹; Michael Mills¹; ¹Ohio State University; ²Exponent; ³Oak Ridge National Laboratory; ⁴Institute of Physics of Materials CAS

9:10 AM

Prisms-plasticity: An Open Source Crystal Plasticity Finite Element Software: *Mohammadreza Yaghoobi*¹; Zhe Chen¹; Duncan A. Greeley¹; Aaditya Lakshmanan¹; John E. Allison¹; Veera Sundararaghavan¹; ¹University of Michigan

9:30 AM

Multi-scale Characterization of Monotonic and Cyclic Properties of Ultra-high Strength CrCoNi Medium-entropy Alloy with Heterogeneous Partially Recrystallized Microstructure: *Milan Heczko*¹; Veronika Mazanova¹; Connor Slone²; Mulaine Shih¹; Tomas Kruml³; Maryam Ghazisaeidi¹; Easo George⁴; Jaroslav Polak³; Michael Mills¹; ¹Ohio State University; ²Exponent; ³Institute of Physics of Materials CAS; ⁴Oak Ridge National Laboratory

9:50 AM Break

10:10 AM Invited

Alloying Design and Deep Learning Applications for Concentrated and High-entropy-Driven Ni-based Superalloys: *Ridwan Sakidja*¹; Mariam Mou¹; ¹Missouri State University

10:40 AM

Investigating Effects of Particles and Voids in Plastic Deformation of Al6061 Using Finite Element Simulations: *Hojun Lim*¹; Philip Noell¹; Raiyan Seede²; John Emery¹; Kyle Johnson¹; ¹Sandia National Laboratories; ²Texas A&M University

11:00 AM

Validation of Representative Volume Element (RVE) Finite Element Models of Dual Phase Steels Using SEM In-situ Tensile Tests and Digital Image Correlation (DIC): *Alexander Bardelcik*¹; Quade Butler¹; Amin Latifi Vanjani¹; Hari Simha¹; ¹University of Guelph

11:20 AM

Tailoring the Properties of Multi-phase Titanium Through the Use of Correlative Microscopy and Machine Learning: *Gunnar Blaschke*¹; David Field¹; Colin Merriman²; ¹Washington State University; ²Idaho National Lab

MODELING

Integration between Modeling and Experiments for Crystalline Metals: From Atomistic to Macroscopic Scales IV — Session IV

Sponsored by: TMS Advanced Characterization, Testing, and Simulation Committee, TMS Materials Characterization Committee, TMS: Nanomaterials Committee

Program Organizers: Mariyappan Arul Kumar, Los Alamos National Laboratory; Irene Beyerlein, University of California, Santa Barbara; Levente Balogh, Queen's University; Caizhi Zhou, University of South Carolina; Lei Cao, University of Nevada; Josh Kacher, Georgia Institute of Technology

Tuesday AM | October 11, 2022
404 | David L. Lawrence Convention Center

Session Chairs: Adrien Couet, University of Wisconsin-Madison; Brandon Wood, Lawrence Livermore National Laboratory

8:00 AM Invited

Multiscale Modeling of the Microstructural Dependence of Degradation Initiation in Al and Ti: *Brandon Wood*¹; Tuan Anh Pham¹; Tae Wook Heo¹; Christine Orme¹; Jennifer Rodriguez¹; James Chapman¹; Tim Hsu¹; Yakun Zhu¹; Ryan Mullen¹; Nir Goldman¹; Seongkoo Cho¹; Nathan Keilbart¹; Kyoung Kweon¹; ¹LLNL

8:30 AM

Calibration, Validation, and Application of a Digital Twin for a Standard End-chilled Plate Casting: *Mohamad Daeipour*¹; Cayman Cushing¹; Matthew Carragher¹; Serge Nakhmanson¹; Harold Brody¹; ¹UConn

8:50 AM

Modelling of Quenching of Low Alloy Steels: *Ashley Scarlett*¹; Eric Palmiere¹; Daniel Cogswell¹; ¹The University of Sheffield

9:10 AM

Experimental Data for Casting Process Simulation Validation: *Jonah Duch*¹; Mathew Hayne¹; Meghan Gibbs¹; ¹Los Alamos National Laboratory

9:30 AM

Predicting Yield Strength in β -NiAl + Cu + VC Triple Nano-precipitate Strengthened Austenitic Steel: *Colin Stewart*¹; Edwin Antillon¹; Richard Fonda¹; Keith Knipling¹; Patrick Callahan¹; Paul Lambert²; ¹US Naval Research Laboratory; ²US Naval Surface Warfare Center, Carderock Division

9:50 AM Break

10:10 AM Invited

Designing Stable γ /L12 Co-precipitates in Cast and Additively Manufactured Al-Cu-Mn-Zr Alloys: *Jonathan Poplawsky*¹; Richard Michi¹; Lawrence Allard¹; Sumit Bahl¹; Dongwon Shin¹; Alex Plotkowski¹; Amit Shyam¹; ¹Oak Ridge National Laboratory

10:40 AM

Monte Carlo Simulations for Synthetic Microstructure Generation of M23C6 Precipitation in 347H Stainless Steels: *William Frazier*¹; Arun Sathanur¹; Ram Devanathan¹; Keerti Kappagantula¹; ¹Pacific Northwest National Laboratory

11:00 AM

Nanoscale Plasticity in Irradiated Inhomogeneous Alloys: *Yash Pachaury*¹; Anter El-Azab¹; ¹Purdue University

11:20 AM Invited

A Blessing in Disguise: Irradiation Damage Helps Slow Down Alloy Corrosion Rate via Oxide Space Charge Compensation Effects: *Adrien Couet*¹; Zefeng Yu¹; Elizabeth Kautz²; Hongliang Zhang¹; Anton Schneider¹; Taeho Kim¹; Yongfeng Zhang¹; Sten Lambeets²; Arun Devaraj²; ¹University of Wisconsin-Madison; ²Pacific Northwest National Laboratory

CERAMIC AND GLASS MATERIALS

Journal of the American Ceramic Society Awards Symposium — Journal of the American Ceramic Society Awards Symposium

Sponsored by: ACerS

Program Organizer: William Fahrenholtz, Missouri University of Science and Technology

Tuesday AM | October 11, 2022

408 | David L. Lawrence Convention Center

Session Chair: William Fahrenholtz, Missouri University of Science and Technology

8:00 AM Introductory Comments

8:10 AM Invited

Historical and Basic Introduction to Antiferroelectrics: *Clive Randall*¹; Ian Reaney²; Zhongming Fan¹; Long-Qing Chen¹; Susan Trolter-McKinstry¹; ¹Pennsylvania State University; ²University of Sheffield

8:30 AM Invited

Flash Sintering: A Paradigm Shift for Processing of Ceramics: *Tarini Prasad Mishra*¹; Rishi Raj²; Olivier Guillon¹; Martin Bram¹; ¹Forschungszentrum Jülich GmbH; ²University of Colorado Boulder

8:50 AM Invited

Synthesis of β -MoO₃ Whiskers by Thermal Evaporation Method and Its Application in Production of ⁹⁹Mo/^{99m}Tc: *Chu Ngo*¹; Tatsuya Suzuki¹; Dung Do¹; Tadachika Nakayama¹; Koichi Niihara¹; Hieu Nguyen²; Hisayuki Suematsu¹; ¹Nagaoka University of Technology; ²National Institute for Materials Science (NIMS)

9:10 AM Invited

Observation of the Electromechanical Responses of (Na,K)NbO₃ under Combined External Mechanical and Thermal Fields: *Neamul Khansur*¹; *Alexander Martin*²; Keiichi Hatano³; Kenichi Kakimoto²; Dominique De Ligny¹; Kyle Webber¹; ¹Friedrich-Alexander-Universität Erlangen-Nürnberg; ²Nagoya Institute of Technology; ³Taiyo Yuden Co., Ltd.

9:30 AM Invited

Synthesis, Densification, Microstructure, and Mechanical Properties of High-entropy Carbide Ceramics: *Lun Feng*¹; William Fahrenholtz¹; Gregory E. Hilmas¹; Wei-Ting Chen¹; ¹Missouri University of Science and Technology

9:50 AM Break

10:20 AM Invited

Unique Performance of Thermal Barrier Coatings Made of Yttria Stabilized Zirconia at Extreme Temperatures (> 1500°C): *Robert Vassen¹; Daniel Emil Mack¹; Martin Tandler¹; Yoo Jung Sohn¹; Doris Sebold¹; Olivier Guillon¹; ¹Forschungszentrum Jülich GmbH*

10:40 AM Invited

Micromechanics of Machining and Wear in Hard and Brittle Materials: *Brian Lawn¹; Oscar Borrero-Lopez²; Han Huang³; Yu Zhang⁴; ¹National Institute of Standards and Technology; ²Universidad de Extremadura; ³The University of Queensland; ⁴University of Pennsylvania*

11:00 AM Invited

Initial Fragmentation and Granular Transition of Ceramics: *Lori Graham-Brady¹; Amartya Bhattacharjee¹; Ryan Hurley¹; ¹Johns Hopkins University*

11:20 AM Invited

Models for the Behavior of Boron Carbide in Extreme Dynamic Environments: *Kaliat Ramesh¹; Lori Graham-Brady¹; William Goddard²; Ryan Hurley¹; Andrew Tonge³; Amartya Bhattacharjee¹; Joel Clemmer⁴; Qinglei Zeng¹; Weixin Li¹; Yidi Shen⁵; Qi An⁵; Nilanjan Mitra¹; ¹Johns Hopkins University; ²California Institute of Technology; ³DEVCOM Army Research Laboratory; ⁴Sandia National Laboratory; ⁵University of Nevada, Reno*

11:40 AM Concluding Comments

LIGHTWEIGHT ALLOYS

Light Metal Technology — Light Metal Technology

Sponsored by: TMS: Composite Materials Committee

Program Organizers: Xiaoming Wang, Purdue University; Peng Cao, The University of Auckland

Tuesday AM | October 11, 2022

402 | David L. Lawrence Convention Center

Session Chair: Christopher Rudolf, US Naval Research Laboratory

9:20 AM

Dielectric Behavior of Aluminum and Its Relevance to Electrical Conduction and Stress/Strain Self-sensing: *Deborah Chung¹; Xiang Xi¹; ¹State University of New York Buffalo*

9:40 AM

Revealing Growth Mechanisms of Faceted Al₂Cu Intermetallic Compounds via High-speed Synchrotron X-ray Tomography: *Zihan Song¹; Oxana Magdysyuk²; Tay Sparks¹; Yu-Lung Chiu¹; Biao Cai¹; ¹University of Birmingham; ²Diamond Light Source Ltd*

10:00 AM Break

10:20 AM

Towards Light Weight Structural Materials-optimized Processing of Nanocrystalline Mg-Al Alloys: *Mohammad Umar Farooq Khan¹; Taban Larimian²; Tushar Borkar²; Rajeev Gupta³; ¹Texas A&M University; ²Cleveland State University; ³North Carolina State University*

10:40 AM

Precipitation Hardening on Fracture Behavior of Extruded Mg10Gd Modified with Nd and La: *Petra Maier¹; Norbert Hort²; ¹University of Applied Sciences Stralsund; ²Helmholtz-Zentrum Hereon*

11:00 AM

An Innovative Experimental Setup for the Electro-thermo-mechanical Characterization of Microscale Ti-6Al-4V Wires: *Won June Choi¹; Maxwell Kulak¹; Chunghwan Kim¹; Eric Payton²; Christopher Rudolf³; Wonmo Kang¹; ¹Arizona State University; ²Air Force Research Laboratory; ³Naval Research Laboratory*

11:20 AM

Residual Stresses in Multilayer Metal Sheets Produced by the Friction Assisted Lateral Extrusion Process: *Claire Adams¹; Máté Sepsi²; David Field¹; Laszlo Toth³; ¹Washington State University; ²University of Miskolc; ³Université de Lorraine*

CERAMIC AND GLASS MATERIALS

Manufacturing and Processing of Advanced Ceramic Materials — New Advances in Ceramic Processing II: Conventional vs. Additive Manufacturing

Sponsored by:

Program Organizers: Bai Cui, University of Nebraska-Lincoln; James Hemrick, Oak Ridge National Laboratory; Mike Alexander, Allied Mineral Products; Eric Faierson, Quad City Manufacturing Laboratory/Western Illinois University; Keith DeCarlo, Blasch Precision Ceramics

Tuesday AM | October 11, 2022

411 | David L. Lawrence Convention Center

Session Chairs: William Carty, Alfred University; Jian Luo, University of California, San Diego

8:00 AM Invited

A Comprehensive Approach to Ceramic Forming Processes: *William Carty¹; ¹Alfred University*

8:30 AM Invited

A Novel Approach to Estimate the Hamaker Constant of Ceramic Systems: *Keith DeCarlo¹; ¹Blasch Precision Ceramics*

9:00 AM

Impact of Embossing Geometry on the Replication Accuracy of Microchannels in Tape Cast Ceramics: *Harrison Teutschbein¹; Mingwei Xu¹; Yue Qiu¹; Chirag Kharangate¹; James McGuffin-Cawley¹; Jennifer Carter¹; ¹Case Western Reserve University*

9:20 AM Invited

Open Platform Material Development for Additive UV Polymer Manufacturing: *Greg Pugh¹; ¹Tethon*

9:50 AM Break

10:10 AM Invited

Ceramic Binder Jetting Additive Manufacturing: *Chao Ma¹; Zhijian Pei¹; ¹Texas A&M University*

10:40 AM

Multi-Material 3D Printing of Ceramics: Process Overview and Successful Trial Examples: *Shawn Allan¹; Martin Schwentenwein²; Sebastian Geier²; Nicole Ross¹; Nicholas Voellm¹; Ryan Fordham¹; ¹Lithoz America, LLC; ²Lithoz GmbH*

11:00 AM

Process Capability of Lithography-based Ceramic Manufacturing: *Ryan Fordham¹; Shawn Allan¹; Nicholas Voellm¹; Nicole Ross¹; ¹Lithoz America*

BIOMATERIALS

Next Generation Biomaterials — Next Generation Biomaterials III

Sponsored by: ACerS Bioceramics Division

Program Organizers: Roger Narayan, University of North Carolina; Sanjiv Lalwani, Lynntech, Inc.

Tuesday AM | October 11, 2022
318 | David L. Lawrence Convention Center

Session Chair: Masanori Kikuchi, National Institute for Materials Science

8:00 AM Invited

Coating of Hydroxyapatite/Collagen Bone-like Nanocomposite by a Modified Electrophoretic Deposition Method and Its Biological Reaction: *Masanori Kikuchi*¹; Tersuo Uchikoshi¹; Kaori Iwanami-Kadowaki²; Hanae Arai²; Takeshi Ogasawara²; Masayoshi Uezono²; Keiji Moriyama²; ¹National Institute for Materials Science; ²Tokyo Medical and Dental University

8:20 AM

Comparison of Various Post Coating Treatments on Plasma Sprayed HA Coatings: Tarun Goyal¹; Manoj Mittal¹; *Jujhar Singh*²; Gursharan Singh²; Shubham Sharma³; ¹Jalandhar-Kapurthala Highway; ²Jalandhar-Kapurthala Highway; ³University Centre for Research and Development and Chandigarh University

8:40 AM Invited

Electrocatalytic Probe for the Disinfection of Dental Pulp: Krista Carlson¹; John Colombo¹; *Jerry Howard*¹; ¹University of Nevada, Reno

LIGHTWEIGHT ALLOYS

Processing-Microstructure-Property Relationships of Titanium and Titanium Alloys — Session II

Sponsored by: TMS: Titanium Committee

Program Organizers: Yufeng Zheng, University of Nevada-Reno; Rongpei Shi, Lawrence Livermore National Laboratory; Benjamin Morrow, Los Alamos National Laboratory; Sriram Vijayan, The Ohio State University; Keyou Mao, Oak Ridge National Laboratory

Tuesday AM | October 11, 2022
312 | David L. Lawrence Convention Center

Session Chair: Ben Morrow, Los Alamos National Laboratory

8:00 AM Invited

Titanium Alloy Microstructures Produced by Additive Manufacturing and Deformation: *Amy Clarke*¹; Benjamin Ellyson¹; Alec Saville¹; Chris Jasien¹; Jake Benzing²; Adam Creuziger²; Sven Vogel³; Kamel Fezzaa⁴; Wayne Chen⁵; John Foltz⁶; ¹Colorado School of Mines; ²National Institute of Standards and Technology; ³Los Alamos National Laboratory; ⁴Argonne National Laboratory; ⁵Purdue University; ⁶ATI Specialty Materials

8:30 AM Invited

Insights from Three-dimensional Characterization of Twins in Titanium: *Rodney McCabe*¹; Hi Vo¹; Patrick Pinney¹; Matthew Schneider¹; M. Arul Kumar¹; Carlos Tome¹; Laurent Capolungo¹; ¹Los Alamos National Laboratory

9:00 AM Invited

Slip-twinning Interdependency in High-strength Alpha-beta Titanium Alloys: *Shaolou Wei*¹; John Foltz²; Joseph Jankowski²; Bhuvi Nirudhoddi³; Luis Ruiz-Aparicio³; C. Tasan¹; ¹Massachusetts Institute of Technology; ²ATI Specialty Materials; ³ATI Specialty Rolled Products

9:30 AM Invited

Role of Oxygen on Phase Stability, Precipitation, and Deformation in Beta Titanium Alloys: *Kathleen Chou*¹; Emmanuelle Marquis¹; ¹University of Michigan

10:00 AM Break

10:20 AM

Conventional Ti Alloys for Aeroengines And Aircraft Landing Gear Beams—a Data-driven Analysis for Selection of Ti-based Alloys and Future Directions: *Ramachandra Canumalla*¹; Tanjore Jayaraman²; ¹Weldaloy Specialty Forgings; ²University of Michigan-Dearborn

10:40 AM

Dilatometric Study of Phase Transformations in Ti-407: *Marco Ponce*¹; ¹Centro de investigación de estudios avanzados del instituto politécnico nacional

11:00 AM

Enhancing Low-cycle Fatigue Life of Commercially-pure Ti By Deformation At Cryogenic Temperature: *Geonhyeong Kim*¹; Seyed Amir Arsalan Shams¹; Jae Nam Kim¹; Jong Woo Won²; Seong Woo Choi²; Jae Keun Hong²; Chong Soo Lee¹; ¹Pohang University of Science and Technology (POSTECH); ²Korea Institute of Materials Science (KIMS)

11:20 AM

Microstructure Evolution and Mechanical Behaviour of Two Phase ($\alpha+\beta$) Ti-6Al-4V Alloy : An Effect of Heat Treatment Temperature and Duration: *Jagadeesh Babu S M*¹; Manjesh Kumar Mishra²; ¹REVA University; ²Malaviya National Institute of Technology (MNIT) Jaipur

BIOMATERIALS

Society for Biomaterials: Biomaterial Applications — Biomaterials for Drug Delivery and Stimuli-responsive function

Program Organizers: Jessica Jennings, University of Memphis; Guillermo Ameer, Northwestern University; Danielle Benoit, University of Rochester; Jordon Gilmore, Clemson University

Tuesday AM | October 11, 2022
316 | David L. Lawrence Convention Center

Session Chair: Danielle Benoit, University of Rochester

8:00 AM Invited

Harnessing Perfluorocarbons to Enhance Oxygenation in Engineered Tissues: *Nic Leipzig*¹; ¹Univeristy of Akron

8:30 AM

Silanized Titanium for Delivery of Hydrophobic Therapeutic in Aqueous Environment: Zoe Harrison¹; Joshua Bush¹; Felio Perez¹; Joel Bumgardner¹; Tomoko Fujiwara¹; Daniel Baker¹; Jessica Jennings¹; ¹University of Memphis

8:50 AM

Hybrid 3D Bioprinting of Tissue Engineering Scaffolds with Dual Delivery Capability for Anticancer Drugs: Jiahui Lai¹; Man Hang Mathew Wong¹; Min Wang¹; ¹University of Hong Kong

9:10 AM

Altering the Size of Doxorubicin Loaded DOPE:DOPC Liposomes to Target Cancer-Associated Fibroblasts and Utilizing Size-dependent Selective Targeting: Tanzeel Ur Rehman¹; Madison Rubin¹; Kaitlin Bratlie¹; ¹Iowa State University

9:30 AM Invited

Antimicrobial Biomaterials Target Intracellular Infection: Bingyun Li¹; ¹West Virginia University School of Medicine

10:00 AM Break

10:20 AM

Utilizing Thiolyne Click Chemistry to Target Cancer Cells Using Folate Conjugated Liposomes: Tanzeel Ur Rehman¹; Kaitlin Bratlie¹; Surya Mallapragada¹; ¹Iowa State University

10:40 AM

Harnessing Biological Functions in Dental Materials: Candan Tamerler¹; Paulette Spencer¹; ¹University of Kansas

CERAMIC AND GLASS MATERIALS

Solid-state Optical Materials and Luminescence Properties — Optical Materials and Luminescence Properties

Sponsored by: ACerS Basic Science Division

Program Organizers: Yiquan Wu, Alfred University; Jas Sanghera, Naval Research Laboratory; Akio Ikese, World-Lab. Co., Ltd; Rong-Jun Xie, Xiamen University; Mathieu Allix, Laboratoire CEMHTI; Kiyoshi Shimamura, National Institute for Materials Science; Liangbi Su, Shanghai Institute of Ceramics; Dariusz Hreniak, Institute of Low Temperature and Structure Research

Tuesday AM | October 11, 2022

409 | David L. Lawrence Convention Center

Session Chairs: Yiquan Wu, Alfred University; Akio Ikese, World-Lab. Co., Ltd

8:00 AM Invited

Ultrafast High Temperature Sintering for Ceramic Membranes: Liangbing Hu¹; ¹University of Maryland

8:20 AM Invited

Upconverting Er³⁺-doped Ytterbium-aluminum Garnet Ceramics: Dariusz Hreniak¹; Robert Tomala¹; Zhengfa Dai²; Daria Szweczyk¹; Andrzej Jezowski¹; Jiang Li³; ¹Institute of Low Temperature and Structure Research PAS; ²Institute of Low Temperature and Structure Research PAS 2 Shanghai Institute of Ceramics CAS; ³Shanghai Institute of Ceramics CAS

8:40 AM Invited

Polycrystalline Ceramics for Lasers: Current Potential and Limits: Rémy Boulesteix¹; Florian Delaunay¹; Lucas Viers¹; Alexandre Maitre¹; ¹University of Limoges

9:00 AM

Fabrication and Properties of Y2O3 Based Ceramics: Shyam Bayya¹; Woohong Kim¹; Joshua Gild²; Tony Zhou²; Adam Floyd³; Bryan Sadowski³; Jas Sanghera¹; ¹Naval Research Laboratory; ²University Research Foundation; ³Jacobs

9:20 AM

Laser Processing of Glass, Using the Memory of Glass to Characterize the Local Modifications: Michael Bergler¹; Ferdinand Werr¹; Kristian Cvecek¹; Alexander Veber²; Urs Eppelt³; Ludger Müllers³; Michael Krause⁴; Thomas Höche⁴; Michael Schmidt¹; Dominique de Ligny¹; ¹Friedrich-Alexander-Universität Erlangen-Nürnberg; ²Humboldt-Universität zu Berlin; ³Coherent Munich GmbH & Co. KG; ⁴Fraunhofer - Institut für Mikrostruktur von Werkstoffen und Systemen IMWS

9:40 AM

Melt Processing of a Co-extruded LiCa₂Mg₂V₃O₁₂ Garnet onto a YAG Single Crystal for IR Laser Applications: John Drazin¹; Hyunjun Kim¹; Kathryn Doyle¹; Andrew Schlup¹; Cynthia Bowers¹; Randall Hay²; Kent Averett²; ¹UES Inc; ²Materials and Manufacturing Directorate, Air Force Research Laboratory

10:00 AM Break

10:20 AM

Reusable Multilayer Photonic Nanostructured Coatings for Optical Limiting of High Energy Lasers: Christopher DeSalle¹; Justin Reiss¹; Patrick Albert¹; Sergei Stepanoff¹; Ryan Romesberg¹; Josie Hoover¹; William Urmann¹; Dax Hoffman¹; Jake Keiper²; Michael Schmitt²; Douglas Wolfe¹; ¹The Applied Research Laboratory at Penn State; ²HAMR Industries

10:40 AM

Development of Sc₂Mo₃O₁₂:Eu³⁺ as a Red Phosphor with Superior Thermally Enhanced Emission: Forough Jahanbazi¹; Yuanbing Mao¹; ¹Illinois Institute of Technology

FUNDAMENTALS AND CHARACTERIZATION

Synthesis, Characterization, Modeling and Applications of Functional Porous Materials — Porous Materials III

Sponsored by: ACerS Basic Science Division

Program Organizers: Lan Li, Boise State University; Winnie Wong-Ng, National Institute of Standards and Technology; Kevin Huang, University of South Carolina

Tuesday AM | October 11, 2022

325 | David L. Lawrence Convention Center

Session Chair: Kevin Huang, University of South Carolina

8:00 AM Invited

Multilayer Coating with a Superhydrophobic Porous Top Layer for Carbon Steel Corrosion Protection: Fangming Xiang¹; David Hopkinson¹; ¹National Energy Technology Laboratory

8:30 AM Invited

Enhanced Recovery of Platinum Group Elements Using Functionalized Silica Materials Coupled with Durable Carbon Storage via Mineralization: *Greeshma Gadikota¹; Ruyi Zheng¹; Prince Ochonma¹; ¹Cornell University*

9:00 AM

Synthesis of Hierarchical Pore Structures Within Monolithic Silica: *Karthikeyan Baskaran¹; Muhammad Ali¹; Casey Elliott¹; Brian Riley²; Krista Carlson¹; ¹University of Nevada, Reno; ²Pacific Northwest National Laboratory*

9:20 AM

Synthesis, Processing and Characterization of Intermetallic Compounds in the Ni-Al And Ti-Al System When Producing Porous Materials: *Borys Sereda¹; Iryna Kruhlak¹; Yuriy Belokon¹; Dmytro Sereda¹; ¹Dneprovsky State Technical University*

9:40 AM Invited

Electrochemically-induced Amorphous to Crystalline Transformation in Niobium Oxide Electrodes for Lithium-ion Batteries

: Hui Xiong¹; Pete Barnes²; Yunxing Zuo³; Kiev Dixon¹; Shyue Ping Ong³; ¹Boise State University; ²Idaho National Laboratory; ³University of California – San Diego

10:10 AM Break

10:30 AM

Valorization of Waste to Energy Ash through Engineered Cellular Magmatics: *Austin Stanfield¹; Cory Trivelpiece¹; Collin Wilkinson²; Robert Hust²; Thomas Adams²; ¹Savannah River National Laboratory; ²Glass WRX*

10:50 AM

Luminescent Tb³⁺-Doped Fluorapatite/Agar Nanocomposite for Detecting UO₂²⁺, Cu²⁺, and Cr³⁺ Ions: *Yuanbing Mao¹; Hongjuan Liu¹; ¹Illinois Institute of Technology*

NUCLEAR ENERGY

Tackling Structural Materials Challenges for Advanced Nuclear Reactors — Investigating Microstructural Features

Sponsored by: TMS Corrosion and Environmental Effects Committee, TMS Nuclear Materials Committee, TMS: Advanced Characterization, Testing, and Simulation Committee

Program Organizers: Miaomiao Jin, Pennsylvania State University; Xing Wang, Pennsylvania State University; Karim Ahmed, Texas A&M University; Jeremy Bischoff, Framatome; Adrien Couet, University of Wisconsin-Madison; Kevin Field, University of Michigan; Lingfeng He, North Carolina State University; Raul Rebak, GE Global Research

Tuesday AM | October 11, 2022

330 | David L. Lawrence Convention Center

Session Chairs: Lingfeng He, North Carolina State University; Raul Rebak, GE Global Research

8:00 AM

Microstructural Evolution of High-throughput Additively Manufactured 316L Stainless Steel with Increasing Hafnium Dopants: *Laura Hawkins¹; Jingfan Yang²; Miao Song³; Daniel Schwen⁴; Yongfeng Zhang⁵; Lin Shao¹; Xiaoyuan Lou²; Lingfeng He⁴; ¹Texas A&M; ²Auburn University; ³University of Michigan; ⁴Idaho National Laboratory; ⁵University of Wisconsin-Madison*

8:20 AM Invited

High-throughput Testing and Characterization of Materials For Nuclear Applications: *Michael Short¹; Myles Stapelberg¹; Eleni Mowery¹; Elena Botica Artalejo¹; Gregory Wallace¹; Tonio Buonassisi¹; Isabel Alvarez¹; ¹Massachusetts Institute of Technology*

8:50 AM

Phase-field Modeling of Radiation Induced Segregation for Multicomponent Alloys: Kinetic Monte Carlo and CALPHAD-Informed Simulations: *Sourabh Bhagwan Kadambi¹; Daniel Schwen¹; Yongfeng Zhang²; Lingfeng He¹; ¹Idaho National Laboratory; ²University of Wisconsin Madison*

9:10 AM Invited

Microstructural Self-organization of Phase-separating Alloys during Irradiation into Global Compositional Patterns at Grain-Boundaries and Inside Grains: *Pascal Bellon¹; Gabriel Bouobda Moladje¹; Sourav Das¹; Soumyajit Jana¹; Robert Averback¹; ¹University of Illinois at Urbana-Champaign*

9:40 AM

Impact of Chemical Short-range Order on Radiation Damage in Fe-Ni-Cr Alloys: *Hamdy Arkoub¹; Miaomiao Jin¹; ¹Penn State University*

10:00 AM Break

10:20 AM Invited

Hierarchical Microstructures: A Potential Route to Enhanced Stability in Structural Materials for Advanced Nuclear Reactors: *Larry Aagesen¹; Subhashish Meher¹; Mark Carroll²; Laura Carroll³; Tresa Pollock⁴; ¹Idaho National Laboratory; ²Federal-Mogul Powertrain; ³University of Michigan; ⁴University of California Santa Barbara*

10:50 AM Invited

Synchrotron High-energy X-ray Studies of Nuclear Structural Materials: *Xuan Zhang*¹; Meimei Li¹; Jonathan Almer¹; Jun-Sang Park¹; Peter Kenesei¹; Andrew Chuang¹; Aniket Tekawade²; ¹Argonne National Laboratory

11:20 AM Invited

Radiation Resistance of MAX and MAB Phase Materials: *Izabela Szlufarska*¹; Jianqi Xi¹; Jun Young Kim¹; Hongliang Zhang¹; ¹University of Wisconsin-Madison

MATERIALS-ENVIRONMENT INTERACTIONS

Thermodynamics of Materials in Extreme Environments — Thermodynamics and Stabilities of Alloys and Ceramics

Sponsored by: ACerS Basic Science Division, ACerS Energy Materials and Systems Division

Program Organizers: Xiaofeng Guo, Washington State University; Kristina Lilova, Arizona State University; Kyle Brinkman, Clemson University; Alexandra Navrotsky, Arizona State University; Jake Amoroso, Savannah River National Laboratory; Xingbo Liu, West Virginia University; Gustavo Costa, NASA Glenn Research Center

Tuesday AM | October 11, 2022

310 | David L. Lawrence Convention Center

Session Chair: Kyle Brinkman, Clemson University

8:00 AM Invited

Persistence of Materials Under Extreme Conditions: *Alexandra Navrotsky*¹; ¹Arizona State University

8:30 AM

Design of High Melting Point Materials via Deep Learning and First Principles: *Qijun Hong*¹; ¹Arizona State University

8:50 AM

Thermo-mechanical Property Prediction of Materials Using a Python Based Interface with Quantum Espresso: *Joseph Derrick*¹; Tejesh Dube¹; Jing Zhang¹; ¹IUPUI MEE Department

9:10 AM Invited

There is More to Heat Capacity Measurements than Calculating Entropy: *Brian Woodfield*¹; ¹Brigham Young University

9:40 AM

High Temperature Boron, Lithium, Iron, and Nickel Aqueous Thermochemistry for Pressurized Water Nuclear Reactors: *Jason Rizk*¹; Brian Wirth²; ¹Los Alamos National Laboratory; ²University of Tennessee, Knoxville

10:00 AM Break

10:10 AM Invited

The Thermochemical Stability of Rare Earth Oxides and Silicates for Thermal/Environmental Barrier Coating Applications: Mackenzie Ridley¹; Kristyn Ardrey²; Cameron Miller²; Kate Tomko²; Mahboobe Jassas²; Kang Wang²; Mukil Ayyasamy²; Prasanna Balachandran²; Bi-Cheng Zhou²; Patrick Hopkins²; *Elizabeth Opila*²; ¹Oak Ridge National Laboratory; ²University of Virginia

10:40 AM

Measuring Interfacial Thermodynamics from High Temperature In situ TEM Based Bicrystals Tested under Mechanical Load: *Shen Dillon*¹; ¹University of California, Irvine

11:00 AM

Phase Diagrams of Metal-Nitrogen Compounds at High Pressure and High Temperature: *Peter Kroll*¹; ¹University of Texas at Arlington

SPECIAL TOPICS

ACerS Frontiers of Science and Society: The Rustum Roy Lecture

Sponsored by: ACerS

Tuesday PM | October 11, 2022

407 | David L. Lawrence Convention Center

Session Chair: Elizabeth Opila, University of Virginia

1:00 PM Invited

Ceramics in Flatlands or How to Build New Materials and Devices Using Nanoscale Bricks: *Yury Gogotsi*¹; ¹Drexel University

SPECIAL TOPICS

MS&T22 Plenary Session — MS&T22 Plenary Session

Tuesday PM | October 11, 2022

Ballroom A | David L. Lawrence Convention Center

2:00 PM Welcome Comments

2:05 PM Introductory Comments

2:10 PM Plenary

ACerS Edward Orton, Jr. Memorial Lecture: Ceramic Particles for Precision Drug Delivery: *Sanjay Mathur*¹; ¹University of Cologne

2:50 PM Award Presentation

2:55 PM Introductory Comments

3:00 PM Plenary

AIST Adolf Martens Memorial Steel Lecture: Interface-based Design – A New Frontier for Microstructure Engineering of High-Performance Steels: *Matthias Militzer*¹; ¹University of British Columbia

3:40 PM Award Presentation

3:45 PM Introductory Comments

3:50 PM Plenary

TMS/ASM Distinguished Lectureship in Materials and Society: Materials Research on Clean Energy: For the Sake of Our Grandchildren: *Iver Anderson*¹; ¹Ames Laboratory (USDOE), Iowa State University

4:30 PM Award Presentation

4:35 PM Concluding Comments

SUSTAINABILITY, ENERGY, AND THE ENVIRONMENT

14th Symposium on Green and Sustainable Technologies for Materials Manufacturing and Processing — Sustainable Processing of Ceramics and Composites II

Sponsored by: ACerS Engineering Ceramics Division

Program Organizers: Surojit Gupta, University of North Dakota; Mritunjay Singh, Ohio Aerospace Institute; Tatsuki Ohji, National Institute of Advanced Industrial Science and Technology; Hisayuki Suematsu, Nagaoka University of Technology; Enrico Bernardo, University of Padova; Rajiv Asthana, University of Wisconsin; Yiquan Wu, Alfred University; Zhengyi Fu, Wuhan University of Technology; Allen Apblett, Oklahoma State University

Wednesday AM | October 12, 2022
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Session Chairs: Yiquan Wu, Alfred University; Enrico Bernardo, University of Padova; Allen Apblett, Oklahoma State University; Jie Yin, Shanghai Institute of Ceramics Chinese Academy of Sciences

8:00 AM

Substrate Orientation and Rare-earth Doping Effects on the Bandgap Engineering of Epitaxial β -(Al_xGa_{1-x})₂O₃ Films: *Iva Milisavljevic*¹; Yiquan Wu¹; ¹Alfred University

8:20 AM Invited

Low Temperature Molten Salt and Microwave Co-assisted Synthesis of Advanced Ceramics for Demanding Applications: *Shaowei Zhang*¹; ¹University of Exeter

8:50 AM Invited

New Construction Materials from Engineered Alkali Activation of Waste Glasses: Giulia Tameni¹; Hamada Elsayed¹; Akansha Mehta²; Jozef Kraxner²; Loredana Contrafatto³; *Enrico Bernardo*¹; ¹University of Padova; ²Funglass, University of Treviso; ³University of Catania

9:20 AM

Effect of RHA Biochar Calcination on Structural, Thermal, and Morphological Properties of BaO-B₂O₃-SiO₂ Glass System-based Coatings: *Nurullah Copoglu*¹; Bugra Cicek¹; ¹Yildiz Technical University

9:40 AM

Application of Animal Bone Residue as Portland Cement Concrete Ingredient: *Frederico Margem*¹; Gabriel Gonçalves¹; Ismael Boechat¹; Patrick do Nascimento¹; Ruthy da Silva¹; ¹Uniredentor

10:00 AM Break

10:20 AM Invited

Rapid Fabrication of SiC Composites by Selective Laser Sintering and Direct Liquid Silicon Infiltration: *Jie Yin*¹; Xuejian Liu¹; Zhengren Huang¹; ¹Shanghai Institute of Ceramics Chinese Academy of Sciences

10:50 AM

Design and Development of Novel Structural Materials from Biomass: *Surojit Gupta*¹; ¹University of North Dakota

SPECIAL TOPICS

50 Years of Characterizing Structural Ceramics and Glasses: Recognizing the Contributions of George Quinn — Standards/Mechanical Testing & Design

Sponsored by: ACerS

Program Organizers: Jeffrey Swab, Army Research Laboratory; Andrew Wereszczak, Oak Ridge National Laboratory

Wednesday AM | October 12, 2022
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Funding support provided by: Corning Inc., 3M, Orton, and Bomas

Session Chairs: Jeffrey Swab, US Army Research Laboratory; Andrew Wereszczak, Oak Ridge National Laboratory

8:00 AM Introductory Comments

8:10 AM Invited

On the Controversies during the Creation of Flexure Strength Standards MIL STD 1942 and ASTM C 1161: *George Quinn*¹; ¹NIST

8:50 AM Invited

A Quintessential Standards Writer and the Tangible Benefits of Standards: *Michael Jenkins*¹; Janine Gallego¹; ¹Bothell Engineering and Science Technologies

9:20 AM Invited

Static and Dynamic Compression Strength of Ceramics and Glasses: *Jeffrey Swab*¹; John Pittari III¹; Christopher Meredith¹; ¹Army Research Laboratory

9:50 AM Invited

Advanced Proof Testing for Structural Ceramics: *Osama Jadaan*¹; Noel Nemeth²; Eric Baker³; ¹University of North Florida; ²Retired; ³Connecticut Reserve Technologies

10:20 AM Break

10:40 AM Invited

Sectioned-flexural and Rotational-Flexural-strength Testing of Brittle Material Cylinders and Tubes: *Andrew Wereszczak*¹; Osama Jadaan²; Emily Steiner¹; Brian Oistad³; Randy Wiles¹; Brett Kuwik⁴; ¹Oak Ridge National Laboratory; ²University of North Florida; ³Saint-Gobain Research North America; ⁴Johns Hopkins University

11:10 AM Invited

On the Elastic Isotropy of the Entropy-stabilized Oxide (Mg, Co, Ni, Cu, Zn)O Compound: *Edgar Lara-Curzio*¹; Krishna Pitike¹; Andres Marquez-Rossy¹; Alexis Flores-Betancourt¹; De Xin Chen¹; Santosh KC¹; Valentino Cooper¹; ¹Oak Ridge National Laboratory

11:40 AM Invited

Observations in Fracture Toughness Testing of Glasses and Optical Ceramics: *Jonathan Salem*¹; ¹NASA GRC

SPECIAL TOPICS

ACerS Robert B. Sosman Award Symposium: Advancing the Science of Materials for Extreme Environments — Session I

Sponsored by: ACerS Basic Science Division

Program Organizers: Yiquan Wu, Alfred University; Greg Hilmas, Missouri University of Science and Technology; Eric Wuchina, NSWCCD

Wednesday AM | October 12, 2022
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Session Chairs: Laura Silvestroni, CNR - ISTEC; Elizabeth Opila, University of Virginia

8:00 AM Invited

Ultra-High Temperature Ceramic Research at Missouri S&T: *Greg Hilmas*¹; William Fahrenholtz¹; ¹Missouri University of Science and Technology

8:30 AM Invited

NSWC Research on UHTCs: A 40+ year Perspective: *Eric Wuchina*¹; Mark Opeka²; Inna Talmy³; James Zaykoski¹; Peter Kaczmarek¹; ¹NSWCCD; ²NSWCCD/Southern Research; ³NSWCCD/Retired

9:00 AM Invited

Regeneration, Co-generation and Generation via Ultra-High Temperature Ceramics: *William Lee*¹; Michael Rushton²; Simon Middleburgh²; ¹Bangor University and Imperial College London; ²Bangor University

9:30 AM Invited

Addressing Challenges to the Application of UHTCs in Extreme Environments: *Michael Cinibulk*¹; ¹AFRL

10:00 AM Break

10:20 AM Invited

Exploring Why Ultra-high Temperature Ceramic Ceramics Work in Extreme Environments: *Laura Silvestroni*¹; Nicola Gilli¹; Jeremy Watts²; William Fahrenholtz²; ¹CNR - ISTEC; ²Missouri University of Science and Technology

10:50 AM Invited

The Peculiarities of Deformation in Transition Metal Carbides: *Gregory Thompson*¹; Christopher Weinberger²; ¹University of Alabama; ²Colorado State University

11:20 AM Invited

Vacancy Ordering in Zirconium Carbide: *Theresa Davey*¹; Ying Chen¹; ¹Tohoku University

11:50 AM Invited

Effects of Liquid and Gas Phase Formation on Mechanisms of Ultra-high Temperature Ceramic Oxidation: *Lavina Backman*¹; Connor Stephens²; *Elizabeth Opila*²; ¹U.S. Naval Research Laboratory; ²University of Virginia

EDUCATION

ACerS/TMS Emerging Faculty Symposium — Faculty Life and Collaborations

Sponsored by: ACerS Education and Professional Development Council, TMS: Education Committee

Program Organizers: Ashley Hilmas, Air Force Research Laboratory; Tessa Davey, Tohoku University; Victoria Miller, University of Florida

Wednesday AM | October 12, 2022
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8:30 AM Introductory Comments

8:35 AM Invited

A Department Chair Perspective on the Faculty Search Process: *Kyle Brinkman*¹; ¹Clemson University

9:05 AM Invited

Successfully Transitioning from a Teaching-Intensive to a Research-Intensive University while on the Tenure-Track: *Janelle Wharry*¹; ¹Purdue University

9:35 AM Invited

Contributing to Academic Culture as Individuals: *Darryl Butt*¹; ¹University of Utah

10:05 AM Break

10:25 AM Invited

Building Compassion and Human Bridges through Research Collaborations: *Olivia Graeve*¹; Jorge Arróyave García de la Cadena¹; Aranza Martínez López¹; ¹University of California San Diego

10:55 AM Invited

Life-Lessons from a Career Spent Interacting with International Professional Societies and Research Collaborations: *Jon Binner*¹; ¹University of Birmingham

ADDITIVE MANUFACTURING

Additive Manufacturing and Cellular/Lattice Structures: Designs, Realization and Applications — Cellular/Lattice Structures III

Sponsored by: TMS Additive Manufacturing Committee, TMS Materials Characterization Committee

Program Organizers: Li Yang, University of Louisville; Allison Beese, Pennsylvania State University; John Carpenter, Los Alamos National Laboratory; Carolyn Seepersad, University of Texas at Austin; Miguel Aguilo, Morphorm LLC

Wednesday AM | October 12, 2022
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Session Chair: Miguel Aguilo, Morphorm LLC

8:00 AM

Effect of Geometrical Characteristics on the Mechanical Properties of Co-Cr-Mo Triply Periodic Minimal Surface Lattices Fabricated by Laser-Powder Bed Fusion: *So-Yeon Park*¹; *Kyu-Sik Kim*²; *Bandar AlMangour*³; *Kee-Ahn Lee*¹; ¹Inha University; ²Agency for Defense Development; ³King Fahd University of Petroleum & Minerals

8:20 AM

Fabrication, Microstructure and High Temperature Mechanical Properties of Inconel 718 Lattice Structures Manufactured by Laser Powder Bed Fusion: *Tae-Hoon Kang*¹; *Yongho Sohn*²; *Kee-Ahn Lee*¹; ¹Inha University; ²University of Central Florida

8:40 AM

Synchronous Involvement of Topology and Microstructure to Design Additively Manufactured Lattice Structure: *Kavan Hazel*¹; ¹The University of Arizona

9:10 AM

Effects of TiB₂ in an Al-Cu-Sc Alloy in the Hybrid Investment Casting Process: *Jose Dias Filho*¹; *Yifan Li*¹; *Aleeza Batool*¹; *Ahmed Qureshi*¹; *Hani Henein*¹; ¹Univeristy of Alberta

9:30 AM

Localized Strain, Microstructure, and Property Control of Ti-5553 Lattice Materials: *Caleb Andrews*¹; *Jenny Wang*²; *Maria Strantz*²; *Manyalibo Matthews*²; *Mitra Taheri*¹; ¹Johns Hopkins University; ²Lawrence Livermore National Laboratory

9:50 AM

Miura-Ori Based Metallic Structure for Large Deformation via Additive Manufacturing: *Vanshika Singh*¹; *Eric Heikkinen*¹; *Sudarsanam Babu*¹; *Michael Kirka*²; ¹University of Tennessee, Knoxville; ²Oak Ridge National Laboratory

10:10 AM Break

10:30 AM

Enabling Novel Porous Noise Absorbers via Additive Manufacturing: *Bhisham Sharma*¹; ¹Wichita State University

11:00 AM

Interlocking Metasurfaces: A Joining Technology for Additive: *Ophelia Bolmin*¹; *Benjamin Young*¹; *Philip Noell*¹; *Brad Boyce*¹; ¹Sandia National Laboratories

11:20 AM

Multi-scale Simulations for Improving the Design of Additive Manufactured Shock Absorbers: *Luiz Lima*¹; *Nannan Song*¹; *Kedar Malusare*²; *Kennedy Neves*¹; *Flavio Souza*¹; ¹Siemens

ADDITIVE MANUFACTURING

Additive Manufacturing Modeling, Simulation, and Machine Learning: Microstructure, Mechanics, and Process — Microstructures & Defects II

Program Organizers: Jing Zhang, Indiana University – Purdue University Indianapolis; Brandon McWilliams, US Army Research Laboratory; Li Ma, Johns Hopkins University; Yeongil Jung, Changwon National University

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Session Chairs: Jing Zhang, Indiana University – Purdue University Indianapolis; Yeon-Gil Jung, Changwon National University; Li Ma, Johns Hopkins University Applied Physics Laboratory; Brandon McWilliams, CCDC Army Research Laboratory

8:00 AM

Energy and Microstructural Evolution of In-situ Alloyed Cu-4at% Cr -2 at% Nb via Laser Powder Bed Fusion: *David Scannapieco*¹; *David Ellis*²; *John Lewandowski*¹; ¹Case Western Reserve University; ²NASA Glenn Research Center

8:20 AM

Microstructure Predictions in Additive Manufacturing from Analytical Solidification Models – A Critical Assessment of Simplifying Assumptions: *Jonah Klemm-Toole*¹; *Charles Smith*¹; *Olivia DeNonno*¹; *Matthew Schreiber*¹; *Luc Hagen*¹; *Gwilym Couch*¹; *Zhenzhen Yu*¹; *Kip Findley*¹; *John Speer*¹; *Joy Gockel*¹; *Amy Clarke*¹; *Tony Petrella*¹; *Craig Brice*¹; ¹Colorado School of Mines

8:40 AM

Development of Rapid Solidification Model for Additive Manufacturing and Application to Al-Si Alloys: *Minho Yun*¹; *In-Ho Jung*¹; ¹Seoul National University

9:00 AM

Modeling the Solidification Cracking Susceptibility of Additively Manufactured Alloys: *Noah Sargent*¹; *Soumya Sridar*¹; *Richard Otis*²; *Wei Xiong*¹; ¹University of Pittsburgh; ²Jet Propulsion Laboratory, California Institute of Technology

9:20 AM

Sparse Sampling for 3D Electron Backscatter Diffraction: *Zachary Varley*¹; *Gregory Rohrer*¹; *Marc De Graef*¹; ¹Carnegie Mellon University

9:40 AM

Printability and Failure Susceptibility of Different Powder Layer Thicknesses in Laser Powder Bed Fusion: *Taylor Sundermann*¹; *David Shoukr*¹; *Peter Morcos*¹; *Raymundo Arroyave*¹; *Alaa Elwany*¹; *Ibrahim Karaman*¹; ¹Texas A&M University

ADDITIVE MANUFACTURING

Additive Manufacturing of High and Ultra-high Temperature Ceramics and Composites: Processing, Characterization and Testing — Composites and Reinforcements

Sponsored by: ACerS Young Professionals Network

Program Organizers: Corson Cramer, Oak Ridge National Laboratory; Lisa Rueschhoff, Air Force Research Laboratory; Greg Hilmas, Missouri University of Science and Technology

Wednesday AM | October 12, 2022
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Session Chair: Austin Martin, Navy Research Lab

8:00 AM Invited

Additive Manufacturing of Chopped Fiber Ultra-High Temperature Ceramic Composites: James Kemp¹; Benjamin Lam¹; Connor Wyckoff¹; William Costakis¹; Lisa Rueschhoff¹; ¹Air Force Research Laboratory

8:30 AM

AM of SiC:SiC Composites via Robocasting: John Stuecker¹; Steve Bullock²; David Mitchell²; Tristin Anderson²; Hunter Berner¹; Corson Cramer²; ¹Robocasting Enterprises; ²Oak Ridge National Laboratories

8:50 AM

Strategies for Printing Fibers and Post-processing for Ceramic Matrix Composites (CMCs): Corson Cramer¹; David Mitchell¹; James Klett¹; Vlastimil Kunc¹; ¹Oak Ridge National Laboratory

9:10 AM

Evaluating Extrusion Deposited Additively Manufactured Fiber-reinforced Thermoplastic Polymers as Carbon/Carbon Preforms: Edwin Romero¹; Eduardo Barocio²; R. Pipes²; Rodney Trice¹; ¹Purdue University; ²The Composites Manufacturing and Simulation Center

9:30 AM

High-temperature Performance of LCVD SiC Fiber-Reinforced CMCs: Mark Schaefer¹; Jeff Vervlied¹; Kirk Williams¹; Joseph Pegna¹; ¹Free Form Fibers

9:50 AM Break

10:10 AM Invited

Considerations for Additive Manufacturing of Ultra-high Temperature Ceramic Composites Using Preceramic Polymers: Brett Compton¹; ¹University of Tennessee

10:40 AM

Anisotropic Microstructures in Platelet-Seeded Silicon Carbide obtained via Direct Ink Writing: Tess Marconie¹; Jeffrey Youngblood¹; Rodney Trice¹; ¹Purdue University

ADDITIVE MANUFACTURING

Additive Manufacturing of Metals: Microstructure, Properties and Alloy Development — High Temperature and Refractory Materials

Program Organizers: Prashanth Konda Gokuldoss, Tallinn University of Technology; Jurgen Eckert, Erich Schmid Institute of Materials Science; Zhi Wang, South China University of Technology

Wednesday AM | October 12, 2022
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Session Chairs: Farahnaz Haftlang, Pohang University of Science and Technology; Veeraraghavan Sundar, UES Inc.

8:00 AM

Temporary Coating to Improve Part Integrity and Post-Sintering Surface Roughness of Binder Jet Printed Tungsten Carbide-Cobalt Parts: Pierangeli Rodriguez De Vecchis¹; Katerina Kimes²; Drew Elhassid³; Markus Chmielus¹; ¹University of Pittsburgh; ²Desktop Metal; ³General Carbide

8:20 AM

Fabrication of Molybdenum Based Refractory Alloys Using Additive Manufacturing: Christopher Ledford¹; Patxi Fernandez-Zelaia¹; Michael Kirka¹; ¹Oak Ridge National Laboratory

8:40 AM

Laser Powder Bed Fusion of Platinum-based Alloys for Industrial High Temperature Structural Applications: Biao Cai¹; Selassie Dorvlo²; Ian Campbell²; Moataz Attallah¹; Parastoo Jamshidi¹; ¹University of Birmingham; ²Cookson Gold

9:00 AM

Printability and Defects in W & W -alloys by Directed Energy Deposition: Amaranth Karra¹; Maarten de Boer¹; Bryan Webler¹; ¹Carnegie Mellon University

9:20 AM

A Direct Laser Deposition Investigation of Microstructure-Processing-Property Relationships in NbVZr-based Alloys: Katharine Padilla¹; Mu Li¹; Zhaohan Zhang¹; Rohan Mishra¹; Katharine Flores¹; ¹Washington University in St. Louis

9:40 AM

Laser Powder Bed Fusion of Pure Nb Powder and Nb-WC Powder Blend: Ana Sofia d'Oliveira¹; Eloisa Cardozo¹; Moataz Attallah²; ¹Universidade Federal do Paraná; ²University of Birmingham

10:00 AM Break

10:20 AM

Microstructure and Mechanical Properties of Co-based Superalloy with /' Microstructure Fabricated by Laser Powder-bed Fusion: Hyeji Im¹; Chuan Liu¹; Carelyn Campbell²; David Dunand¹; ¹Northwestern University; ²NIST

10:40 AM

Sintering Process Optimization for FeCrAl and FeCrAl/Binder Composites for Use in Material Extrusion Additive Manufacturing: Amrita Lall¹; Zachary Kennedy¹; Josef Christ¹; Saumyadeep Jana¹; ¹Pacific Northwest National Laboratory

11:00 AM

Suitability of CoCrFeMn(Ni3Al)_x High Entropy Alloys for Additive Manufacturing: *Zachary Sims*¹; Aurelien Perron¹; Alfred Amon¹; Hunter Henderson¹; Michael Thompson²; Max Neveau²; Orlando Rios²; Scott McCall¹; ¹Lawrence Livermore National Laboratory; ²University of Tennessee Knoxville

ADDITIVE MANUFACTURING

Additive Manufacturing of Metals: Microstructure, Properties and Alloy Development — Other Non-ferrous Materials

Program Organizers: Prashanth Konda Gokuldoss, Tallinn University of Technology; Jurgen Eckert, Erich Schmid Institute of Materials Science; Zhi Wang, South China University of Technology

Wednesday AM | October 12, 2022

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Session Chairs: Jonathan Putman, Exum Instruments; Ahmad Nourian-Avval, Northeastern University

8:00 AM

Copper Printing Capabilities via Binder Jet Printing: *Sabina Kumar*¹; ¹Eaton Corporation

8:20 AM

Microstructure Evolution and Mechanical Properties of 3D Printed and Sintered Copper Parts: *Kameswara Pavan Ajjarapu*¹; Luke Malone¹; Carrie Barber²; Mark Barr²; Matteo Zanon²; Sundar Atre¹; Kunal Kate¹; ¹University of Louisville; ²Kymera International

8:40 AM

Post-process Heat Treatment Effects on Additive Manufactured Pure Copper: *Wanxuan Teng*¹; Biao Cai¹; Kenneth Nai²; Stuart Jackson²; Ian Campbell³; ¹University of Birmingham; ²Renishaw PLC; ³Cookson Precious Metals Ltd

9:00 AM

Simplifying Post-Processing of Copper Alloys Using: *Owen Hildreth*¹; Sanaz Yazdanparast¹; ¹Colorado School of Mines

9:20 AM

Development of High Pressure Heat Treatment for L-PBF F357: *Chad Beamer*¹; Pontus Nilsson¹; Andrew Wessman²; Donald Godfrey³; ¹Quintus Technologies LLC; ²University of Arizona ; ³SLM Solutions Americas

9:40 AM

Influence of Post-Processing Techniques on Process-induced Defects in AM AlSi10Mg and CP-Ti: *Austin Ngo*¹; Hannah Sims¹; John Lewandowski¹; ¹Case Western Reserve University

10:00 AM Break

10:20 AM

Laser-powder Bed Fusion and Mechanical Properties of Al18Co30Cr10Ni32 Eutectic Multi-Principal Element Alloy: *Thinh Hyunh*¹; Abhishek Mehta¹; Nemanja Klejstan²; Asif Mahmud¹; Kevin Graydon¹; Marko Knezevic²; Brandon McWilliams³; Kyu Cho³; Yongho Sohn¹; ¹University of Central Florida; ²University of New Hampshire; ³DEVCOM US Army Research Laboratory

10:40 AM

Stainless Steel and Aluminum Alloy Development for Highly Consistent and Isotropic Properties in Laser Powder Bed Fusion: *Benjamin Rafferty*¹; Jeremy Iten¹; Aaron Stebner²; Akansh Singh³; Branden Kappes⁴; Sridhar Seetharaman⁵; Dyuti Sarker²; Soumya Mohan²; ¹Elementum 3D; ²Georgia Tech; ³Colorado School of Mines; ⁴KMMD; ⁵Arizona State University

11:00 AM

Additively Graded Materials for Thermal Management: *Gianna Valentino*¹; Sharon Park²; Alex Lark¹; Mo-Rigen He²; Kevin Hemker²; ¹Johns Hopkins Applied Physics Laboratory; ²Johns Hopkins University

ADDITIVE MANUFACTURING

Additive Manufacturing of Titanium-based Materials: Processing, Microstructure and Material Properties — Ti-alloys

Program Organizers: Ulf Ackelid, Freemelt AB; Ola Harrysson, North Carolina State University

Wednesday AM | October 12, 2022

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Session Chair: Ulf Ackelid, Freemelt

8:00 AM Invited

Hybrid Strategies to Increasing the Throughput of Electron Beam Selective Melting of Ti-alloys: *Moataz Attallah*¹; Riccardo Tosi¹; Alex Leung²; Emmanuel Muzangaza¹; Xipeng Tan³; ¹University of Birmingham; ²University College London; ³NUS, Singapore

8:40 AM

Additive Manufacturing of Titanium – Boron Carbide In-situ Composites: *Mohan Sai Kiran Nartu*¹; Srinivas Aditya Mantri¹; Thomas W. Scharf¹; Narendra Dahotre¹; Rajarshi Banerjee¹; ¹University of North Texas

9:00 AM

Multi-stage Modeling of Fatigue of Ti-6Al-4V Fabricated by Different Additive Manufacturing Techniques: *Lionardo Lado*¹; *Mohammad Mahtab*¹; ¹University of Tennessee Chattanooga

9:20 AM

Transmission Electron Microscopy Analysis of Cellular Structure of Laser Processed Metastable Ti-Nb Alloy: *Wenhao Lin*¹; Eric Hoglund¹; Helge Heinrich¹; Ji Ma¹; ¹University of Virginia

ADDITIVE MANUFACTURING

Additive Manufacturing: Equipment, Instrumentation and In-Situ Process Monitoring — Equipment, Instrumentation and In-Situ Process Monitoring II

Sponsored by: TMS Additive Manufacturing Committee

Program Organizers: Ulf Ackelid, Freemelt AB; Joy Gockel, Colorado School of Mines; Sneha Prabha Narra, Carnegie Mellon University; Ola Harrysson, North Carolina State University

Wednesday AM | October 12, 2022
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Session Chair: Joy Gockel, Colorado School of Mines

8:00 AM Invited

Challenges and Opportunities for In-Situ Sensing during Electron Beam Powder Bed Fusion Additive Manufacturing: *Tim Horn*¹; ¹North Carolina State University

8:40 AM

High-Speed Thermal Imaging of the Melt Pool in Laser Powder Bed Fusion: *Guadalupe Quirarte*¹; Alexander Myers¹; Syed Uddin¹; Jack Beuth¹; Jonathan Malen¹; ¹Carnegie Mellon University

9:00 AM

Using High-Speed Thermal Imaging to Understand Melt Pool Defects in Laser Powder Bed Fusion: *Alexander Myers*¹; Guadalupe Quirarte¹; Syed Uddin¹; Jonathan Malen¹; Jack Beuth¹; ¹Carnegie Mellon University

9:20 AM

In-situ Process Monitoring, Synchronization and Mapping Laser Powder Bed Fusion Builds of Ti6Al4V: *Samuel Hocker*¹; Brodan Richter¹; Joseph Zalameda¹; Wesley Tayon¹; Erik Frankforter¹; Peter Spaeth¹; Andrew Kitahara²; ¹NASA; ²National Institute of Aerospace

9:40 AM

In-situ Sensor Feature Engineering for Process Development of Energy Conversion Materials: *Joy Gockel*¹; John Middendorf²; Joe Walker²; Vijayarathi Ponnambalam³; Saniya LeBlanc³; Tanvi Banerjee⁴; ¹Colorado School of Mines; ²Open Additive, LLC; ³George Washington University; ⁴Wright State University

10:00 AM Break

10:20 AM

Characterization of Laser Powder Bed Fusion Internal and Surface Defects as a Foundation for In Situ Monitoring: *Sean Dobson*¹; Ashley Paz y Puente¹; ¹University of Cincinnati

NUCLEAR ENERGY

Advanced Characterization of Materials for Nuclear, Radiation, and Extreme Environments III — Spectroscopy/Tomography

Sponsored by: TMS Nanomechanical Materials Behavior Committee, TMS Nuclear Materials Committee

Program Organizers: Cody Dennett, Commonwealth Fusion Systems; Samuel Briggs, Oregon State University; Christopher Barr, Naval Nuclear Laboratory; Michael Short, Massachusetts Institute of Technology; Janelle Wharry, Purdue University; Cheng Sun, Idaho National Laboratory; Caitlin Taylor, Los Alamos National Laboratory; Khalid Hattar, Sandia National Laboratories; Yuanyuan Zhu, University of Connecticut

Wednesday AM | October 12, 2022
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Session Chairs: Janelle Wharry, Purdue University; Christopher Barr, Naval Nuclear Laboratory

8:00 AM Invited

Dose Rate Dependent Radiation Enhanced Diffusion in Model Oxides: *Kayla Yano*¹; Aaron Kohnert²; Tiffany Kaspar¹; Sandra Taylor¹; Hyosim Kim²; Yongqiang Wang²; Daniel Schreiber¹; ¹Pacific Northwest National Laboratory; ²Los Alamos National Laboratory

8:30 AM

Thermomechanical Characterization of Advanced Reactor Materials in High Temperature Gas Environments: *William Searight*¹; Leigh Winfrey²; ¹Pennsylvania State University; ²SUNY Maritime College

8:50 AM Invited

Materials in Extreme Environments Investigated with Positron Spectroscopy: *Rasheed Auguste*¹; Peter Hosemann¹; M. Oskar Liedke²; Maik Butterling²; Farida Selim³; Sebastian Lam¹; Djamel Kaoumi⁴; Ho Lun Chan⁵; Elena Romanovskaia⁵; John Scully⁵; ¹University of California, Berkeley; ²Helmholtz-Zentrum Dresden - Rossendorf; ³Bowling Green State University; ⁴North Carolina State University; ⁵University of Virginia

9:20 AM Invited

In Situ Monitoring of Heavy Liquid Metal and Molten Salt Corrosion under Irradiation with Proton-induced X-ray Emission (PIXE) Spectroscopy: *Franziska Schmidt*¹; Matthew Chancey²; Chaitanya Peddeti¹; Scott Parker²; Yongqiang Wang²; Peter Hosemann¹; ¹University of California Berkeley; ²Los Alamos National Laboratory

9:50 AM Break

10:10 AM

Europium 3⁺ as a Structural Luminescent Probe in Calcined Ceria Pellets: *Jacob Flowers*¹; Kelly Nash¹; Elizabeth Sooby¹; Sumeyra Tek¹; Julian Valdez¹; ¹University of Texas at San Antonio

10:30 AM

Correlating Irradiation Defect Models to Thermal Conductivity Evolution under Irradiation in ThO₂: *Joshua Ferrigno*¹; Saqeeb Adnan¹; Amey Khanolkar²; Miaomiao Jin³; Kaustubh Bawane²; Linu Malakkal²; Erika Nosal¹; Zilong Hua²; Lingfeng He²; David Hurley²; Marat Khafizov¹; ¹The Ohio State University; ²Idaho National Laboratory; ³Penn State University

PROCESSING AND MANUFACTURING

Advanced Joining Technologies for Automotive Lightweight Structures — Friction Stir Welding (FSW)

Sponsored by: ACerS Manufacturing Division, TMS Aluminum Committee

Program Organizers: Yan Huang, Brunel University London; Carla Barbatti, Constellium; Yingchun Chen, Dura Automotive Systems

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Session Chairs: Yingchun Chen, Dura Automotive Systems ; Yan Huang, Brunel University London

8:00 AM Invited

3D Process Modeling of Linear Friction Welding Using a Smoothed Particle Hydrodynamics Based Approach: *Srujan Rokkam*¹; Quang Truong¹; Donald Weaver²; ¹Advanced Cooling Technologies Inc; ²Air Force Research Laboratory

8:30 AM Invited

Microstructural and Mechanical Property Change during Friction Element Welding: Ankit Varma¹; Laine Mears¹; Hongseok Choi¹; Xin Zhao¹; ¹Clemson University

9:00 AM

Additive Friction Stir Deposition for Cladding and Repair of Lightweight Aluminum: *Greg Hahn*¹; Hang Yu¹; ¹Virginia Polytechnic Institute and State University

9:20 AM

Friction Stir Lap Welding of 3T Al Sheets in a Robotic Platform: *Piyush Upadhyay*¹; Hrishikesh Das¹; Shivakant Shukla¹; ¹Pacific Northwest National Laboratory

9:40 AM

Microstructure and Properties of Mg/Mg and Mg/Al FSW Welds: *Krzysztof Mroczka*¹; Stanislaw Dymek²; Adam Pietras³; Aleksandra Weglowska³; Carter Hamilton⁴; Mateusz Kopyscianski²; ¹Cracow University of Technology; ²AGH University of Science and Technology in Krakow; ³The Lukasiewicz Research Network Institute of Welding; ⁴Miami University

MATERIALS-ENVIRONMENT INTERACTIONS

Advanced Materials for Harsh Environments — Session IV

Sponsored by: ACerS Electronics Division

Program Organizers: Navin Manjooran, Chairman, Solve; Gary Pickrell, Virginia Tech

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Session Chairs: Gary Pickrell, Virginia Tech; Navin Manjooran, Chairman, Solve

8:00 AM Presentation Planned

8:40 AM

Utilization of Acacia senegal for Rubber Processing Effluent Treatment: pH Variations and Optimum Dose determination: *O. C Ize-Iyamu*¹; Ikhuazuagbe Ifijen¹; E.E Ukepor¹; O.K Ize-Iyamu²; I.O. Bakare¹; A.O Ohifuemen¹; N.U Udokpoh¹; F.U Mohammed¹; E.A Fagbemi¹; ¹Rubber Research Institute of Nigeria; ² Ambrose Alli University, Ekpoma

9:00 AM

CMAS Interaction with Model YAlO₃ Environmental Barrier Coatings: Effect of Y₃Al₅O₁₂ Precipitation on Apatite Nucleation and Growth: *Amanda Velazquez Plaza*¹; Amanda Krause¹; ¹University of Florida

9:20 AM

Far-Field Passive Wireless Sensors using Conductive Ceramic for High-Temperature Health Monitoring: *Kevin Tennant*¹; Edward Sabolsky¹; Jay Wilhelm²; Brian Jordan¹; Kavin Sivanerai¹; ¹West Virginia University; ²Ohio University

9:40 AM

High Temperature Thick Film Sensor Development Based on Doped Lanthanum Chromites Refractory Semiconductors Materials: *Javier Mena*¹; Edward Sabolsky¹; Konstantinos Sierros¹; Katarzyna Sabolsky¹; Domenic Cipollone¹; Víctor Mendoza²; Anthony Abrahamian¹; ¹West Virginia University; ²Universidad del Norte

10:00 AM Break

10:20 AM

The Effect of Residual Stress on Aluminum Pitting Corrosion: *Junyeop Lee*¹; Eunkyung Lee¹; ¹National Korea Maritime and Ocean University

10:40 AM

An Investigation of High Temperature Corrosion Sensing for Coal-based Power Plant Operations: *Brian Jordan*¹; Edward Sabolsky¹; Daryl Reynolds¹; Kavin Sivaneri¹; Kevin Tennant¹; Derek Hockenberry¹; ¹West Virginia University

11:00 AM Concluding Comments

SUSTAINABILITY, ENERGY, AND THE ENVIRONMENT

Advances and Challenges in Decarbonization of the Steel Industry — Session I

Sponsored by: AIST Metallurgy — Processing, Products & Applications Technology Committee

Program Organizers: Sridhar Seetharaman, Colorado School of Mines; Jeremy Jones, Continuous Improvement Experts Inc. (CIX Inc.); Zane Voss, Continuous Improvement Experts Inc. (CIX Inc.); Sunday Abraham, SSAB Americas; Ronald O'Malley, Missouri University of Science and Technology

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Session Chair: To Be Announced

8:00 AM

Comparative Analysis of Decarbonized Steel with Alternative Materials: *Vaishnavi Vijay Rajulwar*¹; Robert Stirling¹; Tova Jarnerud¹; Sridhar Seetharaman¹; ¹Arizona State University

8:20 AM

Grid Interactive Hydrogen Steelmaking (GISH) – Towards Decarbonization of Steel Industry: *Yuri Korobeinikov*¹; Sridhar Seetharaman¹; Amogh Meshram¹; ¹Arizona State University

8:40 AM

Controlling Processing Conditions and Microstructures to Mitigate Hot-shortness in Steels with Elevated Cu: *Lionel Promel*¹; Henry Geerlings¹; Sridhar Seetharaman¹; Amy Clarke¹; Jonah Klemm-Toole¹; Kester Clarke¹; ¹Colorado School of Mines

9:00 AM

Research and Development for Decarbonisation of the UK Steel Industry: *Zushu Li*¹; ¹University of Warwick

9:20 AM

Modeling Guided Fabrication of Adsorptive Heat Exchanger for Carbon Capture: *Dongsheng Li*¹; Wei Liu²; ¹Advanced Manufacturing LLC; ²Molecule Works Inc.

ARTIFICIAL INTELLIGENCE

AI for Big Data Problems in Advanced Imaging, Materials Modeling and Automated Synthesis — AI for Materials Discovery II

Sponsored by: TMS Advanced Characterization, Testing, and Simulation Committee

Program Organizers: Mathew Cherukara, Argonne National Laboratory; Subramanian Sankaranarayanan, University of Illinois-Chicago; Badri Narayanan, University of Louisville

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Session Chairs: Subramanian Sankaranarayanan, University of Illinois Chicago; Badri Narayanan, University of Louisville

8:00 AM

AI-enabled Platform for Autonomous Experimentation and Materials Discovery: *Henry Chan*¹; Chengshi Wang¹; Jie Xu¹; Rohit Batra¹; Arun Baskaran¹; Maria Chan¹; Pierre Darancet¹; ¹Argonne National Laboratory

8:30 AM

De Novo Inverse Design of Nanoporous Materials by Machine Learning: *Mathieu Bauchy*¹; ¹University of California, Los Angeles

9:00 AM

Deep Learning Approaches for Accelerating Polymer Characterization: *Tarak Patra*¹; ¹IIT Madras

9:30 AM

Multi-Fidelity Machine Learning for Perovskite Discovery: *Arun Kumar Mannodi Kanakkithodi*¹; ¹Purdue University

10:00 AM Break

10:20 AM

Machine Learning for Accelerated Defect Dynamics in Materials: *Ghanshyam Pilania*¹; Anjana Talapatra¹; Anup Pandey¹; Blas Uberuaga¹; Danny Perez¹; ¹Los Alamos National Laboratory

10:50 AM

Understanding Atomic-scale Mechanisms of Defect Dynamics in Rare Earth Nickelates by Machine Learning and Quantum Simulations: *Mirza Galib*¹; *Badri Narayanan*¹; ¹University of Louisville

11:20 AM Concluding Comments

FUNDAMENTALS AND CHARACTERIZATION

Alloy Phase Transformations at Elevated Temperatures — Session III

Sponsored by: TMS High Temperature Alloys Committee, TMS Phase Transformations Committee

Program Organizers: Dinc Erdeniz, University of Cincinnati; Benjamin Adam, Oregon State University; Jonah Klemm-Toole, Colorado School of Mines; Eric Lass, University of Tennessee-Knoxville; Ashley Paz y Puente, University of Cincinnati; Sophie Primig, University of New South Wales; Chantal Sudbrack, National Energy Technology Laboratory

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Session Chair: Chantal Sudbrack, National Energy Technology Laboratory

8:00 AM Invited

Develop Precipitation-Strengthened Refractory High Entropy Alloys for Turbine Blades Applications above 1300 Degree Celsius: *Michael Gao*¹; David Alman¹; Chantal Sudbrack¹; Paul Jablonski¹; Vishnu Raghuraman²; Mike Widom²; Michael Kirka³; ¹National Energy Technology Laboratory; ²Carnegie Mellon University; ³Oak Ridge National Laboratory

8:30 AM Invited

Precipitation Strengthening in BCC Al₂CrMnTiV High-Entropy Alloys: *Keith Knippling*¹; Patrick Callhan¹; ¹Naval Research Laboratory

9:00 AM

Alternate Phase Transformation Paths in a Nb-50Ti Alloy in the Presence of Oxygen Interstitials: *Ravit Silverstein*¹; Anirudh Natarajan²; Anton Van der Ven¹; Carlos Levi¹; ¹University of California, Santa Barbara; ²University of California, Santa Barbara, California

9:20 AM

Additive Manufacturing Design of Metal Matrix Composites of Stainless Steel 316 and Inconel 718: *Daozheng Li*¹; Wei Xiong¹; ¹University of Pittsburgh

9:40 AM Invited

Precursor Metastable Phases and Their Influence on a Precipitation in the Metastable β -titanium Alloy, Ti-5Al-5Mo-5V-3Cr: *Stoichko Antonov*¹; Zachary Kloenne²; Yufeng Zheng³; Rongpei Shi⁴; Hamish Fraser²; Baptiste Gault⁵; ¹National Energy Technology Laboratory; ²The Ohio State University; ³University of Nevada, Reno; ⁴Harbin Institute of Technology; ⁵Max-Planck-Institut für Eisenforschung

10:10 AM Break

10:30 AM

Study of Thermal Decomposition of γ' -Fe₃N Using Molecular Dynamics Simulation: *Jianxin Zhu*¹; Jian-Ping Wang¹; ¹University of Minnesota

10:50 AM

Thermal Stability and Time-temperature-transformation Diagrams of Co-rich Nanocomposite Ribbons: *Yuankang Wang*¹; ¹University of Pittsburgh

11:10 AM

On the Shapes of Time-Temperature-Transformation Curves across Alloys and Reactions: *Robert Hackenberg*¹; ¹Los Alamos National Laboratory

SPECIAL TOPICS

Art and Cultural Heritage: Discoveries during the Pandemic Year — Session I

Sponsored by: ACeRS Art, Archaeology, and Conservation Science Division

Program Organizers: Marie Jackson, University of Utah; Jamie Weaver, National Institute of Standards and Technology

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Session Chairs: Marie Jackson, University of Utah; Jamie Weaver, National Institute of Standards and Technology

8:00 AM Introductory Comments

8:10 AM

Multiscale Imaging and Compositional Analysis Correlation of Heritage Science Materials: *Michael Detisch*¹; *Jillian Cramer*¹; *W. Seales*¹; *T. Balk*¹; *Alyssa Stubbers*¹; ¹University of Kentucky

8:30 AM

Complementary Scientific Techniques for the Study of Mesoamerican Greenstone Objects: *Willow Knight*¹; *Faith Gantz*¹; *Matthew Carl*¹; *Marcus Young*¹; *Brigitte Kovacevich*²; *Dawn Crawford*³; *Elena Torok*⁴; *Fran Baas*⁴; ¹University of North Texas; ²University of Central Florida; ³Southern Methodist University; ⁴Dallas Museum of Art

8:50 AM

Collaboration to Develop and Validate a Microanalytical Methodology to Analyze Early European Porcelains to Predict Firing Temperatures: *Thomas Lam*¹; *Grace Dunham*²; *Jessica Walthew*¹; *Sarah Barack*¹; *William Carty*²; ¹Smithsonian Institution; ²Alfred University

9:10 AM

Acid Corrosion of Earthenware: Interactions between Aluminosilicates and Sulfur-Containing Adsorbents: *Celia Char*¹; *Jessica Heimann*²; *Joseph Bennett*²; *Glenn Gates*³; *Zeev Rosenzweig*²; *Katherine Faber*¹; ¹California Institute of Technology; ²University of Maryland, Baltimore County; ³The Walters Art Museum

9:30 AM Keynote

Art Glass in Pittsburgh: A Creative Hub from Industrial Roots: *Heather McElwee*¹; ¹Pittsburgh Glass Center

10:10 AM Break

10:30 AM

Binder and Volcanic Aggregate Transformations in the Mortar of Tomb of Caecilia Metella Concrete, 1C BCE, Rome: *Marie Jackson*¹; *Linda Seymour*²; *Nobumichi Tamura*³; *Admir Masic*⁴; *Gabriele Vola*⁵; ¹University of Utah; ²Simpson, Gumpertz & Heger; ³Lawrence Berkeley National Laboratory; ⁴Massachusetts Institute of Technology; ⁵Cimprogetti Srl

10:50 AM

Egyptian Blue: Experimental Assessment of Process Variability for Museum Exhibition: Julia Esakoff¹; Arumala Lere-Adams¹; John McCloy¹; Travis Olds²; Lisa Haney²; Ciara Cryst²; ¹Washington State University; ²Carnegie Museum of Natural History

NUCLEAR ENERGY

Ceramics for a New Generation of Nuclear Energy Systems and Applications — Ceramics for Nuclear Energy Application

Sponsored by: TMS Nuclear Materials Committee, ACerS Energy Materials and Systems (EMSD) Division

Program Organizers: Ming Tang, Clemson University; Enrique Martinez Saez, Clemson University; Yongfeng Zhang, University of Wisconsin; Krista Carlson, University of Nevada, Reno; Yutai Katoh, Oak Ridge National Laboratory; Jean Paul Crocombette, CEA Saclay; Erofil Kardoulaki, Los Alamos National Laboratory; Levi Gardner, Argonne National Laboratory; Jian Zhang, Xiamen University; Charmayne Lonergan, Pacific Northwest National Laboratory

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Session Chairs: Maik Lang, University of Tennessee; S. K. Sundaram, Alfred University

8:00 AM Invited

Additive Manufacturing of Ceramics for Nuclear Applications: S. K. Sundaram¹; ¹Alfred University

8:30 AM Invited

Radiation Effects in Single-crystal High-entropy Oxides: Candice Kinsler-Fedon¹; Lauren Nuckols¹; Anamul Mir²; Christopher Nelson³; David Mandrus¹; Yanwen Zhang³; Veerle Keppens¹; William Weber¹; ¹University of Tennessee; ²University of Huddersfield; ³Oak Ridge National Laboratory

9:00 AM

Radiation Damage of Ion-irradiated High Entropy Ceramics: Kun Wang¹; Yonggang Yan¹; Di Chen¹; ¹Alfred University

9:20 AM

Phonon Broadening in High Entropy Ceramic Carbide: Linu Malakkal¹; Kaustubh Bawane¹; Cody Denmet²; Zilong Hua¹; Lingfeng He¹; Yongfeng Lu³; Bai Cui³; ¹Idaho National Laboratory; ²Commonwealth Fusion Systems; ³University of Nebraska-Lincoln

9:40 AM Invited

A Physics-Based Cluster Dynamics Model of Radiation-Enhanced Growth of Oxides: Aaron Kohnert¹; Edward Holby¹; Amitava Banerjee²; Shivani Srivastava³; Mark Asta³; Blas Uberuaga¹; ¹Los Alamos National Laboratory; ²IIIT Jodhpur; ³University of California, Berkeley

10:10 AM Break

10:30 AM Invited

Characterization of Radiation Effects in Ceramics with Spallation Neutron Probes: Maik Lang¹; ¹University of Tennessee

11:00 AM

Corrosion of SiC in Molten Salt and Liquid Lead: Huali Wu¹; Jinsuo Zhang¹; ¹Virginia Polytechnic Institute and State University

11:20 AM

Characterizing Effects of Aging Bismuth Laden Sorbents in NO_x Atmosphere for Radioiodine Capture: Casey Elliott¹; Karthikeyan Baskaran¹; Muhammad Ali¹; Dave Cohrs¹; Brian Riley²; Krista Carlson¹; ¹University of Nevada Reno; ²PNNL

11:40 AM

Modeling Vibrational Modes in Raman Spectra of ThO₂: Saqeeb Adnan¹; Joshua Ferrigno¹; Erika Nosal¹; Chao Jiang²; Marat Khafizov¹; ¹The Ohio State University; ²Idaho National Laboratory

NANOMATERIALS

Controlled Synthesis, Processing, and Applications of Structural and Functional Nanomaterials — Energy Applications

Sponsored by: ACerS Basic Science Division, ACerS Electronics Division, ACerS Engineering Ceramics Division

Program Organizers: Haitao Zhang, University of North Carolina at Charlotte; Gurpreet Singh, Kansas State University; Kathy Lu, Virginia Polytechnic Institute and State University; Edward Gorzkowski, Naval Research Laboratory; Jian Shi, Rensselaer Polytechnic University; Michael Naguib, Tulane University; Sanjay Mathur, University of Cologne

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Session Chairs: Gurpreet Singh, Kansas State University; Michael Naguib, Tulane University

8:00 AM Invited

An Axially Continuous Graphene-Copper Wire for Multifunctional Applications: Wonmo Kang¹; Hamzeh Kashani¹; Chunghwan Kim¹; Christopher Rudolf²; Keith Perkins²; ¹Arizona State University; ²Naval Research Laboratory

8:30 AM Invited

Controlled Synthesis of Robust Reusable Nanostructures for Thermal Management and Energy Efficiency: Sharmila Mukhopadhyay¹; ¹University of Maine

9:00 AM

Synthesis of the Titanium Carbonitride MXenes and their Applications in Energy Storage: Anika Tabassum¹; Kun Liang¹; Ahmad Majed¹; Kaitlyn Prenger¹; Michael Naguib¹; ¹Tulane University

9:20 AM

Role of Pre-Intercalation on the Electrochemical Performance of Ti₃C₂T_x MXene in Aqueous and Room Temperature Ionic Liquid Electrolyte (RTIL) Supercapacitors and in Sodium Ion Capacitors: Kaitlyn Prenger¹; Kun Liang¹; Alexander Brady²; Michael Naguib¹; Robert Sacci²; Hsiu-Wen Wang²; ¹Tulane University; ²Oak Ridge National Laboratory

9:40 AM Invited

Designing Atomically Precise Nanocatalysts for CO₂ Electrochemical Reduction: Giannis Mpourmpakis¹; ¹University of Pittsburgh

10:10 AM Break

10:30 AM

Dopamine Assisted Phase Transformation and Electrochemical Charge Storage Properties of Vanadium Oxide/Carbon Composite Electrodes: *Ryan Andris*¹; *Timofey Averianov*¹; *Ekaterina Pomerantseva*¹; ¹Drexel University

10:50 AM

Computation-aided Developments of Highly Durable and Active Photoanodes and Electrocatalysts: *Heechae Choi*¹; ¹University of Cologne

11:10 AM

Towards the Synthesis of Semiconducting Materials for Photo(electro) catalysis in Energy Conversion: CO₂ Reduction and CH₄ Controlled Oxidation: *Caue Ribeiro*¹; ¹Brazilian Agricultural Research Corporation - EMBRAPA

11:30 AM

Synthesis of WO₃-AgCl Thin Films for Application in Continuous Photocatalytic Microreactor: *Priscila Hasse Palharim*¹; *Carolina de Araújo Gusmão*¹; *Bruno Ramos*¹; *Antonio Carlos Silva Costa Teixeira*¹; ¹Universidade de São Paulo

11:50 AM

Synthesis and Characterization of Copper Nanowire Array: *Long Zhu*¹; *Fei Ren*¹; ¹Temple University

LIGHTWEIGHT ALLOYS

Development in Light Weight Alloys and Composites — Microstructure and Mechanical Properties

Sponsored by: TMS Composite Materials Committee, TMS Materials Characterization Committee

Program Organizers: Ramasis Goswami, Naval Research Laboratory; Nikhil Gupta, New York University; Aashish Rohatgi, Pacific Northwest National Laboratory; Tanjore Jayaraman, University of Michigan-Dearborn

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Session Chairs: Ramachandra Canumalla, Weldaloy Specialty Processing; Nikhil Gupta, NYU

8:00 AM Invited

Friction Stir Processing Based Local Microstructure Modification to Improve High-cycle Fatigue Properties of High-pressure Die-cast Aluminum Alloy: *Avik Samanta*¹; *Hrishikesh Das*¹; *Glenn Grant*¹; *Saamyadeep Jana*¹; ¹Pacific Northwest National Laboratory

8:30 AM

Development of Hierarchical Aluminum-based Metal Matrix Composites Using Friction Extrusion: *Rajib Kalsar*¹; *Benjamin Schuessler*¹; *Xiaolong Ma*¹; *Jens Darsell*¹; *Tianhao Wang*¹; *Sridhar Niverty*¹; *Lei Li*¹; *Ayoub Soulami*¹; *Vineet Joshi*¹; ¹Pacific Northwest National Laboratory

8:50 AM

Designing Al-Cu Alloy to Improve the Mechanical Properties and Thermal Stability via Micro-alloying with Cr Solute: *Gihoon Moon*¹; *Eunkyoung Lee*¹; ¹National Korea Maritime and Ocean University

9:10 AM

Development of Functionally Graded Al Metal Matrix Hybrid Composite Reinforced with CNT, Y₂O₃ & SiC through PM Route: *Rajat Gupta*¹; *Kausik Chattopadhyay*¹; *Nilay Mukhopadhyay*¹; ¹IIT BHU

9:30 AM

Understanding the Influence of Yield Asymmetry on Sheet Metal Bendability of Magnesium Alloys: *Sourav Mishra*¹; *Sushanta Panigrahi*¹; ¹Indian Institute of Technology, Madras

9:50 AM Break

10:10 AM

Recent Developments in Flux-Free Brazing of Aluminum Alloys: *Andreas Kulovits*¹; *Harry Zonker*¹; *Michael Danz*¹; *Marvin Goins*¹; ¹Arconic

10:30 AM

Solute Synergy Improved Thermal Stability of Nanotwinned Al Alloys: *Nick Richter*¹; *Yifan Zhang*²; *Mingyu Gong*³; *Tongjun Niu*¹; *Bo Yang*¹; *Sichuang Xue*⁴; *Jian Wang*³; *Xinghang Zhang*¹; ¹Purdue University; ²Los Alamos National Laboratory; ³University of Nebraska-Lincoln; ⁴Pacific Northwest National Laboratory

FUNDAMENTALS AND CHARACTERIZATION

Emergent Materials under Extremes and Decisive In Situ Characterizations — In Situ Characterization

Sponsored by: ACerS Basic Science Division

Program Organizers: Xiaofeng Guo, Washington State University; Hongwu Xu, Los Alamos National Laboratory; Xujie Lu, Center for High Pressure Science & Technology Advanced Research; Hua Zhou, Argonne National Laboratory; Judith Driscoll, University of Cambridge

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Session Chair: Hua Zhou, Argonne National Laboratory

8:00 AM Introductory Comments

8:10 AM Invited

Structural Transformations Induced under Coupled Extreme Conditions: *Maike Lang*¹; ¹University of Tennessee

8:40 AM Invited

Characterization of Disordered Oxides with Neutron Total Scattering: *Eric O'Quinn*¹; ¹University of Tennessee

9:10 AM Invited

In-Situ X-ray Absorption Spectroscopy of Actinide Speciation in Aqueous Fluids at Extreme Conditions: *Robert Mayanovic*¹; *Jason Baker*²; *Diwash Dhakal*¹; *Nadib Akram*¹; *Xiaofeng Guo*³; *Hakim Boukhalfa*²; *Cheng-Jun Sun*⁴; *Hongwu Xu*²; ¹Missouri State University; ²Los Alamos National Laboratory; ³Washington State University; ⁴Argonne National Laboratory

9:40 AM Invited

Opportunities in High-pressure Science Enabled by Next Generation Synchrotron Sources: *Jesse Smith*¹; ¹HPCAT, Argonne National Laboratory

10:10 AM Break

10:30 AM

Determination of P-V Equation of State of a Natural Clinoptilolite Using High Pressure Synchrotron X-ray Diffraction: *Andrew Strzelecki¹; Stella Chariton²; Cody Cockerham¹; Vitali Prakapenka²; Bethany Chidester¹; Di Wu³; Chris Bradley¹; Garrett Euler¹; Xiaofeng Guo³; Hakim Boukhalfa¹; Hongwu Xu¹; ¹Los Alamos National Laboratory; ²University of Chicago; ³Washington State University*

10:50 AM

Novel Automated Approaches for Studying Extended In Situ Mechanical and High Temperature Transformations of New Materials and Alloys in Scanning Electron and X-ray Microscopy: *Andy Holwell¹; Fang Zhou¹; ¹Carl Zeiss Microscopy LLC*

SUSTAINABILITY, ENERGY, AND THE ENVIRONMENT

Energy Materials for Sustainable Development – Electrets and Magnetic Conversion/Capacitive Storage and Electrochemical Conversion

Sponsored by: ACerS Energy Materials and Systems Division

Program Organizers: Krista Carlson, University of Nevada, Reno; Armin Feldhoff, Leibniz University Hannover; Kyle Brinkman, Clemson University; Eva Hemmer, University of Ottawa; Nikola Kanas, BioSense Institute; Kjell Wiik, Norwegian University of Science and Technology; Lei Zuo, Virginia Tech; Joshua Tong, Clemson University; Danielle Benetti, Institut National de la Recherche Scientifique; Katherine Develos-Bagarinao, National Institute of Advanced Industrial Science and Technology; Soumi Chatterjee, Aditya Birla Science & Technology Company, Ltd

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Session Chairs: Janusz Tobola, AGH University of Science and Technology; Amjad Almansour, NASA Glenn Research Center

8:00 AM Keynote

Electret Energy Sources Based on Electrical Conductors: *Deborah Chung¹; Xiang Xi¹; ¹State University of New York Buffalo*

8:40 AM Invited

Bulk Nanostructured Oxide-metal Composites for Wind Turbines and Electric Vehicles: *Javier Garay¹; ¹University of California San Diego*

9:00 AM Invited

Properties of Carbon Nanotube Composite Conductors for High Performance Propulsion Motors: *Mike Sumption¹; ¹Ohio State University*

9:20 AM

A Thermodynamic and Properties Database for Permanent Magnetic Materials: *Weiwei Zhang¹; Paul Mason¹; ¹Thermo-Calc Software Inc.*

9:40 AM

Ab Initio Modeling of Ionic and Electronic Conductivity of La₂NiO_{4-d} Cathode Material for Solid Oxide Fuel Cell: *Songge Yang¹; Yu Zhong¹; ¹Worcester Polytechnic Institute*

10:00 AM Break

10:20 AM

A Metal-insulator Transition in a Complex Oxide at T = 293K: *Sepideh Akhbari¹; ¹Catholic University of America -Vitreous State Lab*

10:40 AM Invited

Bandgap Engineering and Electrochemical Properties of Disordered LaFeO₃ and Heterostructures: *Uma Sharma¹; Priyanka Jha¹; Pardeep Jha¹; Prabhakar Singh¹; ¹IIT (BHU) Varanasi*

CERAMIC AND GLASS MATERIALS

Engineering Ceramics: Microstructure-Property-Performance Relations and Applications – Processing-Microstructure-Property Relations of Engineering Ceramics

Sponsored by: ACerS Engineering Ceramics Division

Program Organizers: Young-Wook Kim, University of Seoul; Hua-Tay Lin, Guangdong University of Technology; Junichi Tatami, Yokohama National University; Michael Halbig, NASA Glenn Research Center

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Session Chairs: Yiquan Wu, Alfred University; Soshu Kiriha, Osaka University

8:00 AM Invited

Investigation of Local Mechanical Responses in Ceramic Materials Based on In Situ TEM Observations: *Eita Tochigi¹; ¹The University of Tokyo*

8:30 AM

The Effects of Microstructure on the Properties of Reticulated Porous Ceramics: *Jang-Hoon Ha¹; Jongman Lee¹; In-Hyuck Song¹; ¹Korea Institute of Materials Science*

8:50 AM

Fabrication of Porous Silica with Controllable Porosity via Freeze Casting: *Mert Arslanoglu¹; Rahul Panat¹; Burak Ozdoganlar¹; ¹Carnegie Mellon University*

9:10 AM

Tin Oxide as a Model System for Sintering without Shrinkage – Monitoring Microstructure Evolution and Elastic Property Changes: *Petra Simonova¹; Willi Pabst¹; Vojtech Necina¹; ¹University of Chemistry and Technology, Prague*

FUNDAMENTALS AND CHARACTERIZATION

Grain Boundaries, Interfaces, and Surfaces: Fundamental Structure-Property-Performance Relationships — Grain Growth

Sponsored by: ACerS Basic Science Division

Program Organizers: Shen Dillon, University of California, Irvine; Wolfgang Rheinheimer, Julich Research Center; Catherine Bishop, University of Canterbury; Ming Tang, Rice University; John Blendell, Purdue University; Wayne Kaplan, Technion - Israel Institute Of Technology; Melissa Santala, Oregon State University

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Session Chairs: Shen Dillon, University of California, Irvine; Amanda Krause, Carnegie Mellon University

8:00 AM

Understanding the Microstructure and Migration Mechanisms of Terrace-defect Interfaces Using Multiscale Characterizing Methods: *Jian Song*¹; Yue Liu¹; Jian Wang²; ¹Shanghai Jiao Tong University; ²University of Nebraska-Lincoln

8:20 AM

In-situ TEM Observation on the Two Distinct Shear-coupled Migration Behaviors of One Mixed Grain Boundary: *Zhengwu Fang*¹; Scott Mao¹; Guofeng Wang¹; ¹University of Pittsburgh

8:40 AM

Migration Kinetics of Twinning Disconnections in Nanotwinned Cu: An In Situ HRTEM Deformation Study: *Quan Li*¹; Yue Liu¹; XiaoQin Zeng¹; ¹Shanghai Jiao Tong University

9:00 AM Invited

Elucidating the Role of Grain Boundary Networks on Grain Growth in Textured Alumina: Bryan Conry¹; Joel Harley¹; Michael Tonks¹; Michael Kesler²; Amanda Krause³; ¹University of Florida; ²Oak Ridge National Laboratory; ³Carnegie Mellon University

9:30 AM

Simulate Grain Growth with Machine Learning Techniques: Shaoxun Fan¹; Ming Tang¹; Fei Zhou²; ¹Rice University; ²Lawrence Livermore National Lab

10:00 AM Break

10:20 AM

Suppression of Abnormal Grain Growth in Alumina by Grain Boundary Engineering: *Bryan Conry*¹; Joel Harley¹; Michael Tonks¹; Michael Kesler²; Amanda Krause³; ¹University of Florida; ²Oak Ridge National Laboratory; ³Carnegie Mellon University

10:40 AM Invited

Learning the Grain Boundary Solute Drag Hypersurface: *Fadi Abdeljawad*¹; Malek Alkayali¹; ¹Clemson University

11:10 AM

Changes in the Energy of the Grain Boundary Network during Grain Growth in Polycrystals: *Zipeng Xu*¹; Robert Suter¹; Gregory Rohrer¹; ¹Carnegie Mellon University

FUNDAMENTALS AND CHARACTERIZATION

High Entropy Materials: Concentrated Solid Solutions, Intermetallics, Ceramics, Functional Materials and Beyond III — Processing and Properties II

Sponsored by: TMS: Nanomaterials Committee

Program Organizers: Yu Zhong, Worcester Polytechnic Institute; Michael Gao, National Energy Technology Laboratory; Xingbo Liu, West Virginia University; Peter Liaw, University of Tennessee; Jian Luo, University of California, San Diego; Yiquan Wu, Alfred University; Mitra Taheri, Johns Hopkins University; Amy Clarke, Colorado School of Mines

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Session Chairs: Hyoung Seop Kim, POSTECH; Peter Liaw, University of Tennessee

8:00 AM Keynote

Exploring Properties and Relationships in High Entropy Alloys: *David Shifter*¹; ¹Office of Naval Research

8:30 AM Invited

Grain Refinement and Nano-scale Precipitates in Non-equiatomic CoCrFeNiMo Medium-entropy Alloy: *Hyoun Seop Kim*¹; Hyeonseok Kwon¹; ¹Pohang University of Science and Technology

9:00 AM

Laser Welding of CoCrFeMnNi High Entropy Alloy to Inconel 718: *Joao Oliveira*¹; ¹FCT-UNL

9:20 AM

Mechanical and Oxidation Behavior of Hf-25Ta-5X Refractory Complex Concentrated Alloys: *Eric Payton*¹; Tinuade Daboiku¹; Satish Rao¹; Oleg Senkov¹; ¹Air Force Research Laboratory

9:40 AM

Microstructural Characterization and Oxidation Resistance in Multi FCC Principal Element Alloys: *Mckenna Hitter*¹; Shailendra Varma¹; ¹University of Texas at El Paso

10:00 AM Break

10:20 AM

Phase Evolution and Oxidation Study of Combinatorially Designed Hf-Al-Si Refractory Complex Concentrated Alloy for High Temperature Applications: *Sophia Cooper*¹; Samir Aouadi¹; Andrey Voevodin¹; Anindya Ghoshal²; Victoria Blair²; Marcus Young¹; ¹University of North Texas; ²US Army Research Laboratory

10:40 AM

3D Ink-extrusion Printing of CoCr(Cu)FeNi High-entropy: *Dingchang Zhang*¹; Christoph Kenel¹; David Dunand¹; ¹Northwestern University

11:00 AM

Experimental Determination of Mid-temperature Phases in Refractory Multi-Principal Element Ternary Alloys for Thermodynamic and Solid Solution Strengthening Modeling: *Adira Balzac*¹; Benjamin Ellyson¹; Kester Clarke¹; Amy Clarke¹; ¹Colorado School of Mines

11:20 AM

High-temperature Oxidation and Mechanical Behavior of Ta-Ti-Cr Concentrated Refractory Alloys: *Noah Welch*¹; Maria Quintana¹; Todd Butler²; Peter Collins¹; ¹Iowa State University; ²Air Force Research Laboratory, WPAFB

MATERIALS-ENVIRONMENT INTERACTIONS

High Temperature Oxidation of Metals and Ceramics – Environmental Barrier Coatings, Thermal Barrier Coatings, and Hypersonics

Sponsored by: TMS Corrosion and Environmental Effects Committee

Program Organizers: Kenneth Kane, Oak Ridge National Laboratory; Elizabeth Sooby, University of Texas at San Antonio; Patrick Brennan, General Electric Research; Lavina Backman, U.S. Naval Research Laboratory; Kinga Unocic, Oak Ridge National Laboratory; Richard Oleksak, National Energy Technology Laboratory; David Shifler, Office of Naval Research; Raul Rebak, GE Global Research

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Session Chairs: Kinga Unocic, Oak Ridge National Laboratory; David Shifler, Office of Naval Research

8:00 AM Invited

Oxidation and Erosion Implications of CMAS on Environmental Barrier Coatings: *Bryan Harder*¹; Kang Lee¹; Michael Presby¹; Benjamin Kowalski¹; Jamesa Stokes¹; John Setlock²; ¹NASA Glenn Research Center; ²University of Toledo

8:30 AM

Rare-earth Monosilicate Interactions with Calcium-magnesium Aluminosilicate: *Cameron Miller*¹; Elizabeth Opila¹; ¹University of Virginia

8:50 AM

Investigating Fifth Oxide Effect on CMXAS Glass Properties: *Clark Luckhardt*¹; Elizabeth Opila¹; ¹University of Virginia

9:10 AM

High-temperature High-velocity Water Vapor Exposures of Ytterbium-silicate Dual-phase Mixture Compositions: *Eric Stone*¹; Elizabeth Opila¹; ¹University of Virginia

9:30 AM

New Approaches to Study Oxygen Transport in SiC-based Ceramic Matrix Composites: *Koen Verrijt*¹; David Poerschke¹; ¹University of Minnesota Twin Cities - Chemical Engineering & Materials Science

9:50 AM

Thermal Expansion Analysis of Mixed and High Entropy Rare Earth Disilicates via Synchrotron X-ray Scattering: *Alejandro Salanova*¹; Ian Brummel¹; Elizabeth Opila¹; Jon Ihlefeld¹; ¹University of Virginia

10:10 AM Break

10:30 AM

Failure Behavior Analysis of Thermal Barrier Coatings under Adverse Environment: Analytical and Numerical Modeling: Jinrong Yan¹; Xin Wang¹; Kuiying Chen²; ¹Carleton University; ²NRC

10:50 AM

Mo-Si-B Coatings for Protection of SiC-based Materials in High Temperature Active Oxidation Environments: *Jeffrey Becker*¹; John Perepezko¹; ¹University of Wisconsin - Madison

11:10 AM

Investigation of High Emittance, Oxidation Resistant Multi-Layer Coatings for Carbon/Carbon Composites for Hypersonic Application: *Abdullah Al Saad*¹; Carlos Martinez¹; Rodney Trice¹; ¹Purdue University

FUNDAMENTALS AND CHARACTERIZATION

Inference-based Approaches for Material Discovery and Property Optimisation – Structure-Property Inference from Experiments

Sponsored by: TMS Advanced Characterization, Testing, and Simulation Committee, TMS Chemistry and Physics of Materials Committee

Program Organizers: Felix Hofmann, University of Oxford; Michael Short, Massachusetts Institute of Technology; Cody Dennett, Commonwealth Fusion Systems; Mohamed Abdallah Reza, University Of Oxford; Daniel Mason, UK Atomic Energy Authority

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Session Chair: Felix Hofmann, University of Oxford

8:00 AM Introductory Comments

8:10 AM Invited

Uncover Hidden Materials Properties with the Lens of Machine Learning: *Mingda Li*¹; ¹MIT

8:50 AM

Comparing High-dose Simulated Irradiation in Tungsten to Experiments: *Daniel Mason*¹; Max Boleininger¹; Fredric Granberg²; Guanze He³; Felix Hofmann³; Sergei Dudarev¹; ¹UKAEA; ²University of Helsinki; ³Oxford University

9:10 AM

Using Local Thermal Transport Property to Characterize Microstructure of Materials from Additive and Advanced Manufacturing Technologies: *Zilong Hua*¹; Jorgen Rufner¹; Arin Preston¹; Amey Khanolkar¹; Cody Dennett²; Robert Schley¹; Caleb Picklesimer¹; Asa Monson¹; Michael McMurtrey¹; David Hurley¹; ¹Idaho National Laboratory; ²Commonwealth Fusion Systems

9:30 AM Invited

Exploring the Evolution of Irradiation-induced Defects Through Their Energetic Signatures: *Charles Hirst*¹; Fredric Granberg²; Boopathy Kombaiyah³; Penghui Cao⁴; Scott Middlemas³; R. Scott Kemp¹; Ju Li¹; Kai Nordlund²; Michael Short¹; ¹Massachusetts Institute of Technology; ²University of Helsinki; ³Idaho National Laboratory; ⁴University of California, Irvine

10:10 AM Break

10:30 AM

Multi-technique Characterisation of Ion-irradiation Effects on High-pressure-Torsion (HPT) Processed EUROFER-97: *Kay Song*¹; Gregory Strangward-Pryce¹; Abdallah Reza¹; Guanze He¹; David Yang¹; Kenichiro Mizohata²; Felix Hofmann¹; ¹University of Oxford; ²University of Helsinki

10:50 AM Panel Discussion

MODELING

Integration between Modeling and Experiments for Crystalline Metals: From Atomistic to Macroscopic Scales IV — Session V

Sponsored by: TMS Advanced Characterization, Testing, and Simulation Committee, TMS Materials Characterization Committee, TMS: Nanomaterials Committee

Program Organizers: Mariyappan Arul Kumar, Los Alamos National Laboratory; Irene Beyerlein, University of California, Santa Barbara; Levente Balogh, Queen's University; Caizhi Zhou, University of South Carolina; Lei Cao, University of Nevada; Josh Kacher, Georgia Institute of Technology

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Session Chairs: Janelle Wharry, Purdue University; Ill Ryu, University of Texas at Dallas

8:00 AM Invited
Multi-scale and Multi-physical Model of Defect-driven Plasticity in Nanostructural Metals: *Ill Ryu*¹; ¹University of Texas at Dallas

8:30 AM
Influence of the Cross Slip Based Dynamic Recovery during Plane Strain Compression of Aluminium: *Chaitali Patil*¹; Supriyo Chakraborty¹; Stephen Niezgoda¹; ¹Ohio State University

8:50 AM
Atomistic Modeling of a Nano-precipitate Strengthened Alloy: *Edwin Antillon*¹; Colin Stewart¹; Noam Bernstein¹; Michelle Johannes¹; Richard Fonda¹; Keith Knippling¹; Patrick Callahan¹; ¹Naval Research Laboratory

9:10 AM
Atomistic Simulation of the Effect of Grains Misorientation on the Fatigue Nano-crack Growth in NiTi: *Saeed Ataollahi*¹; Mohammad J. Mahtabi¹; ¹University of Tennessee at Chattanooga

9:30 AM
Leveraging Electron Microscopy to Inform Ab Initio Calculation: Deducing Surface Chemistry and Annealing Conditions from Equilibrium Tungsten Nanoparticle Shapes in Scandate Cathodes: *Mujan Seif*¹; Xiaotao Liu¹; John Balk¹; Matthew Beck¹; ¹University of Kentucky

9:50 AM Break

10:10 AM Invited
Unexpected Deformation-Induced Martensitic Transformations in Ni-Cr Alloy 625: *Janelle Wharry*¹; Caleb Clement¹; Chao Yang²; ¹Purdue University; ²MSE Supplies

10:40 AM
Interactions between Defects and Omega Phase in Ti via Molecular Dynamics and Phase Field Simulations: *Khanh Dang*¹; Darshan Bamney¹; Carlos Tomé¹; Laurent Capolungo¹; ¹Los Alamos National Laboratory

11:00 AM

Hybrid Ab Initio-machine Learning Simulation of Dislocation-defect Interactions: Petr Grigorev¹; Alexandra Goryaeva²; James Kermode³; Mihai-Cosmin Marinica²; *Thomas Swinburne*⁴; ¹Aix-Marseille Université / CNRS; ²CEA; ³University of Warwick; ⁴CNRS

11:20 AM Invited
Extended Core Structure of Planar Defects and Localized Phase Transformation in Crystalline Solids: Longsheng Feng¹; Shakthipriya Baskar Kannan¹; Ashton Egan¹; Maryam Ghazisaeidi¹; Mike Mills¹; *Yunzhi Wang*¹; ¹Ohio State University

CERAMIC AND GLASS MATERIALS

Manufacturing and Processing of Advanced Ceramic Materials — Novel Processing of Oxide Ceramics I

Sponsored by:

Program Organizers: Bai Cui, University of Nebraska-Lincoln; James Hemrick, Oak Ridge National Laboratory; Mike Alexander, Allied Mineral Products; Eric Faierson, Quad City Manufacturing Laboratory/Western Illinois University; Keith DeCarlo, Blasch Precision Ceramics

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Session Chairs: Keith DeCarlo, Blasch Precision Ceramics; Fei Peng, Clemeson University

8:00 AM Invited
Fabrication and Microstructure Representation of Heterogeneous Gradient Complex Materials: *Dongsheng Li*¹; Tom Maloney²; Seyed Niknam³; ¹Advanced Manufacturing LLC; ²Skyre Inc; ³Western New England University

8:30 AM
Cold Sintering of Potassium Sodium Niobate, K0.5Na0.5NbO3: *Koki Nakagawa*¹; Masato Iwasaki¹; Clive A. Randall²; ¹NGK Spark Plug Co.,Ltd.; ²Materials Research Institute, The Pennsylvania State University

8:50 AM
Development of CeO2 Stabilized ZrO2 Inks for DIW: *Mia Kovac*¹; Erin Koos²; Jozef Vleugels¹; Annabel Braem¹; ¹KU Leuven Department of Materials Engineering, Belgium; ²KU Leuven Department of Chemical Engineering, Belgium

9:10 AM Invited
Alumina-based Coatings for Metal-cutting Applications: *Zhenyu Liu*¹; ¹Kennametal Inc

9:40 AM
Surface Area Reduction Behavior of Various Forming Methods of Alumina: *Daniel Delia*¹; William Carty¹; Hyojin Lee¹; ¹Alfred University

10:00 AM Break

10:20 AM
The Correlation of Mullite Formation in Porcelains with the Glass Formation Boundary: *Hyojin Lee*¹; William Carty¹; ¹Alfred University

10:40 AM
Fabrication and Characterization of Dense Advanced Ceramic Coatings by Aerosol Deposition: *Zhenying Yang*¹; Tom Coyle¹; Ali Dolatabadi¹; ¹University of Toronto

11:00 AM

Role of Processing and Microstructure on the Phase Transformation in High Entropy Oxides: *Alexander Dupuy¹; Julie Schoenung¹; ¹University of California, Irvine*

ARTIFICIAL INTELLIGENCE

Materials Informatics for Images and Multi-dimensional Datasets — Session I

Sponsored by: ACerS Basic Science Division, ACerS Electronics Division

Program Organizers: Amanda Krause, Carnegie Mellon University; Alp Sehrliglu, Case Western Reserve University; Daniel Ruscitto, GE Research

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Session Chair: Amanda Krause, Carnegie Mellon University

8:00 AM

FeCrAl Alloy Design Utilizing Literature, Experiments, High Throughput Characterization, and Machine Learning: *Sandipp Krishnan Ravi¹; Andrew Hoffman¹; Rajnikant Umretiya¹; Bojun Feng¹; Subhrajit Roychowdhury¹; Sayan Ghosh¹; Raul Rebak¹; ¹GE Research*

8:40 AM

Multimodal Data of Fatigue Fracture Surfaces for Analysis in a CNN: *Katelyn Jones¹; Elizabeth Holm¹; Anthony Rollett¹; ¹Carnegie Mellon University*

9:00 AM

Establishing PSP Relationships with Microstructure Features Quantified Using Machine Learning: *Joshua Stuckner¹; ¹NASA Glenn Research Center*

9:20 AM

Process-Structure-Property Relationships from Variational Autoencoders: *Michael White¹; N.H. Gowtham²; Christopher Race¹; Philip Withers¹; Bikramjit Basu²; ¹University of Manchester; ²Indian Institute of Science*

9:40 AM

Polycrystal Graph Neural Network: *Minyi Dai¹; Mehmet Demirel¹; Xuanhan Liu¹; Yingyu Liang¹; Jia-Mian Hu¹; ¹University of Wisconsin-Madison*

10:00 AM Break

10:20 AM

Automated Defect Identification for Tristructural Isotropic Fuels: *Joseph Oncken¹; Nancy Lybeck¹; Jeffrey Phillips¹; Scott Niedzialek²; Justin Coleman¹; ¹Idaho National Laboratory; ²BWX Technologies*

CERAMIC AND GLASS MATERIALS

Mesoscale Phenomena in Functional Polycrystals and Their Nanostructures — Electronic, Thermal and Optical Phenomena

Sponsored by: ACerS Electronics Division

Program Organizers: Serge Nakhmanson, University of Connecticut; Edward Gorzkowski, Naval Research Laboratory; James Wollmershauser, U.S. Naval Research Laboratory; Seungbum Hong, KAIST; Javier Garay, UCSD; Pierre-Eymeric Janolin, CentraleSupélec

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Session Chairs: Serge Nakhmanson, University of Connecticut; Edward Gorzkowski, NRL; Javier Garay, UCSD

8:00 AM Keynote

A New Carbon Solid: Layered Amorphous Graphene — Its Structure, Cohesion and Space-projected Conductivity: *Rajendra Thapa¹; Chinonso Ugwumadu¹; Kishor Nepal¹; Jason Tremblay¹; David Drabold¹; ¹Ohio University*

8:40 AM

Conduction in Aluminum with Graphite and Graphene Additives: *Kishor Nepal¹; Chinonso Ugwumadu¹; Rajendra Thapa¹; Kashi Subedi¹; David Drabold¹; Keerti Kappagantula²; ¹Ohio University; ²Pacific NorthWest National Laboratory*

9:00 AM

Structure, Charge Distribution and Electronic Transport Mechanism in Layered Amorphous Graphene: *Rajendra Thapa¹; Chinonso Ugwumadu¹; Kishor Nepal¹; David Drabold¹; ¹Ohio University*

9:20 AM

Micro/Nanostructure Effects on Thermal Conductivity and Optical Light Transmission—Designing High Performance Laser Ceramics: *Javier Garay¹; ¹University of California, San Diego*

9:40 AM Invited

Synthesis, Processing, and Properties of High Performance Lead Free Electro-optic Ceramics: *Alexander Dupuy¹; Yasuhiro Kodera²; Javier Garay²; ¹University of California, Irvine; ²University of California, San Diego*

10:10 AM Break

10:30 AM Invited

Fabrication and Properties of Multi-scale Architected Materials: *Christopher Spadaccini¹; ¹Lawrence Livermore National Laboratory*

10:50 AM Invited

Aerosol Deposition and Characterization of Complex Oxide Systems: *Eric Patterson¹; Sara Mills²; Heonjune Ryou¹; James Wollmershauser¹; Edward Gorzkowski¹; ¹U.S. Naval Research Laboratory; ²ASEE Post Doc*

11:10 AM Invited

From Nanoparticles to Nanocrystalline Solids with New Functionalities: Thermoelectrics as a Case Study: *Boris Feigelson¹; James Wollmershauser¹; Kevin Anderson¹; Benjamin Greenberg¹; Alan Jacobs¹; ¹US Naval Research Laboratory*

11:40 AM

Modeling Thermoelectric Properties of Polycrystalline Materials at Mesoscale: *Dharma Raj Basaula*¹; Mohamad Daeipour¹; Lukasz Kuna²; John Mangeri³; Boris Feygelson²; Serge Nakhmanson¹; ¹University of Connecticut; ²U.S. Naval Research Laboratory; ³Luxembourg Institute of Science and Technology

12:00 PM

Polycrystal-inspired Stochastic Mechanical Modeling of Complex, Heterogeneous Porous Microstructures: *Mujan Seif*¹; Matthew Beck¹; ¹University of Kentucky

NANOMATERIALS

Nanotechnology for Energy, Environment, Electronics, Healthcare and Industry — Session I

Program Organizers: Navin Manjooran, Chairman, Solve; Gary Pickrell, Virginia Tech

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Session Chairs: Gary Pickrell, Virginia Tech; Navin Manjooran, Chairman, Solve

8:00 AM Introductory Comments

8:40 AM

3D Metal Oxide Magnetic Nanostructures for The Design of Nanosensors and Magnetic Actuators: *Ojodomo Achadu*¹; ¹University of Warwick

9:00 AM

Antibacterial Action of Gold Nanoparticles Against Various Types of Bacteria: A Concise Review: *Ikhazuagbe Ifijen*¹; *Best Atoe*²; ¹Rubber Research Institute of Nigeria; ²Atoe Specialist Medical Centre Limited

9:20 AM

Electromagnetic Interference (Emi) Shielding Features of Gum Arabic Emulsified Superparamagnetic Lightweight Natural Rubber Latex/Fe3O4 Nanocomposite: *Stanley Omorogbe*¹; *Ikhazuagbe Ifijen*¹; *Areguamen Aigbodion*¹; *Doreen O. Omorogbe*²; *Joy Iyamu*³; *Omotehinse Orimisan*⁴; ¹Rubber Research Institute of Nigeria; ²F.C.T Universal Basic Education Board, Abuja, Nigeria; ³University of Benin; ⁴Paramount PC

9:40 AM

Ternary Oxides Based on Cobalt, Iron, Copper Nanoparticles for Supercapacitor Electrode: A Review: *Ikhazuagbe Ifijen*¹; *Esther Ikhuoria*²; ¹Rubber Research Institute of Nigeria; ²University of Benin

10:00 AM Break

10:20 AM

Fabrication of Flexible Nanocomposites Based on PVC, Electrical and Magnetic Nano Fillers for the Shielding Against Unwanted Electromagnetic Waves: *HM Fayzan Shakir*¹; *Khadija Zubair*¹; *Ting kai Zhao*¹; ¹Northwestern Polytechnical University

10:40 AM

Removal of Copper (II) and Lead (II) from Hydrometallurgical Effluent onto Cellulose Nanocomposites: Mechanistic and Artificial Neural Network Modeling: *Musamba Banza*¹; *Hilary Rutto*¹; *Tumisang Seodigeng*¹; ¹Vaal University of Technology

11:00 AM Concluding Comments

BIOMATERIALS

Next Generation Biomaterials — Next Generation Biomaterials IV

Sponsored by: ACerS Bioceramics Division

Program Organizers: Roger Narayan, University of North Carolina; Sanjiv Lalwani, Lynntech, Inc.

Wednesday AM | October 12, 2022

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Session Chairs: Russell Lee Leonard, University of Tennessee Space Institute; Annaliza Perez-Torres, University of Kentucky

8:00 AM Invited

Using Glass Ceramics to Improve the Detective Quantum Efficiency of Indirect Flat Panel Detector Systems: *Russell Leonard*¹; *Emily Moore*¹; *Austin Thomas*¹; *Lino Costa*¹; *Brian Canfield*¹; *Adrian Howansky*²; *Anthony Lubinsky*³; *Jacqueline Johnson*¹; ¹University of Tennessee Space Institute; ²Stony Brook University Hospital; ³SUNY Stony Brook

8:20 AM

Microstructural and Mechanical Characterization of Three-dimensional Porous Titanium Carbide Structures Fabricated by Powder Technology: *Joaquin Villalba-Guevara*¹; *Ena Athenea Aguilar-Reyes*¹; *Carlos Alberto León-Patiño*¹; ¹Universidad Michoacana de San Nicolás de Hidalgo

8:40 AM

Structural Analysis of Silver and Copper Substituted Hydroxyapatite for Biomedical Applications: *Sierra Kucko*¹; *Timothy Keenan*¹; ¹Alfred University

9:00 AM

Microscopic Characterizations of Cross-linked Gelatin Electrospun Nanofibrous Scaffolds: *Fang Zhou*¹; *Tobias Hedkte*²; *Christian E H Schmelzer*²; *Juliana Martins de Souza e Silva*³; ¹Carl Zeiss Microscopy; ²Fraunhofer Institute for Microstructure of Materials and Systems; ³Institute of Physics, Martin Luther University Halle-Wittenberg

9:20 AM

Understanding Proton Diffusion in Biocompatible Polymer Membranes: *Gloria Bazargan*¹; *Daniel Gunlycke*²; ¹NRC Research Associate, US Naval Research Laboratory; ²Chemistry Division, US Naval Research Laboratory

CERAMIC AND GLASS MATERIALS

Phase Transformations in Ceramics: Science and Applications — Session I

Program Organizers: Pankaj Sarin, Oklahoma State University; Scott McCormack, University of California, Davis; Waltraud Kriven, University of Illinois at Urbana-Champaign; Theresa Davey, Tohoku University; Sanjay V. Khare, University of Toledo

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Session Chairs: Pankaj Sarin, Oklahoma State University; Waltraud Kriven, University of Illinois at Urbana-Champaign

8:00 AM

A Thermodynamic Database for Ultra-high Temperature Ceramics: *Weiwei Zhang*¹; Paul Mason¹; ¹Thermo-Calc Software Inc.

8:30 AM

Simulation of ZrO₂ Phase Transformation for Superelasticity Understanding: *Deepak Dhariwal*¹; Kathy Lu¹; ¹Virginia Tech

8:50 AM

Crystallization Kinetics of Yttria-doped Ytterbium Disilicate Environmental Barrier Coatings: *Dawson Smith*¹; Molly O'Connor²; Robert Golden³; Marshall Sweet⁴; Rodney Trice¹; Michael Titus¹; ¹Purdue University; ²Praxair Surface Technologies; ³Rolls Royce; ⁴

9:10 AM

Phase Stability of Co-substituted Rare Earth Disilicate Systems for Environmental Barrier Coatings: *Christine Brockman*¹; V. V. Rohit Bukka¹; Clinton Switzer¹; Amjad Almansour²; Pankaj Sarin¹; ¹Oklahoma State University; ²NASA Glenn Research Center

9:30 AM

In-situ High Temperature Coefficient of Thermal Expansion of Metal-diborides Through X-ray Diffraction: *Fox Thorpe*¹; Elizabeth Sobalvarro Converse²; Jesus Rivera²; Harry Charalambous²; Gabriella King²; Wyatt Du Frane²; Joshua Kuntz²; Scott McCormack¹; ¹University of California, Davis; ²Lawrence Livermore National Laboratory

9:50 AM Break

10:10 AM

Phase Control of Polytypic Ba_{0.5}Sr_{0.5}MnO₃ Films on Polycrystalline Substrates: Catherine Zhou¹; Gregory Rohrer¹; Paul Salvador¹; ¹Carnegie Mellon University

10:40 AM

Martensitic Transformation in Shape Memory Ceramic Composites: *Donnie Erb*¹; Hang Yu¹; ¹Virginia Polytechnic Institute and State University

11:00 AM

HfW₂O₈ and Hf_{1-x}Ti_xW₂O₈ Negative Thermal Expansion and Phase Transformation: *Benjamin Hulbert*¹; Dylan Blake¹; Kuo-Pin Tseng¹; Waltraud Kriven¹; ¹University of Illinois at Urbana Champaign

MATERIALS-ENVIRONMENT INTERACTIONS

Progressive Solutions to Improve Corrosion Resistance of Nuclear Waste Storage Materials — Atomistic Simulations, Machine Learning and Artificial Intelligence for Glass Corrosion, Glass Design and Canisters Lifetime

Sponsored by: TMS Corrosion and Environmental Effects Committee, TMS: Nuclear Materials Committee

Program Organizers: Madeleine Jordache, Stevens Institute of Technology; Gary Pickrell, Virginia Tech; Bai Cui, University of Nebraska-Lincoln

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Session Chairs: Madeleine Jordache, Stevens Institute of Technology; Gary Pickrell, Virginia Tech; Bai Cui, University of Nebraska -Lincoln

9:45 AM Introductory Comments

9:50 AM

Environmental Cracking Lifetime Prediction through the Development of Pitting and SCC Models for Nuclear Waste Storage Casks: *Sarah Blust*¹; James Burns¹; ¹University of Virginia

10:10 AM

Impact of Irradiation on The Properties of Calcium Silicate Hydrate (CSH) Gel Layer Formed After Aqueous Corrosion of Borosilicate Glasses: *Amreen Jan*¹; N M Anoop Krishnan¹; ¹Indian Institute of Technology Delhi

10:30 AM Invited

Characterization of Hydrated Aluminosilicate Gel from Glass Corrosion: Reaction Mechanism, Structure and Properties from Reactive Molecular Dynamics: *Jincheng Du*¹; ¹University of North Texas

11:00 AM Invited

Predicting the Long-term Durability of Nuclear Waste Immobilization Glasses using Machine Learning: *Mathieu Bauchy*¹; ¹University of California, Los Angeles

11:30 AM Invited

Designing Glasses for Nuclear Waste Immobilization with AI and ML: *N M Anoop Krishnan*¹; ¹Indian Institute of Technology Delhi

BIOMATERIALS

Society for Biomaterials: Biomaterial Applications — Dental and Orthopaedic Biomaterials

Program Organizers: Jessica Jennings, University of Memphis; Guillermo Ameer, Northwestern University; Danielle Benoit, University of Rochester; Jordon Gilmore, Clemson University

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Session Chair: Jordon Gilmore, Clemson University

8:00 AM Invited

Silver Doped Titanium Oxide Layers for Improved Photocatalytic Activity and Potential Antibacterial Properties of Titanium Implants: Aya Al¹; Amol Janorkar¹; Mary Marquart¹; Jason Griggs¹; Joel Bumgardner²; Michael Roach¹; ¹University of Mississippi Medical Center; ²University of Memphis

8:30 AM

Biodegradable Ceramic Coating on Lithium-Aluminum-Zinc (LAZ) and Lithium-Zinc (LZ) Magnesium Alloys Using Micro-arc Oxidation: Prashant Kumta¹; John Ohodnicki¹; Abhijit Roy¹; ¹University of Pittsburgh

8:50 AM

Novel Biodegradable Porous Magnesium Alloy Scaffolds for Critical Sized Calvarial Bone Defect Reconstruction: Prashant Kumta¹; Abhijit Roy¹; Mubin Aral¹; Matthew Criado¹; John Ohodnicki¹; Fatih Zor²; Vijay Gorantla²; Alejandro Almaraz¹; MaCalus Hogan¹; ¹University of Pittsburgh; ²Wake Forest University

9:10 AM

In Vitro Biochemical Analysis of Bioactive Glass Ionomer Cement (45S5) with Citric Acid as Setting Modifier: Muhammad Uddin¹; ¹DOW University of Health Sciences (DUHS)

9:30 AM

Bioactive Polyelectrolyte Layer by Layer Assembled Corrosion Resistant Coatings on Surface Treated MgAZ31 Alloys: Prashant Kumta¹; Sangeetha Kunjukunju¹; John Ohodnicki¹; Abhijit Roy¹; Boeun Lee¹; Joe Candiello¹; ¹University of Pittsburgh

9:50 AM Break

10:10 AM

Exploring the Potential of Strontium Substituted Amorphous Calcium Phosphate and Dicalcium Phosphate Dihydrate Based Hydroxyapatite Forming Bone Cement: Prashant Kumta¹; John Ohodnicki¹; Abhijit Roy¹; ¹University of Pittsburgh

10:30 AM

Hydroxyapatite Loaded with 2-heptylcyclopropane-1-carboxylic Acid Inhibits *S. Aureus* Biofilm Formation: Emily Montgomery¹; Isabella Bianca Reaño¹; Rachel Wiley¹; Daniel Baker¹; J. Amber Jennings¹; ¹The University of Memphis

IRON AND STEEL (FERROUS ALLOYS)

Steels for Sustainable Development — Hydrogen & New Applications

Sponsored by: TMS Steels Committee

Program Organizers: Ian Zuazo, ArcelorMittal Global R&D - Industeel; Matthias Militzer, University of British Columbia; Jonah Klemm-Toole, Colorado School of Mines; Kester Clarke, Colorado School of Mines

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Session Chairs: Ian Zuazo, ArcelorMittal Global R&D - Industeel; Jonah Klemm-Toole, Colorado School of Mines

8:00 AM Invited

Probing Hydrogen-assisted Phase Transformations in Austenitic Stainless Steels Using Synchrotron X-ray Diffraction: Samantha Lawrence¹; Reju Pokharel¹; Bjørn Clausen¹; Donald Brown¹; John Carpenter¹; Mary O'Brien¹; Christopher San Marchi²; ¹Los Alamos National Laboratory; ²Sandia National Laboratories

8:30 AM Invited

Microstructural Engineering of High Mn Duplex Steel to Achieve Low-cost, High-performance Solutions for Hydrogen Storage and Delivery: Yuran Kong¹; Allison Kosberg¹; Pawan Kathayat¹; Lawrence Cho¹; Kip Findley¹; John Speer¹; ¹Colorado School of Mines

9:00 AM

Development of Evaluation Method of Low Alloy Steel in Hydron Environment Using Concurrent Cathodic Hydrogen Charging: Yoshihiro Nishihara¹; Ayaka Nozaki¹; Hiroshi Okano¹; Shusaku Takagi¹; ¹JFE steel corporation

9:20 AM

Influence of C and N on Hydrogen Embrittlement in 17Cr-10Ni-6Mn Stable Austenitic Stainless Steel: Yeonggeun Cho¹; Hyung-Jun Cho¹; Sung-Joon Kim¹; ¹Postech

9:40 AM

Mechanical Property Alterations through Hydrogen Trapping by Nanocarbide Dispersions in Steels: Bahrum Rocky¹; Shrestha Rakish²; Chris Marchi²; Ryan Wilkerson³; Chris Weinberger⁴; Steve Daniweicz¹; Gregory Thompson¹; ¹University of Alabama; ²Sandia National Laboratories (SNL); ³National Aeronautics and Space Administration (NASA); ⁴Colorado State University (CSU)

10:00 AM Break

10:20 AM Invited

Low-density, Medium-Mn Steels for Lightweighting: Influence of Al content on Microstructure and Tensile Properties: Tomas Scuseria¹; Kelcey Garza²; Dean Pierce³; Jerry Arnold²; Amy Clarke¹; Kester Clarke¹; ¹Colorado School of Mines; ²Cleveland-Cliffs; ³Oak Ridge National Laboratory

10:40 AM

Evaluation of Heavy Gauges 690 MPa-class Offshore Steel Racks Required in Modern Wind Turbine Installation Vessels: David Quidort¹; Anne Higelin¹; Aurélien Chaize¹; Sophie Perret¹; Jean-Christophe Milek¹; ¹INDUSTEEL FRANCE

11:00 AM

Maximizing Scrap Recycling by Designing Cu Tolerant Steel Compositions: *Henry Geerlings¹; Lionel Promel¹; Amy Clarke¹; Kester Clarke¹; Jonah Klemm-Toole¹; Sridhar Seetharaman¹; ¹Colorado School of Mines*

11:20 AM

Development of Ultra-high Strength TWIP Steel with Increased Corrosion Resistance: *Pavel Podany¹; Tomas Studecky¹; Tomas Gregor¹; ¹COMTES FHT a.s.*

NUCLEAR ENERGY

Tackling Structural Materials Challenges for Advanced Nuclear Reactors — Advanced Manufacturing

Sponsored by: TMS Corrosion and Environmental Effects Committee, TMS Nuclear Materials Committee, TMS: Advanced Characterization, Testing, and Simulation Committee

Program Organizers: Miaomiao Jin, Pennsylvania State University; Xing Wang, Pennsylvania State University; Karim Ahmed, Texas A&M University; Jeremy Bischoff, Framatome; Adrien Couet, University of Wisconsin-Madison; Kevin Field, University of Michigan; Lingfeng He, North Carolina State University; Raul Rebak, GE Global Research

Wednesday AM | October 12, 2022

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Session Chair: Kevin Field, University of Michigan

8:00 AM

Electrodeposition of Functionally Graded Interlayers for Enhanced Divertor/Heatsink Bonding for Fusion Reactors: *Holly Garich¹; Katherine Lee¹; Brian Skinn¹; ¹Faraday Technology, Inc.*

8:20 AM

ICME and ML Modeling Framework of U-10%wt Mo Fabrication Processes: *Ayoub Soulami¹; William Frazier¹; Yucheng Fu¹; Lei Li¹; Kyoo Sil Choi¹; Zhijie Xu¹; Vineet Joshi¹; ¹Pacific Northwest National Laboratory*

8:40 AM Invited

Heavy Ion Irradiation Response of an Additively Manufactured 316L Stainless Steel: *Xinghang Zhang¹; Zhongxia Shang¹; Cuncui Fan¹; Lin Shao²; Thomas Voisin³; Y Wang⁴; ¹Purdue University; ²Texas A&M University; ³Lawrence Livermore National Lab; ⁴University of California, Los Angeles*

9:10 AM

Progress Toward Additive Manufacturing of Ferritic-martensitic, In situ Tempered Steels for Nuclear Applications: *Calvin Lear¹; Todd Steckley¹; Mehmet Topsakal²; Simerjeet Gill²; Thomas Lienert³; Stuart Maloy⁴; ¹Los Alamos National Laboratory; ²Brookhaven National Laboratory; ³Optomec; ⁴Pacific Northwest National Laboratory*

9:30 AM Invited

Structural Material Design for Power Plants Using Additive Manufacturing: *Wei Xiong¹; ¹University of Pittsburgh*

10:00 AM Break

10:20 AM

Phase Field Modeling of Hot Isostatic Pressing for Joining of Dissimilar Metals: *Albert Lin¹; Yongfeng Zhang¹; ¹University of Wisconsin - Madison*

10:40 AM

Understanding of Alloying Additions for Design of Gas Atomization Reaction Synthesis Produced Oxide Dispersoid Strengthened Alloys: *Emma Cockburn¹; ¹Emma Cockburn*

11:00 AM

Studying Microstructural Evolution in an Oxide Dispersion Strengthened 14YWT Ferritic Steel Tube Manufactured using SolidStir™ Technology: *Shubhrodev Bhowmik¹; Pranshu Varshney¹; Osman El Atwani²; Stuart Maloy³; Kumar Kandasamy⁴; Niles Kumar¹; ¹University of Alabama, Tuscaloosa; ²Los Alamos National Lab; ³Pacific Northwest National Lab; ⁴Enabled Engineering*

11:20 AM Invited

Neutron Irradiation Effects in PM-HIP Nuclear Structural Alloys: *Janelle Wharry¹; Caleb Clement¹; Yangyang Zhao¹; Sri Sowmya Panuganti¹; Yu Lu²; Yaqiao Wu²; Donna Guillen³; David Gandy⁴; ¹Purdue University; ²Boise State University; ³Idaho National Laboratory; ⁴Electric Power Research Institute*

CERAMIC AND GLASS MATERIALS

Undergraduate Research in Ceramics — Undergraduate Research in Ceramics and Glass

Sponsored by: ACerS

Program Organizers: Steve Feller, Coe College; Mario Affatigato, Coe College

Wednesday AM | October 12, 2022

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Session Chair: Caio Bragatto, Coe College

8:30 AM Introductory Comments

8:40 AM Invited

Systematic Measurement of Isobaric Specific Heat Capacity: *Hillary Smith¹; Colby Stoddard¹; ¹Swarthmore College*

9:00 AM Question and Answer Period

9:05 AM

The Creation and Implementation of a Ceramics and Glass Science Research Laboratory at a Primarily Undergraduate College: *Casey Schwarz¹; Rashi Sharma²; Julie Donnelly²; Myungkoo Kang²; Kathleen Richardson²; Adelle Schade³; ¹Ursinus College; ²University of Central Florida; ³Albright College*

9:25 AM Question and Answer Period

9:30 AM

Beyond The Laboratories - How to Create a Thriving Community Around Science: *Mario Affatigato¹; Steve Feller¹; Caio Bragatto²; ¹Coe College; ²Washington State University*

9:50 AM Question and Answer Period

9:55 AM Break

10:15 AM

Processing of Native Minerals and Glasses for Clay-based Ceramics: *Jenna Saylor¹; Katrina Donovan¹; Jon Kellar¹; ¹South Dakota School of Mines and Technology*

10:35 AM Question and Answer Period

10:40 AM Invited

Funding Undergraduate Research in Glass at Coe College: *Steve Feller*¹; Mario Affatigato¹; ¹Coe College

11:00 AM Question and Answer Period

11:05 AM

Novel Ceramics and Glass Science Course built to Engage Undergraduate Students Using Simulations and Art: *Julie Donnelly*¹; *Rashi Sharma*¹; *Casey Schwarz*²; *Matilynn Lam*¹; ¹University of Central Florida; ²Ursinus College

11:25 AM Question and Answer Period

SPECIAL TOPICS

50 Years of Characterizing Structural Ceramics and Glasses: Recognizing the Contributions of George Quinn — Mechanical Testing & Design/Fractography & Failure Analysis

Sponsored by: ACerS

Program Organizers: Jeffrey Swab, Army Research Laboratory; Andrew Wereszczak, Oak Ridge National Laboratory

Wednesday PM | October 12, 2022
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Funding support provided by: Corning Inc., 3M, Orton, and Bomas

Session Chairs: Andrew Wereszczak, Oak Ridge National Laboratory; James Varner, Alfred University

2:30 PM Invited

Interpretation of Zerodur® Strength Data: *Jonathan Salem*¹; ¹NASA GRC

3:00 PM Invited

Fractal Analysis of Brittle Fracture and Crack Branching: *John Mecholsky*¹; *Daniel DeLellis*¹; *Nicholas Mecholsky*²; ¹University of Florida; ²Catholic University of America

3:30 PM Break

3:50 PM Invited

Coating Effect on Vial Crack Response: *Jamie Morley*¹; *Alicia Gallagher*¹; *James Webb*¹; *Steven DeMartino*¹; ¹Corning Incorporated

4:20 PM Invited

Failure Analysis of a Large SiC Component: *Kristin Breder*¹; *Eric Buchovecky*¹; *Ryan Koseski*¹; ¹Saint-Gobain

4:50 PM Invited

On the 3rd Edition of the NIST Guide to Fractography of Ceramics and Glasses: *George Quinn*¹; ¹NIST

SPECIAL TOPICS

ACerS Robert B. Sosman Award Symposium: Advancing the Science of Materials for Extreme Environments — Session II

Sponsored by: ACerS Basic Science Division

Program Organizers: Yiquan Wu, Alfred University; Greg Hilmas, Missouri University of Science and Technology; Eric Wuchina, NSWCCD

Wednesday PM | October 12, 2022
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Session Chairs: Greg Hilmas, Missouri University of Science and Technology; Eric Wuchina, NSWCCD

2:00 PM Invited

Progress in Manufacturing Ultra-High Temperature Ceramic Matrix Composites (UHTCMCS): *Jon Binner*¹; ¹University of Birmingham

2:30 PM Invited

Thermodynamic Assessment of Zr-B-C-O System Applied to Ultra High Temperature Ceramic Processing & Oxidation: *Erica Corral*¹; ¹University of Arizona

3:00 PM Invited

Exploring Microstructural Complexity in UHTCs for New Heat Management Strategies Using Cost-Effective Manufacturing Approaches: *Carolina Tallon*¹; ¹Virginia Polytechnic Institute

3:30 PM Break

3:50 PM Invited

High-entropy Transition Metal Diborides: Local Structure vs. Long-range Chemical Homogeneity: *Frederic Monteverde*¹; *Mattia Gaboardi*²; ¹ISTEC-CNR; ²Elettra-Sincrotrone Trieste S.C.p.A.

4:20 PM Invited

High-entropy Rare-earth Zirconates for Thermal Barrier Coatings with Low Thermal Conductivity and Graceful Behavior during CMAS Corrosion: *Guo-Jun Zhang*¹; ¹Donghua University

4:50 PM Invited

From Academic Research on UHTCs to Industry R&D and Entrepreneurship: *Sumin Zhu*¹; ¹MSE Supplies LLC

SPECIAL TOPICS

ACerS Robert B. Sosman Award Symposium: Advancing the Science of Materials for Extreme Environments — Sosman Presentation

Sponsored by: ACerS Basic Science Division

Program Organizers: Yiquan Wu, Alfred University; Greg Hilmas, Missouri University of Science and Technology; Eric Wuchina, NSWCCD

Wednesday PM | October 12, 2022
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Session Chair: Yiquan Wu, Alfred University

1:00 PM Invited

Advancing the Science of Materials for Extreme Environments: *William Fahrenholtz*¹; ¹Missouri University of Science and Technology

EDUCATION

ACerS/TMS Emerging Faculty Symposium — Funding, Mentorship, and Growth as Faculty Members

Sponsored by: ACerS Education and Professional Development Council, TMS: Education Committee

Program Organizers: Ashley Hilmas, Air Force Research Laboratory; Tessa Davey, Tohoku University; Victoria Miller, University of Florida

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Session Chair: To Be Announced

2:00 PM Invited

Integrating Scientific Writing into Undergraduate Level Traditional Engineering Courses: *Mengying Liu*¹; ¹Washington and Lee University

2:30 PM Invited

Funding, Mentoring and Broadening Participation: Opportunities and Pathways: *Jonathan Madison*¹; ¹National Science Foundation

3:00 PM Invited

The STEM Ambassador Program: Engaging Materials Scientists with Public Groups – Where They Live, Work, Recreate, and Gather: *Nalini Nadkarni*¹; *Andrew George*¹; *Sara Yeo*¹; ¹University of Utah

3:30 PM Break

3:50 PM Invited

Navigating the National Science Foundation - Tips for Early Career Faculty and Researchers: *Alexis Lewis*¹; ¹National Science Foundation

ADDITIVE MANUFACTURING

Additive Manufacturing Modeling, Simulation, and Machine Learning: Microstructure, Mechanics, and Process — AM Processes

Program Organizers: Jing Zhang, Indiana University – Purdue University Indianapolis; Brandon McWilliams, US Army Research Laboratory; Li Ma, Johns Hopkins University; Yeongil Jung, Changwon National University

Wednesday PM | October 12, 2022
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Session Chairs: Brandon McWilliams, CCDC Army Research Laboratory; Li Ma, Johns Hopkins University Applied Physics Laboratory; Yeon-Gil Jung, Changwon National University; Jing Zhang, Indiana University - Purdue University Indianapolis

2:00 PM

Tailoring Formation of TCP Phases during Additively Manufactured Inconel 625 by CALPHAD-based Simulations with Experimental Validations: *Hui Sun*¹; *Shun-Li Shang*¹; *Shipin Qin*²; *Allison Beese*¹; *Zi-Kui Liu*¹; ¹The Pennsylvania State University; ²Align Technology

2:20 PM

Discrete Element Method Based Simulations of Metal Powder Pouring and Raking Processes in Additive Manufacturing: *Michael Fazzino*¹; *Ummay Habiba*²; *Rainer Hebert*¹; *Serge Nakhmanson*¹; ¹University of Connecticut

2:40 PM

Planar and Full-Process Modeling of the Powder-Bed Fusion Ti-6Al-4V Columnar-to-Equiaxed Transition Behavior: *Brodan Richter*¹; *Joshua Pribe*²; *George Weber*¹; *Edward Glaessgen*¹; ¹National Aeronautics and Space Administration; ²National Institute of Aerospace

3:00 PM

Powder Bed Packing Density Dependence on Particle Size Distribution: Simulation and Experimental Analysis: *Ummay Habiba*¹; *Michael Fazzino*¹; *Serge Nakhmanson*¹; *Rainer Hebert*¹; ¹University of Connecticut

3:20 PM

Rapid Qualification of Wire Feed Direct Energy Deposition Process Builds Using ICME Approach: *Amit Verma*¹; *Andrew Huck*¹; *Rajib Halder*¹; *Anthony Rollett*¹; ¹Carnegie Mellon University

3:40 PM Break

4:00 PM

Towards Qualification and Certification of Laser Powder Bed Fusion Ti-6Al-4V with In-Situ Process Monitoring and Automated Defect Detection: *Andrew Kitahara*¹; *Samuel Hocker*²; *Brodan Richter*²; *Wesley Tayon*²; *Joseph Zalameda*²; *Edward Glaessgen*²; ¹National Institute of Aerospace; ²NASA Langley Research Center

4:20 PM

The Effect of the Process Environment on Gas and Particle Entrainment in Laser Powder Bed Fusion: *Michael Stokes*¹; *Saad Khairallah*²; *Alexey Volkov*¹; *Alexander Rubenchik*²; ¹The University of Alabama; ²Lawrence Livermore National Laboratory

4:40 PM

Thermomechanical Modeling of Axisymmetric Geometries for Laser Hot Wire Additive Manufacturing: *Elizabeth Chang-Davidson*¹; Brandon Abranovic¹; Jack Beuth¹; ¹Carnegie Mellon University

5:00 PM

Studying Melt Pool Variation and Its Effects on the Formation of Porous Defects via GPU-based Process Simulation: *David Anderson*¹; Chaitanya Vallabh¹; Shawn Hinnebusch¹; Xiayun Zhao¹; Albert To¹; ¹University of Pittsburgh

5:20 PM

In Situ Confocal Imaging and Quantification of Defects in Binder-Jet Printed (BJP) Steel Parts: *Pooja Maurya*¹; P.Chris Pistorius¹; ¹Carnegie Mellon University

ADDITIVE MANUFACTURING

Additive Manufacturing of Ceramic-based Materials: Process Development, Materials, Process Optimization and Applications — Additive Manufacturing of Ceramics-based Materials III

Sponsored by: ACerS Basic Science Division, ACerS Engineering Ceramics Division, ACerS Manufacturing Division

Program Organizers: Lei Chen, University of Michigan-Dearborn; Xuan Song, University of Iowa; Xiangyang Dong, Missouri University of Science and Technology; Yiquan Wu, Alfred University; Paolo Colombo, University of Padova; Rajendra Bordia, Clemson University; Long-Qing Chen, Pennsylvania State University

Wednesday PM | October 12, 2022
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Session Chair: Xiangfan Chen, Arizona State University

2:00 PM Invited

Rapid Three-dimensional Printing of High-resolution Piezoelectric Structures Using Micro-CLIP: *Siyi Liu*¹; Wenbo Wang¹; Luyang Liu¹; *Xiangfan Chen*¹; ¹Arizona State University

2:30 PM

Modeling and Monitoring of Thermal Accumulation During Laser Powder Bed Fusion of Cemented Carbides: *Alex Gourley*¹; Edgar Mendoza¹; Reeja Jeyan¹; Jack Beuth¹; ¹Carnegie Mellon University

2:50 PM

Phase-field Modeling of Co-Sintering of Ceramic Electrolyte/Electrode for All Solid-State Li-ion Batteries: *Lei Chen*¹; Yaohong Xiao¹; ¹University of Michigan-Dearborn

3:10 PM

SLA-based Additive Manufacturing of 3D Structures with Surface Activated Silicone Carbide-polymer Composite: *M. M. Towfiqur Rahman*¹; Ahmed El-Ghannam¹; Erina Baynoji Joyee¹; ¹University of North Carolina at Charlotte

3:30 PM Break

3:50 PM

Influence of Laser Processing Parameters on Thermoelectric and Microstructural Properties of Bi₂Te₃: *Saniya LeBlanc*¹; Eric Fodran²; Eric Barnes²; Cagri Oztan¹; ¹George Washington University; ²Northrop Grumman

4:10 PM

Micro-Cold Spray: Effect of Particle Impact Velocity on SiC Film Morphology: *Derek Davies*¹; Michael Gammage²; Michael Becker¹; John Keto¹; Desiderio Kovar¹; ¹University of Texas at Austin; ²CCDC DEVCOM Army Research Laboratory

ADDITIVE MANUFACTURING

Additive Manufacturing of High and Ultra-high Temperature Ceramics and Composites: Processing, Characterization and Testing — New Methods and Characterization

Sponsored by: ACerS Young Professionals Network

Program Organizers: Corson Cramer, Oak Ridge National Laboratory; Lisa Rueschhoff, Air Force Research Laboratory; Greg Hilmas, Missouri University of Science and Technology

Wednesday PM | October 12, 2022
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Session Chair: Lisa Rueschhoff, Air Force Research Laboratory

2:00 PM Invited

Heterogeneous Lattice Structure Ceramic-Refractory Metal Materials Created via Additive Manufacturing: *David Mitchell*¹; Corson Cramer¹; Trevor Aguirre¹; Steven Bullock¹; Christopher Ledford¹; Michael Kirka¹; Austin Schumacher¹; ¹Oak Ridge National Laboratory

2:30 PM Invited

Optimizing Functionally Graded ZrB₂-Mo Components by Ceramic On-Demand Extrusion (CODE): *Austin Martin*¹; Clare Sabata¹; Jeremy Watts¹; Gregory Hilmas¹; Ming Leu¹; Tieshu Huang²; ¹Missouri University of Science and Technology; ²Kansas City National Security Campus, Honeywell Federal Manufacturing & Technologies

3:00 PM Invited

Laser-induced Slip Casting for Additive Manufacturing of Large Ceramic Components: *Shawn Allan*¹; Yannik Zieger²; Martin Schwentenwein²; Johannes Homa²; ¹Lithoz America LLC; ²Lithoz GmbH

3:30 PM Break

3:50 PM

In-Bath 3D Printing of Preceramic Polymers: *Majid Minary*¹; ¹Arizona State University

4:10 PM

Micro and Nanostructured Compositing Approaches to Green Body Strengthening of Polymer-Derived UHTC: *Justin Hendrix*¹; Matthew Laskoski¹; ¹Naval Research Lab

4:30 PM

Oxidation Behavior of Additively Manufactured SiC-SiOC Composites: *Mackenzie Ridley*¹; Trevor Aguirre¹; Corson Cramer¹; ¹Oak Ridge National Laboratory

4:50 PM

Structural Characterization of the 3D Printed Ceramic Composite Materials: *Saja Al-ajrash*; Charles Browning¹; ¹University of Dayton

ADDITIVE MANUFACTURING

Additive Manufacturing of Metals: Microstructure, Properties and Alloy Development — Other Materials

Program Organizers: Prashanth Konda Gokuldoss, Tallinn University of Technology; Jurgen Eckert, Erich Schmid Institute of Materials Science; Zhi Wang, South China University of Technology

Wednesday PM | October 12, 2022
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Session Chairs: Katerina Kimes, Desktop Metal / ExOne; Markus Chmielus, University of Pittsburgh

2:00 PM

Novel High-Manganese TRIP/TWIP Steel Wire Feedstocks for Use in Wire Arc Additive Manufacturing: *Jamie McIntyre*¹; William Lansing¹; Zhenzhen Yu¹; Eric Lass²; Jonah Klemm-Toole¹; ¹Colorado School of Mines; ²University of Tennessee Knoxville

2:20 PM

Parameter Exploration and Controlled Defect Studies in High Deposition Rate Wire Arc Directed Energy Deposition of 316L for Pressure Retaining Components: *Luc Hagen*¹; Zhenzhen Yu¹; Stephen Tate²; Jonah Klemm-Toole¹; ¹Colorado School of Mines; ²Electric Power Research Institute

2:40 PM

Reduction in Shrinkage of Binder Jet Printed Large Stainless-Steel Parts Using Novel Metal Powders: *Alex Paterson*¹; Kyle Myers¹; Adam Bartel²; Austin Peters²; ¹Desktop Metal / ExOne; ²Tundra Companies

3:00 PM

Systematic Approach to Determining Ideal Process Parameters for Low Alloy Steels in Directed Energy Deposition: *Jose Lolli*¹; Bryan Webber¹; Maarten de Boer¹; Jack Beuth¹; ¹Carnegie Mellon University

3:20 PM Break

3:40 PM

Extraordinary Combination of Strength and Ductility in an Additively Manufactured Fe-based Medium Entropy Alloy through the In-situ Formed Nanoprecipitate: *Farahnaz Haftlang*¹; Eun Seong Kim¹; Yoon-Uk Heo¹; Hyoung Seop Kim¹; ¹Pohang University of Science and Technology

4:00 PM

Automated Serial Sectioning for Validation of X-ray Computed Tomography of Additively Manufactured Alloys: *Veeraraghavan Sundar*¹; Griffin Jones²; Rachel Reed¹; Jayme Keist²; ¹UES Inc.; ²PSU / ARL

4:20 PM

On the Utility of Using Volumetric Energy Density for Microstructure and Defect Predictions in Laser Powder Bed Fusion Additive Manufacturing: *Charles Smith*¹; Elias Roll¹; Olivia DeNonno¹; Matthew Schreiber¹; Anthony Petrella¹; Craig Brice¹; Joy Gockel¹; Amy Clarke¹; Jonah Klemm-Toole¹; ¹Colorado School of Mines

4:40 PM

The Role of Nucleation in Determining the Microstructure Development in Rapidly Solidified Alloys: *Nima Najafizadeh*¹; Yijia Gu¹; ¹Missouri University of Science and Technology

5:00 PM

Tortuosity and Flow Characterization towards 3D Binder-Jet Printed N95 Mask Filter: *Aaron Acierno*¹; Teddi Sedlar¹; Erica Erickson¹; Markus Chmielus¹; ¹University of Pittsburgh

ADDITIVE MANUFACTURING

Additive Manufacturing of Metals: Microstructure, Properties and Alloy Development — Processing and Characterization

Program Organizers: Prashanth Konda Gokuldoss, Tallinn University of Technology; Jurgen Eckert, Erich Schmid Institute of Materials Science; Zhi Wang, South China University of Technology

Wednesday PM | October 12, 2022
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Session Chairs: Jonah Klemm-Toole, Colorado School of Mines; Allison Beese, Pennsylvania State University

2:00 PM

Laser Powder Bed Fusion Process: Effect of Laser Remelting/Scanning/Pulsing/Shaping: *Prashanth Konda Gokuldoss*¹; ¹Tallinn University of Technology

2:20 PM

Design New Feedstock Materials for Additive Manufacturing Using a Commercial Alloy Powder Mixture: *Daozheng Li*¹; Wei Xiong¹; ¹University of Pittsburgh

2:40 PM

Tuning the Microstructure and Mechanical Properties of AlSi10Mg Alloy via In-situ Heat-treatments in Laser Powder Bed Fusion: *Federico Bosio*¹; Chinmay Phutela¹; Alya Alhammedi¹; Nesma Aboulkhair¹; ¹Technology Innovation Institute

3:00 PM

Exceptional Ductility Induced by The Intrinsic Grain Boundary Engineering: *Lin Gao*¹; Wenhao Lin¹; Zhongshu Ren¹; Ma Ji¹; Tao Sun¹; ¹University of Virginia

3:20 PM Break

3:40 PM

From Chemistry at the Scale of Printing to Bulk Quantitation: A Powerful Tool for Characterizing Additive Manufacturing Materials: *Jonathan Putman*¹; Peyton Willis¹; Madeline Martelles²; Ellen Williams¹; ¹Exum Instruments; ²University of Tulsa

4:00 PM

Measurement and Classification of SLM Feedstock Powders by X-Ray Microscopy and Machine Learning: *Daniel Sinclair*¹; Eshan Ganju¹; Hamidreza Torbati-Sarrafi¹; Nikhilesh Chawla¹; ¹Purdue University

4:20 PM

Visualization of Metallic Alloy Microstructural Evolution under Additive Manufacturing Conditions: *Oliver Hesmondhalgh*¹; Amy Clarke¹; ¹Colorado School of Mines

4:40 PM

Origin of Epitaxy Loss in Laser Powder Bed Fusion: *Prosenjit Biswas*¹; Ji Ma¹; ¹University of Virginia

5:00 PM

Effect of Thermo-mechanical Treatment on Mechanical Performance of Cold Spray Additively Manufactured Deposits: *Ahmad Nourian-Avval¹; Sinan Muftu¹; ¹Northeastern University*

5:20 PM

Surface Nanotextured Powders for 3D Printing of High Reflectivity Metals: *Ottman Tertuliano¹; Philip Depond²; Andrew Lee³; David Doan³; X. Gu³; Manyalibo Matthews²; Wei Cai³; Adrian Lew³; ¹University of Pennsylvania; ²Lawrence Livermore National Laboratory; ³Stanford University*

ADDITIVE MANUFACTURING

Additive Manufacturing of Titanium-based Materials: Processing, Microstructure and Material Properties — Ti-processing

Program Organizers: Ulf Ackelid, Freemelt AB; Ola Harrysson, North Carolina State University

Wednesday PM | October 12, 2022

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Session Chair: Sneha Prabha, Carnegie Mellon University

2:00 PM

Correlating Laser Based Powder Bed Processing Conditions to the Fatigue Behavior of Additively Manufactured Ti-6Al-4V with As-built Surfaces: *Jayme Keist¹; Nickolas Sotiropoulos¹; Scott Tokarz¹; Edward Reutzel¹; ¹Pennsylvania State University*

2:20 PM

Direct-Ink Writing of Hierarchically Porous Titanium for Enhanced Osseointegration: *John Misiaszek¹; David Dunand¹; ¹Northwestern University*

2:40 PM

Effect of Surface Finish on Fatigue Behavior of Laser Powder Bed Fusion Processed Hydride-Dehydride Ti-6Al-4V Powder: *Mohammadreza Asherloo¹; Ziheng Wu²; Muktesh Paliwal³; Anthony Rollett²; Amir Mostafaei¹; ¹Illinois Institute of Technology; ²Carnegie Mellon University; ³Kymera International*

3:00 PM

Influence of Substrate Condition and Initial Residual Stresses on Wire Fed Electron Beam Additive Deposition: *Fatih Sikan¹; Priti Wanjara²; Javad Gholipour Baradari²; Mathieu Brochu¹; ¹McGill University; ²National Research Council Canada*

3:20 PM Break

3:40 PM

Modelling the Additive Manufacturing of a Titanium-based Hip Implant: *Lakshana Mohee¹; ¹ANSYS Granta*

4:00 PM

Process Window Approach for Qualification of Laser Powder Bed Fusion: *Anthony Rollett¹; Jack Beuth¹; John Lewandowski²; Sneha Narra¹; Kenji Shimada¹; Craig Brice³; Frank Medina⁴; Ryan Wicker⁴; Elizabeth Holm¹; Albert To⁵; Kirk Rogers⁶; Ayman Salem⁷; ¹Carnegie Mellon University; ²Case Western University; ³Colorado School of Mines; ⁴University of Texas El Paso; ⁵University of Pittsburgh; ⁶Barnes Global Advisors; ⁷Materials Resources LLC*

4:20 PM

Role of Build Orientation and Layers on Microstructure and Multi-scale Mechanical Properties of Wire Arc Additive Manufactured Commercially Pure Titanium: *Tanaji Paul¹; Blanca Palacios¹; Tyler Dolmetsch¹; Cheng Zhang¹; Benjamin Boesl¹; Arvind Agarwal¹; ¹Florida International University*

4:40 PM

Spatially Resolving Structure-Behavior Relations in Additive Manufactured Adaptive Materials: *Arnab Chatterjee¹; Reginald Hamilton¹; ¹Penn State*

5:00 PM

Manipulating Fatigue Life in L-PBF with Contour Control: *Christian Gobert¹; Austin Ngo²; David Scannapieco²; John Lewandowski²; Jack Beuth¹; ¹Carnegie Mellon University; ²Case Western Reserve University*

ADDITIVE MANUFACTURING

Additive Manufacturing: Equipment, Instrumentation and In-Situ Process Monitoring — Equipment, Instrumentation and In-Situ Process Monitoring III

Sponsored by: TMS Additive Manufacturing Committee

Program Organizers: Ulf Ackelid, Freemelt AB; Joy Gockel, Colorado School of Mines; Sneha Prabha Narra, Carnegie Mellon University; Ola Harrysson, North Carolina State University

Wednesday PM | October 12, 2022

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Session Chair: Joy Gockel, Colorado School of Mines

2:00 PM Invited

In-situ Process Monitoring of Laser Powder Bed Fusion Additive Manufacturing Using Thermionic Emission Detection: *Aiden Martin¹; Philip DePond¹; John Fuller¹; Saad Khairallah¹; Justin Angus¹; Gabe Guss¹; Manyalibo Matthews¹; ¹Lawrence Livermore National Laboratory*

2:40 PM

Real-time, High-speed and High-resolution Multi- and Hyperspectral Imaging of Powder Bed Fusion: *Steven Storck¹; Mark Foster²; Nathan Drenkow¹; Brendan Croom¹; Milad Alemohammad²; Christopher Stiles¹; Bobby Mueller¹; Michael Pekala¹; Mary Dafron¹; Ryan Carter¹; Dylan Madisetti²; ¹JHU/APL; ²Johns Hopkins University*

3:00 PM

Instrumenting an EOS M290 with a Smart Build-Plate: *Adam Hehr¹; Mark Norfolk¹; Ben Stefanko¹; Jason Riley¹; Megan Bax²; Plamen Petkov²; Ryan Zvanut²; Tristan Cullom²; ¹Fabrisonic LLC; ²Kansas City National Security Campus*

3:20 PM Break

3:40 PM Invited

Microstructure Control during Wire and Arc Additive Manufacturing: *Joao Oliveira¹; ¹FCT-UNL*

4:20 PM

Investigating the Use of In-situ Weld Pool Characteristics and Temperature Measurements for Monitoring Part Quality in Wire Arc Additive Manufacturing: *Ryan Utz¹; Jack Beuth¹; Chris Pistorius¹; Sneha Narra¹; ¹Carnegie Mellon University*

4:40 PM

Optimization of Laser Powder Bed Fusion AM through Process Gas Control: *Jacque Berkson¹; Antonio Ramirez¹; ¹The Ohio State University*

5:00 PM

Exploring Synchronized Dual Laser Scan Strategies for Increased Productivity of Laser Powder Bed Fusion: *Lars Vanmunster¹; Tom Kerkhofs¹; Bey Vrancken¹; ¹KU Leuven*

PROCESSING AND MANUFACTURING

Advanced Joining Technologies for Automotive Lightweight Structures — Resistance and Ultrasonic Spot Welding Plus (RSW & USW, etc.)

Sponsored by: ACeS Manufacturing Division, TMS Aluminum Committee

Program Organizers: Yan Huang, Brunel University London; Carla Barbatti, Constellium; Yingchun Chen, Dura Automotive Systems

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Session Chairs: Paul Briskham, Atlas Copco IAS UK Ltd; Yan Huang, Brunel University London

2:00 PM

Integrating an Interlayer Technology Approach to Advanced Materials While Resistance Spot Welding: *Liya Amanuel¹; Bryan Lara¹; Antonio Ramirez¹; ¹The Ohio State University*

2:20 PM

Fatigue Analyses of Dissimilar Aluminum-Steel Clinch Joints for Lightweight Construction: *Lars Ewenz¹; Sebastian Schöne¹; Martina Zimmermann²; ¹TU Dresden; ²TU Dresden and Fraunhofer Institute for Material and Beam Technology IWS*

2:40 PM

A Novel Approach to Determine Intermetallic Formation and Growth in the Aluminum-Iron System Using Resistance-based Diffusion Couples: *Michael Eff¹; Wei Zhang²; Jerry Gould¹; Antonio Ramirez³; ¹EWI; ²The Ohio State University; ³The Ohio State University*

3:00 PM

Dissimilar Materials Welding between AA6061 and CFRP Utilizing Vaporizing Foil Actuator Welding: *YuHyeong Jeong¹; Kyucheol Jeong¹; Wonju Lee¹; Hyung-gyu Kim¹; Jonghun Yoon¹; ¹Hanyang University*

ARTIFICIAL INTELLIGENCE

AI for Big Data Problems in Advanced Imaging, Materials Modeling and Automated Synthesis — AI for Materials Design

Sponsored by: TMS Advanced Characterization, Testing, and Simulation Committee

Program Organizers: Mathew Cherukara, Argonne National Laboratory; Subramanian Sankaranarayanan, University of Illinois-Chicago; Badri Narayanan, University of Louisville

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Session Chairs: Mathew Cherukara, Argonne National Laboratory; Badri Narayanan, University of Louisville; Subramanian Sankaranarayanan, University of Illinois Chicago

2:00 PM

A Novel Training Methodology for Phase Segmentation of Steel Microstructures Using a Deep Learning Algorithm: *Nikhil Chaurasia¹; Shikhar Jha¹; Sandeep Sangal¹; ¹Indian Institute of Technology Kanpur*

2:20 PM

Data-driven Search for Promising Intercalating Ions and Layered Materials for Metal-ion Batteries: *Shayani Parida¹; C. Barry Carter¹; Avnish Mishra²; Arthur Doble²; Avinash Dongare¹; ¹University of Connecticut; ²EaglePicher Technologies*

2:40 PM

Hybrid GNN Approach to Industrial Time Series and IoT Applications: *Atish Bagchi¹; ¹SPSA DIGITAL*

3:00 PM

Multi-property Graph Networks for Novel Materials Discovery: *Alexander New¹; Nam Le¹; Michael Pekala¹; Kyle McElroy¹; Janna Domenico¹; Christine Piatko¹; Elizabeth Pogue¹; Tyrel McQueen²; Christopher Stiles¹; ¹Johns Hopkins University Applied Physics Laboratory; ²Johns Hopkins University*

3:20 PM Break

3:40 PM

Rapid Metallic Alloy Development Leveraging Machine Learning: *Nhon Vo¹; Ha Bui²; ¹NanoAL LLC; ²Amatrium Inc.*

4:00 PM

Machine Learning Guided Prediction of Rupture Time of 347H Stainless Steel: *Mohammad Fuad Nur Taufique¹; Madison Wenzlick²; Arun Sathanur¹; William Frazier¹; Ram Devanathan¹; Keerti Kappagantula¹; Shoieb Ahmed Chowdhury¹; ¹Pacific Northwest National Laboratory; ²National Energy Technology Laboratory*

4:20 PM Concluding Comments

SPECIAL TOPICS

Art and Cultural Heritage: Discoveries during the Pandemic Year — Session II

Sponsored by: ACerS Art, Archaeology, and Conservation Science Division

Program Organizers: Marie Jackson, University of Utah; Jamie Weaver, National Institute of Standards and Technology

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Session Chairs: Jamie Weaver, National Institute of Standards and Technology; Marie Jackson, University of Utah

2:00 PM Division Meeting

2:20 PM Invited

From the Study of Ancient Objects to the Scientific Study of Culturally Innovated and Curated Technologies: *Pamela Vandiver*¹; ¹University of Arizona

3:00 PM

Reproduction of Melting Behavior for Vitrified Hillforts Based on Amphibolite, Granite, and Basalt Lithologies: *John McCloy*¹; José Marcial²; Jack Clarke³; Mostafa Ahmadzadeh¹; John Wolff¹; Edward Vicenzi⁴; David Bollinger¹; Erik Ogenhall⁵; Mia Englund⁵; Rolf Sjöblom⁶; Albert Kruger⁷; ¹Washington State University; ²Pacific Northwest National Laboratory; ³University of Sheffield; ⁴Museum Conservation Institute, Smithsonian Institution; ⁵The Archaeologists, National Historical Museums (SHM); ⁶Luleå University of Technology; ⁷US Department of Energy

3:20 PM

The Identification of Materials and Processes Used in the Manufacture of Orotone, Hand-Colored Orotone, and Silvertone Photographs: *Vanessa Johnson*¹; Ivanny Jácome-Valladares¹; Claire Kenny²; *Tami Lasseeter Clare*¹; ¹Portland State University; ²University of Washington

3:40 PM Concluding Comments

NUCLEAR ENERGY

Ceramics for a New Generation of Nuclear Energy Systems and Applications — Nuclear Waste Management

Sponsored by: TMS Nuclear Materials Committee, ACerS Energy Materials and Systems (EMSD) Division

Program Organizers: Ming Tang, Clemson University; Enrique Martinez Saez, Clemson University; Yongfeng Zhang, University of Wisconsin; Krista Carlson, University of Nevada, Reno; Yutai Katoh, Oak Ridge National Laboratory; Jean Paul Crocombette, CEA Saclay; Erol Kardoulaki, Los Alamos National Laboratory; Levi Gardner, Argonne National Laboratory; Jian Zhang, Xiamen University; Charmayne Lonergan, Pacific Northwest National Laboratory

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Session Chairs: Krista Carlson, University of Nevada, Reno; Jake Amoroso, Savannah River National Laboratory

2:00 PM Invited

Development of Novel TRU-containing Ceramics for Nuclear Waste Immobilization: *Jake Amoroso*¹; ¹Savannah River National Laboratory

2:30 PM Invited

Environmental Degradation of Ceramic Materials in Nuclear Energy Systems: *Hwasung Yeom*¹; Kumar Sridharan¹; ¹University of Wisconsin Madison

3:00 PM

Single Component Variations in Glass Ceramic Waste Forms: *Ryan Kissinger*¹; ¹Lawrence Livermore National Laboratory

3:20 PM Break

3:40 PM Invited

Sulfur Retention of Low Activity Waste Glasses

: *Austin Stanfield*¹; Jake Amoroso¹; ¹Savannah River National Laboratory

4:10 PM

Bismuth Loaded Carbon Foam as an Effective Radio Iodine Sorbent: *Karthikeyan Baskaran*¹; Casey Elliott¹; Muhammad Ali¹; Hammad Malik¹; Brian Riley²; Krista Carlson¹; ¹University of Nevada, Reno; ²Pacific Northwest National Laboratory

4:30 PM

Synthesis and Characterization of Super Occluded LiCl-KCl in Zeolite-4A as a Chloride Salt Waste Form Intermediate: *Allison Harward*¹; Krista Carlson²; Tae-Sic Yoo³; Guy Frederickson³; Mike Patterson³; Michael Simpson¹; ¹University of Utah; ²University of Nevada-Reno; ³Idaho National Laboratories

NANOMATERIALS

Controlled Synthesis, Processing, and Applications of Structural and Functional Nanomaterials — Heterostructures & Polymer-Derived Ceramics

Sponsored by: ACerS Basic Science Division, ACerS Electronics Division, ACerS Engineering Ceramics Division

Program Organizers: Haitao Zhang, University of North Carolina at Charlotte; Gurpreet Singh, Kansas State University; Kathy Lu, Virginia Polytechnic Institute and State University; Edward Gorzkowski, Naval Research Laboratory; Jian Shi, Rensselaer Polytechnic University; Michael Naguib, Tulane University; Sanjay Mathur, University of Cologne

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Session Chairs: Kathy Lu, Virginia Tech; Gurpreet Singh, Kansas State University

2:00 PM Invited

The Many Faces of "Free" Carbon in Polymer-Derived Ceramics: *Peter Kroll*¹; ¹University of Texas at Arlington

2:30 PM Invited

Bioceramic Cellular Solids: Structure, Mechanics, and Formation: *Ling Li*¹; ¹Virginia Polytechnic Institute

3:00 PM

Inquiry of SiOC Structural Evolution via Synchrotron X-ray and Reactive Force Field Simulation: *Kathy Lu*¹; Yue Zhou¹; Harrison Chaney²; Ni Yang¹; ¹Virginia Polytechnic Institute and State University

3:20 PM Break

3:40 PM

Building Better Lithium-ion Battery Anodes with Enhanced Capability and Cycling Efficiency Using MoSe₂/SiOC Freestanding Structure: *Sonjoy Dey*¹; Gurpreet Singh¹; ¹Kansas State University

4:00 PM

Using a Reactive Hydrogen Atmosphere to attain Polymer-Derived SiCN ceramics: *Akshada Hande*¹; Peter Kroll¹; ¹University of Texas Arlington

4:20 PM

Non-hydrolytic Sol-gel Chemistry to Functional Hybrid Materials: *Nicola Pinna*¹; ¹Humboldt-Universität zu Berlin

4:40 PM

Novel Carbyne Based Materials for Gas Sensing: Fabrication and Characterization: Mohamad-Anas Hejazi¹; Osman Eksik²; Çigdem Tasdelen-Yücedag²; Caner Ünlü¹; Andrey Brigadin³; Alexander Lukin⁴; *Levent Trabzon*¹; ¹Istanbul Teknik University; ²Gebze Teknik University; ³Swissimpianti Sagl; ⁴Western-Caucasus Research Center

LIGHTWEIGHT ALLOYS

Development in Light Weight Alloys and Composites — Microstructure, Processing and Mechanical Properties

Sponsored by: TMS Composite Materials Committee, TMS Materials Characterization Committee

Program Organizers: Ramasis Goswami, Naval Research Laboratory; Nikhil Gupta, New York University; Aashish Rohatgi, Pacific Northwest National Laboratory; Tanjore Jayaraman, University of Michigan-Dearborn

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Session Chairs: Tanaji Paul, Florida International University; Aashish Rohatgi, PNNL

2:00 PM

Influence of Alkaline Earth Metals on Structure Formation and Magnesium Alloys Properties: Volodymyr Tsyganyov¹; *Vadim Shalomeev*¹; Sergei Sheyko²; ¹Zaporizhzhia Polytechnic National University; ²Zaporizhzhia National University

2:20 PM

Enhancing the Strength of Al-B4C Composites: *Ramasis Goswami*¹; ¹Naval Research Laboratory

2:40 PM

The Effect of Si on Tungsten Aluminide Formation and Growth: *Henry Young*¹; Raghavan Srinivasan¹; Ammar Alyasari²; ¹Wright State University; ²Middle Technical University

3:00 PM

Investigation of the Residual Stress on AlSi10MnMg Alloy with Various Grain Size: *Minjeong Jeon*¹; Eunhyung Lee¹; ¹Korea Maritime and Ocean University

3:20 PM

Self-assembly and In-situ X-ray Diffraction Characterization of Two-dimensional Ti₃C₂T_x MXene in Al Matrices for Additive Manufacturing: *Brian Wyatt*¹; Babak Anasori¹; ¹Indiana University - Purdue University Indianapolis

3:40 PM Break

4:00 PM

Improving the Strength of AlCoCrNi Dual-phase High-entropy Alloy through Chemical Transformation: *Zulfiya Usmonova*¹; Nurislombek Mahkamjonkhodzoda¹; Malikabonu Sobirova¹; Jakhongir Bakirov¹; Elyorjon Jumaev¹; ¹New Uzbekistan University

4:20 PM

The Role of Mo and Ti in Strengthening Mechanical Properties of the AlCrFeNi Eutectic High Entropy Alloys: *Jakhongir Bakirov*¹; Malikabonu Sobirova¹; Bunyodbek Ismoilov¹; Zulfiya Usmonova¹; Nurislombek Mahkamjonkhodzoda¹; Firdavs Kutliev¹; Elyorjon Jumaev¹; ¹New Uzbekistan University

CERAMIC AND GLASS MATERIALS

Dislocations in Ceramics: Processing, Structure, Mechanics, and Functionality — Dislocations in Ceramics: Mechanics and Functionality

Program Organizers: Xufei Fang, Technische Universität Darmstadt; Till Frömling, Technische Universität Darmstadt; Lukas Porz, Norwegian University of Science and Technology; Wolfgang Rheinheimer, Julich Research Center; Atsutomu Nakamura, Osaka University

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Session Chairs: Wolfgang Rheinheimer, Julich Research Center; Oliver Preuß, Technische Universität Darmstadt

2:00 PM Invited

In Situ Observation of Fracture Dominated by a Single Dislocation and Its Governing Mechanics: *Takashi Sumigawa*¹, ¹Kyoto University

2:30 PM

Understanding and Engineering Dislocations in Oxides at Room Temperature: Xufei Fang¹, *Oliver Preuß*¹, ¹Technische Universität Darmstadt

2:50 PM

Effects of Light Illumination on the Dislocation-mediated Plasticity in Single-crystalline ZnO: *Yan Li*¹; Xufei Fang²; Eita Tochigi³; Yu Oshima⁴; Katsuyuki Matsunaga⁴; Atsutomu Nakamura¹, ¹Osaka University; ²Technical University of Darmstadt; ³The University of Tokyo; ⁴Nagoya University

3:10 PM Invited

Atomistic and Multiscale Computational Analysis of the Connection between Dislocation Slip and Ionic Transport in Plastically Deformed Oxides: *Liming Xiong*¹, ¹Iowa State University

3:40 PM Break

4:00 PM

Charged Dislocations in Ionic Ceramics: Equilibrium and Kinetics: *Edwin Garcia*¹; Vikrant Karra², ¹Purdue University; ²Indian Institute of Technology

4:20 PM

Dislocation-Modified Photoelectric Properties of Oxide Ceramics: *Mehrzad Soleimany*¹; Maximilian Kissel¹; Lukas Porz²; Till Frömling¹; Marin Alexe³; Jürgen Rödel¹, ¹Technical University of Darmstadt; ²Norwegian University of Science and Technology; ³University of Warwick

FUNDAMENTALS AND CHARACTERIZATION

Emergent Materials under Extremes and Decisive In Situ Characterizations — Extreme Conditions

Sponsored by: ACerS Basic Science Division

Program Organizers: Xiaofeng Guo, Washington State University; Hongwu Xu, Los Alamos National Laboratory; Xujie Lu, Center for High Pressure Science & Technology Advanced Research; Hua Zhou, Argonne National Laboratory; Judith Driscoll, University of Cambridge

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Session Chair: Xiaofeng Guo, Washington State University

2:00 PM Invited

In Situ Microstructural Characterization of Metallic Nuclear Fuels: Tiankai Yao¹; Kaustubh Bawane¹; Sriram Vijayan²; Amey Khanolkar¹; Fidelma Giulia Di Lemma¹; *Lingfeng He*¹, ¹Idaho National Laboratory; ²The Ohio State University

2:30 PM Invited

The Role of Anisotropic Diffusion on the Bubble/Void Superlattice Formation in Metals: *Cheng Sun*¹, ¹Idaho National Laboratory

3:00 PM Invited

Understanding Surface Radiation Damage in Concentrated Solid-Solution Alloys by Nanoindentation: *Youxing Chen*¹; Liuqing Yang¹; Yanwen Zhang²; Nan Li³, ¹University of North Carolina at Charlotte; ²Oak Ridge National Laboratory; ³Los Alamos National Laboratory

3:30 PM Break

3:50 PM Invited

In-Situ High Temperature Neutron and X-ray Studies of Corrosion Kinetics and Salt Properties: *Emily Liu*¹; Emily Stefanis¹; Ryan Bedell¹, ¹Rensselaer Polytechnic Institute

4:20 PM

Electrochemical Deposition with Redox Replacement of Lanthanum with Uranium in Molten LiCl-KCl: *Jeffrey Eakin*¹; Daniel Molina¹; Haluk Beyenal¹; Cornelius Ivory¹, ¹Washington State University

4:40 PM

Influence of Cementite Morphology and Its Orientation on Deformation and Fracture of Pearlitic Steel Wire: *Ki-Seong Park*¹; Saurabh Pawar¹; Abhishek Singh¹; Da-Hye Shin²; Dong-Chan Jang²; Choong-ryeol Lee³; Jun-Hark Park³; Il-Heon Son³; Sang-yoon Lee³; Shi Hoon Choi¹, ¹Sunchon National University; ²Korea Advanced Institute of Science and Technology; ³Technical Research Lab., POSCO

5:00 PM Concluding Comments

SUSTAINABILITY, ENERGY, AND THE ENVIRONMENT

Energy Materials for Sustainable Development — Thermal Conversion

Sponsored by: ACerS Energy Materials and Systems Division

Program Organizers: Krista Carlson, University of Nevada, Reno; Armin Feldhoff, Leibniz University Hannover; Kyle Brinkman, Clemson University; Eva Hemmer, University of Ottawa; Nikola Kanas, BioSense Institute; Kjell Wiik, Norwegian University of Science and Technology; Lei Zuo, Virginia Tech; Joshua Tong, Clemson University; Danielle Benetti, Institut National de la Recherche Scientifique; Katherine Develos-Bagarinao, National Institute of Advanced Industrial Science and Technology; Soumi Chatterjee, Aditya Birla Science & Technology Company, Ltd

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Session Chairs: Jianhua Tong, Clemson University; Javier Garay, University of California San Diego

2:00 PM

Thermoplastic Elastomers for High Performance Barocaloric Cooling: Naveen Weerasekera¹; Kameswara Pavan Ajjarapu¹; Kavish Sudan¹; Gamini Sumanasekera¹; Kunal Kate¹; Bikram Bhatia¹; ¹University of Louisville

2:20 PM Invited

Caloric Materials for New Heat-management Technologies: Dejvid Crešnar¹; Matic Morgan¹; Boštjan Zalar¹; Samo Kralj²; Zdravko Kutnjak¹; Gregor Skacej³; Brigita Rozic¹; ¹Jozef Stefan Institute; ²University of Maribor; ³University of Ljubljana

2:50 PM Invited

Electronic Structure Calculations of Materials Converting Energy: Thermoelectrics and Ion Batteries: Janusz Tobola¹; Michal Rybski¹; Kamil Kutorasinski¹; Janina Molenda¹; ¹AGH University of Science and Technology

3:20 PM Break

3:40 PM

The Development of a Machine Learning Guided Process for the Additive Manufacturing of Thermoelectric Materials: Connor Headley¹; Roberto Herrera del Valle¹; Ji Ma¹; Prasanna Balachandran¹; Vijayarathi Ponnambalam²; Saniya LeBlanc²; Dylan Kirsch³; Joshua Martin³; ¹University of Virginia; ²George Washington University; ³National Institute of Standards and Technology

4:00 PM

Thermoelectric Properties of Additively Manufactured Fe₃Al₂Si₃: Babak Alinejad¹; Amir Mostafaei¹; ¹Illinois Institute of Technology

4:20 PM

Multi-layer Numerical Modeling of Selective Laser Melting Based Additive Manufacturing of Thermoelectric Powders
 : Jagannath Suresh¹; Lei Zuo¹; ¹Virginia Tech

4:40 PM Invited

Calcium Cobaltate Based Composite Ceramics for Thermoelectric Energy Harvesting: Armin Feldhoff¹; Zhijun Zhao¹; Mario Wolf²; Matthias Jakob²; Oliver Oeckler²; Richard Hinterding¹; ¹Leibniz University Hannover; ²University of Leipzig

CERAMIC AND GLASS MATERIALS

Engineering Ceramics: Microstructure-Property-Performance Relations and Applications — Properties and Applications of Engineering Ceramics and Composites

Sponsored by: ACerS Engineering Ceramics Division

Program Organizers: Young-Wook Kim, University of Seoul; Hua-Tay Lin, Guangdong University of Technology; Junichi Tatami, Yokohama National University; Michael Halbig, NASA Glenn Research Center

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Session Chair: Michael Halbig, NASA

2:00 PM

Manufacturing and Performance of Grain Textured Piezoelectric Ceramics for Acoustic Applications: Mark Fanton¹; Joshua Fox¹; Beecher Watson¹; Christopher Eadie¹; Richard Meyer¹; ¹Penn State University

2:20 PM

Development of Textured Piezoelectric Ceramics for High-bandwidth Applications: Beecher Watson¹; Mark Fanton¹; Richard Meyer¹; ¹Penn State University

2:40 PM

Crack-path Formation in SiC/SiC Composites: Zubaer Hossain¹; ¹University of Delaware

3:00 PM

Refractory Cements and Composites Materials Based on Them in System BaO-AL₂O₃-SiO₂: Nikolai Iliukha¹; ¹Kyiv University

3:20 PM Break

3:40 PM

Role of Electrostatic Potential Energy in Carbon Nanotube Strengthened Cement Paste: Muhammad Azeem¹; ¹University of Sharjah

4:00 PM

Development of Process-Structure-Property-Performance Relationships for the Advancement of Hard Ceramics Employing FAST and HiPIMS: Christopher DeSalle¹; Caillin Ryan¹; Robert Slapikas¹; Ryan Sweny¹; Simon Divilov²; Hagen Eckert²; Corey Oses²; Marco Esters²; Stefano Curtarolo²; Donald Brenner³; William Fahrenholtz⁴; Jon-Paul Maria⁵; Cormac Toher⁶; Eva Zurek⁷; Douglas Wolfe¹; ¹The Applied Research Laboratory at Penn State; ²Duke University; ³North Carolina State University; ⁴Missouri University of Science & Technology; ⁵Pennsylvania State University; ⁶University of Texas at Dallas; ⁷University at Buffalo

FUNDAMENTALS AND CHARACTERIZATION

Grain Boundaries, Interfaces, and Surfaces: Fundamental Structure-Property-Performance Relationships — Processing and Microstructure

Sponsored by: ACerS Basic Science Division

Program Organizers: Shen Dillon, University of California, Irvine; Wolfgang Rheinheimer, Julich Research Center; Catherine Bishop, University of Canterbury; Ming Tang, Rice University; John Blendell, Purdue University; Wayne Kaplan, Technion - Israel Institute Of Technology; Melissa Santala, Oregon State University

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Session Chairs: Shen Dillon, University of California, Irvine; Melissa Santala, Oregon State University

2:00 PM Invited

Measurements of 3D Microstructures to Determine Grain Boundary Velocities in Polycrystals: *Gregory Rohrer*¹; ¹Carnegie Mellon University

2:30 PM

Grain Growth Study of Strontium Titanate: Comparison between High Energy X-ray Diffraction Microscopy and Simulation: *Vivekanand Muralikrishnan*¹; He Liu²; Lin Yang¹; Robert Suter²; Michael Tonks¹; Gregory Rohrer²; Amanda Krause¹; ¹University of Florida; ²Carnegie Mellon University

2:50 PM Invited

Characterizing Interface Diffusion Mechanisms in Al and Al-Si Alloys via Atomistic Simulations: *Ian Chesser*¹; Raj Koju¹; Yuri Mishin¹; ¹George Mason University

3:20 PM

Grain Boundary Character and Relative Energy Distributions in Nanocrystalline Metallic Films: *Matthew Patrick*¹; Gregory Rohrer²; Katayun Barmak¹; ¹Columbia University; ²Carnegie Mellon University

3:40 PM

Fundamental Structure-Property-Performance Relationships of Unidirectional Grain Boundaries, Interfaces, and Surfaces during SHS Processing: *Borys Sereda*¹; Iryna Kruhliak¹; Dmytro Sereda¹; Dmytro Kruhliak¹; ¹Dneprovsky State Technical University

FUNDAMENTALS AND CHARACTERIZATION

High Entropy Materials: Concentrated Solid Solutions, Intermetallics, Ceramics, Functional Materials and Beyond III — Materials Discovery and Design II & Theory and Modeling II

Sponsored by: TMS: Nanomaterials Committee

Program Organizers: Yu Zhong, Worcester Polytechnic Institute; Michael Gao, National Energy Technology Laboratory; Xingbo Liu, West Virginia University; Peter Liaw, University of Tennessee; Jian Luo, University of California, San Diego; Yiquan Wu, Alfred University; Mitra Taheri, Johns Hopkins University; Amy Clarke, Colorado School of Mines

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Session Chairs: Prashant Singh, Ames Laboratory of US DOE; Mitra Taheri, Johns Hopkins University

2:00 PM Invited

Theory-guided Design of Refractory Alloys for Ultra-high-temperature Applications: *Prashant Singh*¹; Gaoyuan Ouyang¹; Matthew J Kramer¹; Jun Cui¹; Duane D Johnson¹; ¹Ames Laboratory

2:20 PM

Towards to an ICME Approach for the Discovery of the Lightweight High Entropy Alloys: *Shengyen Li*¹; Jianliang Lin¹; John Macha¹; Mirella Vargas¹; Michael Miller¹; ¹Southwest Research Institute

2:40 PM

High-throughput Approach for Stacking Fault Energies in HEAs: *Jize Zhang*¹; Yu Zhong¹; ¹Worcester Polytechnic Institute

3:00 PM

Atomic Mobility Assessment of the fcc Ternary Co-Cr-Mn Alloy: *Sri Pragna Pendem*¹; Nobufumi Ueshima¹; Katsunari Oikawa¹; ¹Tohoku University

MATERIALS-ENVIRONMENT INTERACTIONS

High Temperature Oxidation of Metals and Ceramics — Oxidation of Ceramics and HEA/Refractory Alloys

Sponsored by: TMS Corrosion and Environmental Effects Committee

Program Organizers: Kenneth Kane, Oak Ridge National Laboratory; Elizabeth Sooby, University of Texas at San Antonio; Patrick Brennan, General Electric Research; Lavina Backman, U.S. Naval Research Laboratory; Kinga Unocic, Oak Ridge National Laboratory; Richard Oleksak, National Energy Technology Laboratory; David Shifter, Office of Naval Research; Raul Rebak, GE Global Research

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Session Chair: Lavina Backman, Naval Research Laboratory

2:00 PM Invited

Alumina Forming MAX Phases: Current Status and Future Perspectives: *Miladin Radovic*¹; Yexiao Chen²; Dongqi Ha¹; James Smialek³; ¹Texas A&M University; ²ASM; ³NASA Glenn

2:30 PM

Design of Ultra-high Temperature Ceramics for Oxidation Resistance: *Niquana Smith*¹; Elizabeth Opila¹; ¹University of Virginia

2:50 PM

High Temperature Oxidation Behavior of Ta vs TaC: *Connor Stephens*¹; Elizabeth Opila¹; ¹University of Virginia

3:10 PM

Evaluating the Oxidation Behavior of 1300C Capable Nb-Si-based Alloys: *Patrick Brennan*¹; Rebecca Casey¹; Chen Shen¹; Scott Oppenheimer¹; Bernard Bewlay¹; Akane Suzuki¹; ¹General Electric Research

3:30 PM Break

3:50 PM

High Temperature Oxidation Behavior of Equimolar NbTiZr: *Charlotte Brandenburg*¹; David Beaudry²; Michael Waters³; Lauren Walters³; Elaf Anber²; Jean-Philippe Couzinie⁴; Loic Perriere⁴; Mitra Taheri²; James Rondinelli³; Elizabeth Opila¹; ¹University of Virginia; ²Johns Hopkins University; ³Northwestern University; ⁴Institut de Chimie et des Matériaux Paris-Est

4:10 PM

Microstructure, High Temperature Oxidation and Mechanical Properties of Fe-Cr-Ni-Al Medium Entropy Alloy: *Yu-Jin Hwang*¹; Kyu-Sik Kim²; Young-Sang Na³; Ka-Ram Lim³; Kee-Ahn Lee¹; ¹Inha University; ²Agency for Defense Development; ³Korea Institute of Materials Science

4:30 PM

Thermochemical Stability of High Entropy Rare Earth Oxide (HERO) Coatings for Refractory Alloys: *Kristyn Ardrey*¹; Elizabeth Opila¹; Patrick Hopkins¹; Bicheng Zhou¹; Prasanna Balachandran¹; ¹University of Virginia

4:50 PM

High-temperature Oxidation-resistant Mechanism of Refractory High Entropy Alloy: *Kun Wang*¹; Yonggang Yan¹; ¹Alfred University

5:10 PM

A Computational Investigation of the Early Stages of Degradation of High Entropy Alloy Surfaces: *Adib Samin*¹; Tyler Dolezal¹; ¹Air Force Institute of Technology

FUNDAMENTALS AND CHARACTERIZATION

Inference-based Approaches for Material Discovery and Property Optimisation — Structure-Property Inference from Simulations

Sponsored by: TMS Advanced Characterization, Testing, and Simulation Committee, TMS Chemistry and Physics of Materials Committee

Program Organizers: Felix Hofmann, University of Oxford; Michael Short, Massachusetts Institute of Technology; Cody Dennett, Commonwealth Fusion Systems; Mohamed Abdallah Reza, University Of Oxford; Daniel Mason, UK Atomic Energy Authority

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Session Chair: Michael Short, MIT

2:00 PM Invited

Probing the Local Charge Density and Phonon Dynamics by Electron Microscopy: *Xiaoqing Pan*¹; ¹University of California Irvine

2:40 PM

A General Solid Solution Strengthening Model in Multicomponent Alloys: *Taiwu Yu*¹; Thomas Barkar²; Paul Mason¹; ¹Thermo-Calc Software Inc; ²Thermo-Calc Software AB

3:00 PM

Alloy-agnostic Criteria for Solidification Cracking Susceptibility Evaluation: *Rafael Giorjao*¹; Eric Brizes¹; Antonio Ramirez¹; ¹Ohio State University

3:20 PM

High Throughput CALPHAD-based Thermodynamic and Kinetic Evaluation of Stainless-steel Solidification: *Nathan Daubenmier*¹; Benjamin Sutton²; Antonio Ramirez¹; ¹The Ohio State University; ²ThermoCalc

3:40 PM Break

4:00 PM Panel Discussion

MODELING

Integration between Modeling and Experiments for Crystalline Metals: From Atomistic to Macroscopic Scales IV — Session VI

Sponsored by: TMS Advanced Characterization, Testing, and Simulation Committee, TMS Materials Characterization Committee, TMS: Nanomaterials Committee

Program Organizers: Mariyappan Arul Kumar, Los Alamos National Laboratory; Irene Beyerlein, University of California, Santa Barbara; Levente Balogh, Queen's University; Caizhi Zhou, University of South Carolina; Lei Cao, University of Nevada; Josh Kacher, Georgia Institute of Technology

Wednesday PM | October 12, 2022
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Session Chairs: Marc De Graef, Carnegie Mellon University; Andrea Hodge, University of Southern California

2:00 PM Invited

Combinatorial Synthesis and High-throughput Characterization for Alloy Systems: *Andrea Hodge*¹; ¹University of Southern California

2:30 PM

Third Generation Thermodynamic Modelling of the Ga-Mn-Ni System: *Liangyan Hao*¹; *Wei Xiong*¹; ¹University of Pittsburgh

2:50 PM

Molecular Dynamics Analysis and Optimization of Ultra High Temperature Ceramic (UHTC) Compositions for Propulsion: *Robert Slapikas*¹; *Anindya Ghoshal*²; *Luis Bravo*²; *Muthuvel Murugan*²; *Ryan McGowan*²; *Patrick Albert*¹; *Justin Reiss*¹; *Petr Kolonin*³; *Susan Sinnott*¹; *Douglas Wolfe*¹; ¹Penn State; ²U.S. Army Research Laboratory; ³Applied Research Laboratory, The Pennsylvania State University

3:10 PM Invited

Examination of Computed Aluminum Grain Boundary Structures and Interface Energies that Span the 5D Space of Crystallographic Character: *Eric Homer*¹; *Gus Hart*¹; *Braxton Owens*¹; *Derek Hensley*¹; *Jay Spendlove*¹; *Lydia Serafin*¹; ¹Brigham Young University

3:40 PM Break

4:00 PM

Predictive Phase-field Modeling of Nucleation and Growth of $\beta 1$ Precipitates during Aging of Mg-Nd Alloys: *David Montiel*¹; *Stephen DeWitt*¹; *Qianying Shi*¹; *Zhihua Huang*¹; *Katsuyo Thornton*¹; *John Allison*¹; ¹University of Michigan

4:20 PM

Propagation of Uncertainty in Molecular Dynamic Simulations of Polycrystalline Nickel: *Meizhong Lyu*¹; *Anqi Qiu*¹; *Elizabeth Holm*¹; ¹Carnegie Mellon University

4:40 PM Invited

Defects and the Electron Beam Interaction Volume in Electron Back-scattered Diffraction: *Marc De Graef*¹; ¹Carnegie Mellon University

CERAMIC AND GLASS MATERIALS

Manufacturing and Processing of Advanced Ceramic Materials — Novel Processing of Oxide Ceramics II

Sponsored by:

Program Organizers: Bai Cui, University of Nebraska-Lincoln; James Hemrick, Oak Ridge National Laboratory; Mike Alexander, Allied Mineral Products; Eric Faierson, Quad City Manufacturing Laboratory/Western Illinois University; Keith DeCarlo, Blasch Precision Ceramics

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Session Chairs: Yan Chen, Oak Ridge National Lab; Chao Ma, Texas A&M

2:00 PM Invited

Neutron Scattering Visualizing Defects Generation and Structure Recovery in Ball-milled Spinel Oxide: *Yan Chen*¹; *Ke An*¹; ¹Oak Ridge National Laboratory

2:30 PM

Characterization of Early Stage Sintering in Hydroxyapatite via Thermal Conductivity Measurements: *Anne Leriche*¹; *Benoit Nait-Ali*²; *David Smith*²; ¹UPHF - LMCPA; ²IRCER

2:50 PM

Investigation of Electrical Properties of BaTiO₃-PEEK cComposite Processed by Cold Sintering: *Toshiki Okazaki*¹; *Clive Randall*²; ¹KYOCERA Corporation; ²The Pennsylvania State University

3:10 PM

Thermal and Mechanical Properties of Freeze-tape Cast Derived Ceramic-metal Composites: *Amanda Marotta*¹; *Stephen Sofie*¹; ¹Montana State University

3:30 PM Break

3:50 PM Invited

Ultrafast High Temperature Sintering of Ceramic Materials for High Temperature Applications: *Hua Xie*¹; *Ji-Cheng Zhao*¹; *David Clarke*²; *Jian Luo*³; *Liangbing Hu*¹; ¹University of Maryland, College Park; ²Harvard University; ³University of California San Diego

4:20 PM

A Polyvinyl Pyrrolidone Based Binder for PZT Ceramics: *Eric Neuman*¹; *Emma MacLaughlin*¹; *Catherine Colletti*¹; *Jada Beltran*¹; ¹Sandia National Laboratories

4:40 PM

Preparation of BaTiO₃ Composites by Cold Sintering Process: *Takashi Nunokawa*¹; *Clive Randall*¹; ¹The Pennsylvania State University

5:00 PM

Passive pH Control Using Ceramic Particles: *Alicia Mayville*¹; *William Carty*¹; ¹New York State College of Ceramics at Alfred University

CERAMIC AND GLASS MATERIALS

Manufacturing and Processing of Advanced Ceramic Materials — Processing of Carbides, Borides, and Nitrides

Sponsored by:

Program Organizers: Bai Cui, University of Nebraska-Lincoln; James Hemrick, Oak Ridge National Laboratory; Mike Alexander, Allied Mineral Products; Eric Faierson, Quad City Manufacturing Laboratory/Western Illinois University; Keith DeCarlo, Blasch Precision Ceramics

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Session Chairs: Surojit Gupta, University of North Dakota; Dongsheng Li, Advanced Manufacturing LLC

2:00 PM Invited

Current Progress in Synthesis and Design of Ternary Phases: *Surojit Gupta*¹; ¹University of North Dakota

2:30 PM

Ultra-fast Densification of UHTC ZrB₂: *Santanu Mondal*¹; Juan Shiraishi²; Sreenivasulu Gollapudi¹; Carolina Galdeano¹; Jie-Fang Li¹; Dwight Viehland¹; ¹Virginia Polytechnic Institute

2:50 PM

Investigation of Lamination Approaches for SiC-filled Thermoplastic Polymer Blends: *Olivia Brandt*¹; Rodrigo Orta¹; Rodney Trice¹; Jeffrey Youngblood¹; ¹Purdue University

3:10 PM

The Optimization of Field Assisted Sintering Technology and Processing for Ultrahigh Temperature Ceramics for Extreme Environments: *Patrick Albert*¹; Erik Furton; Petr Kolonin²; Robert Slapikas¹; Allison Beese¹; Douglas Wolfe¹; ¹The Pennsylvania State University; ²The Applied Research Laboratory at Penn State

3:30 PM Break

3:50 PM

Development of Textured UHTC Borides Using Extremely Low Magnetic Fields: *Juan Diego Shiraishi*²; Ben Dillinger¹; Carolina Tallon¹; ¹Virginia Tech

4:10 PM

Densification and Phase Analysis of Zirconium Carbide Ceramics with Different Carbon Contents: *Yue Zhou*¹; Jeremy Watts¹; William Fahrenholtz¹; Greg Hilmas¹; ¹Missouri University of Science and Technology

ARTIFICIAL INTELLIGENCE

Materials Informatics for Images and Multi-dimensional Datasets — Session II

Sponsored by: ACerS Basic Science Division, ACerS Electronics Division

Program Organizers: Amanda Krause, Carnegie Mellon University; Alp Sehirlioglu, Case Western Reserve University; Daniel Ruscitto, GE Research

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Session Chair: Amanda Krause, Carnegie Mellon University

2:00 PM

Materials Data Science for Reliability: Data Handling: *Laura Bruckman*¹; ¹Case Western Reserve University

2:40 PM

Neighborhood Maps for Discovery of Novel Materials in Reduced Dimensions Using Machine Learning: *Suchismita Goswami*¹; V. Stanev²; H. Liang²; I. Takeuchi²; ¹MEST; ²UMD

3:00 PM

Machine Learning Enabled Reproducible Data Analysis for Electron Microscopy: Xiaoting Zhong¹; Nestor Zaluzec²; Yu Lin³; Jiadong Gong³; ¹Lawrence Livermore National Laboratory; ²Argonne National Laboratory; ³QuesTek Innovations

3:20 PM Break

3:40 PM

Computer Vision Applications in Materials Science and Engineering: *Aroba Saleem*¹; Idris Jeelani¹; ¹University of Florida

4:00 PM

Combining Limited Image and Tabular Data to Understand Failure Modes in Metals: *Jonathan Owens*¹; Andrew Detor¹; Jason Parolini²; Daniel Ruscitto¹; ¹GE Global Research; ²GE Gas Power

CERAMIC AND GLASS MATERIALS

Mesoscale Phenomena in Functional Polycrystals and Their Nanostructures — Dielectric and Magnetic Phenomena

Sponsored by: ACerS Electronics Division

Program Organizers: Serge Nakhmanson, University of Connecticut; Edward Gorzkowski, Naval Research Laboratory; James Wollmershauser, U.S. Naval Research Laboratory; Seungbum Hong, KAIST; Javier Garay, UCSD; Pierre-Eymeric Janolin, CentraleSupélec

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Session Chairs: Seungbum Hong, KAIST; John Mangeri, LIST; James Wollmershauser, NRL

2:00 PM Invited

Strain-induced Novel Quantum and Ionic Phenomena in Oxide Heterostructures: *Honyung Lee*¹; ¹Oak Ridge National Laboratory

2:30 PM Invited

Optimization of Metal/Ferroelectric/Insulator/Semiconductor Capacitor Toward Reliable Gate Stacks of Field-effect-transistors: *Min Hyuk Park*¹; *Younghwan Lee*¹; ¹Seoul National University

3:00 PM

Modeling the Relaxor Dielectric Dispersion of Ba(1-x)Sr(x)TiO₃ with a Local Phase Field Method: *Ashok Gurung*¹; *John Mangeri*²; *S. Pamir Alpay*¹; *Serge Nakhmanson*¹; ¹University of Connecticut; ²Luxembourg Institute of Science and Technology

3:20 PM Invited

Coupled Multiferroic Phase Field Models for BiFeO₃: Domain Topologies and Order Parameter Dynamics: *John Mangeri*¹; ¹Luxembourg Institute of Science and Technology

3:50 PM Break

4:10 PM

Mesoscale Magnetic Imaging of Functional Materials: *Ilya Sochnikov*¹; *Bochao Xu*¹; *Joshua Bedard*¹; *Jacob Franklin*¹; ¹University of Connecticut

4:30 PM Invited

Field-assisted Sintering of FeCo/MnZn Ferrite Core-Shell Structured Particles: *Bowen Dong*¹; *Haobo Wang*¹; *Matthew Willard*¹; *Gabriel Santillan*²; *Andrew Sherman*²; ¹Case Western Reserve University; ²Powdermet

4:50 PM Invited

Supercrystals as Hybrid Nanostructured Materials with Tailored Mechanical and Magnetic Properties: *Diletta Giuntini*¹; ¹Hamburg University of Technology

CERAMIC AND GLASS MATERIALS

Phase Transformations in Ceramics: Science and Applications — Session II

Program Organizers: Pankaj Sarin, Oklahoma State University; Scott McCormack, University of California, Davis; Waltraud Kriven, University of Illinois at Urbana-Champaign; Theresa Davey, Tohoku University; Sanjay V. Khare, University of Toledo

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Session Chairs: Waltraud Kriven, University of Illinois at Urbana-Champaign; Pankaj Sarin, Oklahoma State University

2:00 PM

Microstructural Evolution of Single Crystal CoTi₂O₅: A Study Combining Experiment and Simulation: *Junyan Zhang*¹; *Connor McNamara*¹; *Animesh Kundu*¹; *Helen Chan*¹; *Jeffrey Rickman*¹; ¹Lehigh University

2:30 PM

Single Crystal Growth and Characterization of Magnetic Ceramics Using the Laser Heated Pedestal Growth Process: *Edward Hoffman*¹; *Dolendra Karki*¹; *Travis Olds*²; *Paul Ohodnicki*¹; ¹University of Pittsburgh; ²Carnegie Museum of Natural History

2:50 PM

Study Toward Size Dependent Solid State Phase Transition between -WO₃ and e-WO₃ via In Situ Cryogenic Raman Spectroscopy: *Owen Abe*¹; *Zanlin Qiu*¹; *Zexu Chen*¹; *Joerg Jinschek*²; *Pelagia-Irene Gouma*¹; ¹Ohio State University; ²Denmark Technical University

3:10 PM

Far-From-Equilibrium Processing of Materials with Swift Heavy Ions and Mechanical Milling: *Eric O'Quinn*¹; *Alexandre Solomon*¹; *Casey Corbridge*¹; *Antonio Fuentes*²; *Maik Lang*¹; ¹University of Tennessee; ²Cinvestav Unidad Saltillo

MATERIALS-ENVIRONMENT INTERACTIONS

Progressive Solutions to Improve Corrosion Resistance of Nuclear Waste Storage Materials — Thermal History Effects on Borosilicate Glasses and Glass Ceramics and Canisters Stress Corrosion Cracking Mitigation

Sponsored by: TMS Corrosion and Environmental Effects Committee, TMS: Nuclear Materials Committee

Program Organizers: Madeleine Jordache, Stevens Institute of Technology; Gary Pickrell, Virginia Tech; Bai Cui, University of Nebraska-Lincoln

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Session Chairs: Madeleine Jordache, Stevens Institute of Technology; Bai Cui, University of Nebraska - Lincoln; Gary Pickrell, Virginia Tech

2:00 PM Introductory Comments

2:05 PM Invited

SCC of Nuclear Waste Canisters: Mechanisms and Mitigation: *Janelle Wharry*¹; Haozheng Qu¹; Timothy Montoya²; Jason Taylor²; Kyle Johnson³; Rebecca Schaller²; Eric Schindelholz⁴; ¹Purdue University; ²Sandia National Laboratories; ³VRC Metal Systems; ⁴The Ohio State University

2:25 PM Invited

From Preferential Bonding to Phase Separation in Boro-silicate Glasses: *Doris Möncke*¹; ¹Alfred University

2:55 PM Invited

Microstructural Development and Chemical Durability of a Borosilicate Glass-ceramic Waste-form: *Richard Brow*¹; Nicholas Roberts¹; Paul Porter¹; Jarrod Crum²; ¹Missouri University of Science and Technology; ²Pacific Northwest National Lab

IRON AND STEEL (FERROUS ALLOYS)

Steels for Sustainable Development — Renewables & Power Generation

Sponsored by: TMS Steels Committee

Program Organizers: Ian Zuazo, ArcelorMittal Global R&D - Industeel; Matthias Militzer, University of British Columbia; Jonah Klemm-Toole, Colorado School of Mines; Kester Clarke, Colorado School of Mines

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Session Chairs: Ian Zuazo, ArcelorMittal Global R&D - Industeel; Kester Clarke, Colorado School of Mines

2:00 PM Invited

Steel Developments for the Global Energy Transition: Andrew Gingell¹; Sylvain Pillot¹; ¹Industeel

2:30 PM Invited

The Essence of Mo and Ni Alloying in Steels for Renewable Power Generation: *Hardy Mohrbacher*¹; ¹NiobelCon bvba

3:00 PM

Exploring the Impact of N Solubility and Trace Elements on the Creep Properties of P92 Steel: *Stoichko Antonov*¹; Martin Detrois¹; Paul Jablonski¹; ¹National Energy Technology Laboratory

3:20 PM

Cyclic Deformation and Strain Localization of Ferrite-pearlite Low Alloy Steel under Low-cycle Fatigue: *Shutong Zhang*¹; Rafael Arthur Giorjao¹; Jacque Berkson¹; Antonio J. Ramirez¹; ¹Ohio State University

3:40 PM Break

4:00 PM

Through Thickness Microstructural Features for Optimum Ductility Performance in High Pressure Gaseous Hydrogen Pipelines: Douglas Stalheim¹; Andrew Slifka²; *Aaron Litschewski*³; ¹DGS Metallurgical Solutions, Inc.; ²NIST; ³CBMM North America

4:20 PM

Effects of Austenitizing Temperature on the Mechanical Properties of Nano-structured Bainitic Steel: *Bhawesh Chhajed*¹; Kushal Mishra¹; Kritika Singh²; Aparna Singh¹; ¹Indian Institute of Technology Mumbai; ²Helmholtz Zentrum

FUNDAMENTALS AND CHARACTERIZATION

Synthesis, Characterization, Modeling and Applications of Functional Porous Materials — Porous Materials IV

Sponsored by: ACeRS Basic Science Division

Program Organizers: Lan Li, Boise State University; Winnie Wong-Ng, National Institute of Standards and Technology; Kevin Huang, University of South Carolina

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Session Chair: Lan Li, Boise State University

2:00 PM Invited

Hybrid Pore Formation in Microporous Cu Spheres: Mark Atwater¹; Braden Jones¹; ¹Liberty University

2:20 PM

Development and Application of a Multi-scale Simulation Toolkit to Model Fibrous Materials Properties: *Adnan Taqi*¹; Matthew Beck¹; ¹University of Kentucky

2:40 PM

Investigating the Effect of the Aspect Ratio on the Elasticity of a Porous Material: *Naji Mashrafi*¹; Matthew Beck¹; ¹University of Kentucky

3:00 PM

Scalable Metamaterial Synthesis via Colloidal Assembly: *Bradley Straka*¹; Haydn Wadley¹; ¹The University of Virginia

NUCLEAR ENERGY

Tackling Structural Materials Challenges for Advanced Nuclear Reactors — Mechanical Behaviors

Sponsored by: TMS Corrosion and Environmental Effects Committee, TMS Nuclear Materials Committee, TMS: Advanced Characterization, Testing, and Simulation Committee

Program Organizers: Miaomiao Jin, Pennsylvania State University; Xing Wang, Pennsylvania State University; Karim Ahmed, Texas A&M University; Jeremy Bischoff, Framatome; Adrien Couet, University of Wisconsin-Madison; Kevin Field, University of Michigan; Lingfeng He, North Carolina State University; Raul Rebak, GE Global Research

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Session Chair: Xing Wang, Pennsylvania State University

2:00 PM

Deformation Behaviour of Ion-irradiated FeCr – A Nanoindentation Study: *Kay Song*¹; Hongbing Yu²; Phani Karamched¹; Kenichiro Mizohata³; David Armstrong¹; Felix Hofmann¹; ¹University Of Oxford; ²Canadian Nuclear Laboratories; ³University of Helsinki

2:20 PM Invited

Mechanical Behavior of Additively Manufactured Steels with Monotonic and Graded Microstructures: *Thak Sang Byun*¹; Maxim Gussev¹; Timothy Lach¹; ¹Oak Ridge National Laboratory

2:50 PM Invited

Computer Modeling of Oxidation-induced Grain Boundary Embrittlement in Nickel: *Ziqi Xiao*¹; *Xian-Ming Bai*¹; ¹Virginia Polytechnic Institute and State University

3:20 PM Break

3:40 PM

Investigation of Fracture Behavior of Nuclear Graphite NBG-18 Using In-situ Mechanical Testing Coupled with Micro-CT: *Gongyuan Liu*¹; Yichun Tang¹; Jing Du¹; Aman Haque¹; ¹Penn State University

4:00 PM Invited

Multi-scale Modeling of the Mechanical Response of Structural Metals Subjected to Thermo-mechanical Loads and Irradiation: the Role of Microstructure: *Laurent Capolungo*¹; Arul Kumar¹; Andrea Rovinelli¹; Ricardo Lebensohn¹; ¹Los Alamos National Laboratory

4:30 PM Invited

Microplasticity of Irradiated Inhomogeneous Alloys: *Anter El-Azab*¹; *Yash Pachaury*¹; ¹Purdue University

Technical Meeting and Exhibition

MS&T22

MATERIALS SCIENCE & TECHNOLOGY

Featuring:


THE Advanced Materials
SHOW | USA


THE NANOTECHNOLOGY
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POSTER SESSION with Presenters

Sunday, October 9

Poster Installation	3:00 p.m. – 5:00 p.m.
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Monday, October 10

Poster Installation	12:00 – 2:00 p.m. <i>(if you cannot set-up your poster on Sunday)</i>
General Poster Viewing	2:00 – 5:00 p.m.
General Poster Session with Reception	5:00 – 6:00 p.m.

Tuesday, October 11

General Poster Viewing	8:00 a.m. – 5:00 p.m.
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Wednesday, October 12

General Poster Viewing	8:00 a.m. – 12:00 p.m.
General Poster Removal	12:00 – 2:00 p.m.

SUSTAINABILITY, ENERGY, AND THE ENVIRONMENT

14th Symposium on Green and Sustainable Technologies for Materials Manufacturing and Processing – Poster Session

Sponsored by: ACerS Engineering Ceramics Division

Program Organizers: Surojit Gupta, University of North Dakota; Mritunjay Singh, Ohio Aerospace Institute; Tatsuki Ohji, National Institute of Advanced Industrial Science and Technology; Hisayuki Suematsu, Nagaoka University of Technology; Enrico Bernardo, University of Padova; Rajiv Asthana, University of Wisconsin; Yiquan Wu, Alfred University; Zhengyi Fu, Wuhan University of Technology; Allen Applett, Oklahoma State University

Monday PM | October 10, 2022
Ballroom BC | David L. Lawrence Convention Center

L-1: A Review of Minerals for Design of Sustainable Materials: *Surojit Gupta*¹; ¹University of North Dakota

L-2: A Review on the Utilization of Fly Ash: *Arshdeep Kang*¹; ¹TIET

L-3: Characterization of a Natural Mixed Fibers Functional Groups by Infrared Spectroscopy: *Frederico Margem*¹; *João Dornelas*¹; ¹Uniredentor

L-5: Effect of Sodium Silicate/ Sodium Hydroxide Ratio on Compressive Strength and Microstructure of Kankara Metakolin Based Geopolymer: *Jacob Adejo*¹; *Usman Muazu*²; *Jamilu Usman*¹; ¹Ahmadu Bello University; ²Kaura Namoda Polytechnic

L-6: Evaluation of Dewaxing Behavior of Alumina Green Body by a Combined OCT/TG/FT-IR System and Thermomechanical Analysis: *Mariiko Minami*¹; *Junichi Tatami*¹; *Motoyuki Iijima*¹; ¹Yokohama National University

L-7: Fabrication of Blue-light Emitted and Transparent Lu- α -SIALON:Ce³⁺ Ceramics: *Kohei Aminaka*¹; *Junichi Tatami*¹; *Motoyuki Iijima*¹; *Takuma Takahashi*²; ¹Yokohama National University; ²Kanagawa Institute of Industrial Science and Technology

L-8: Fly Ash Bricks: An Ecofriendly Construction Material, Its Properties and Uses in Different Environmental Areas (A Review): *Manpreet Chahal*¹; *Onkar Sidhu*²; ¹Village Ghamoor ghat PO Rampura Gujran; ²Punjab University, Patiala

L-9: Green Synthesis of ZnO Nanoparticles Using Lemongrass Extract and Measurement of Their Antibacterial Activities: *Tjokorde Samadhi*¹; *Vita Wonoputri*¹; *David Widagdo*¹; *Selli Astuti*¹; ¹Faculty of Industrial Technology, Institut Teknologi Bandung

L-10: Purification of an Indigenous Barite Mineral for Sustainability of Operation in the Nigerian Oil and Gas Industries: *Alafara Baba*¹; *Abdul Alabi*²; *Fausat Akanji*³; ¹University of Ilorin; ²Kwara State University, Malete; ³SHEDA Science and Technology Complex

L-11: Solar Energy Sizing for an Irrigation System for Field Maintenance: *Frederico Margem*¹; *Daniel Gallo*¹; *Pablo da Silva*¹; *Jefferson Matheus Lopes*¹; ¹Uniredentor

L-12: Sustainable Waste Processing Through Modular Anaerobic Digestion: *Dylan Lew*¹; ¹Ecotone Renewables

STUDENT EVENTS

2022 Undergraduate Student Poster Contest – 2022 Undergraduate Student Poster Contest

Monday PM | October 10, 2022
Ballroom BC | David L. Lawrence Convention Center

3D Printed Ceramics for Sensing Applications: *Francisco Rodriguez*¹; *Adedapo Ajayi*¹; *Jing Zhang*¹; ¹Indiana University – Purdue University Indianapolis

A Novel High-energy X-ray Diffraction Microscopy (HEDM) Processing Algorithm for Reconstructing Large 3D Intragranular Orientation Gradients: *Meddelin Setiawan*¹; *Katherine Shanks*²; *Allison Beese*¹; *Darren Pagan*¹; ¹Pennsylvania State University; ²Cornell High Energy Synchrotron Source

Applications of Mask R-CNN Image Analysis for Satellite Detection in Additive Manufacturing: *Stephen Price*¹; ¹Worcester Polytechnic Institute

Applying Bioactive Glass for Long-term Drug Delivery
: *Marie Sykes*¹; *Casey Schwarz*¹; ¹Ursinus College

Automated Quantification of Microstructure & Damage in Large SiC-SiC CMC Computed Tomography Datasets via Machine Learning: *Tyriek Craigs*¹; *Ashley Hilmas*²; *Craig Przybyla*²; ¹SOCHE; ²AFRL/RXCC

Biodegradable Films for Food Packaging: *Elizabeth Stump*¹; ¹University of Utah

Biomimetic Structural Self-assembly: *Ryan Wager*¹; ¹WVU Medicine Dept. of Orthopedics

Capacitive Deionization for Rare Earth Element Separations and Recovery: *Clara Ehinger*¹; *Alondra Sanchez*¹; *Lauren Valentino*¹; ¹Applied Materials Division, Argonne National Lab

Characterization of LiNi_{1/3}Mn_{1/3}Co_{1/3}O₂ Solid Oxide Cathodes through In-operando X-ray Diffraction: *Matthew Frame*¹; ¹Carnegie Mellon University

Characterizing Wood Species using Electron Microscopy: *Elliot Frankel*¹; *Sara Gibson*¹; *Allison Weller*¹; *Vincent Du*¹; *Timothy Yang*¹; ¹Carnegie Mellon University

Comparative Study of Clustering Methods for Additive Manufacturing: *Mansi Gera*¹; ¹Worcester Polytechnic Institute

Computer Vision and Machine-learning Approaches to 2-D High Energy X-ray Diffraction Image Analysis for Phase Detection: *Zhuldyz Ualikhankyzy*¹; *WeiQi Yue*¹; *Pawan Tripathi*¹; *Nathaniel Tomczak*¹; *Gabriel Ponon*¹; *Laura Bruckman*¹; *Matthew Willard*¹; *Vipin Chaudhary*¹; *Roger French*¹; ¹Case Western Reserve University

Conversion of Additively Manufactured Polymer Matrix Composites to High Temperature Ceramic Composites: *Branen Bussey*¹; *Connor Wyckoff*²; *William Costakis*³; *Roneisha Haney*⁴; *Lisa Rueschoff*⁴; *Amber Powell*⁴; ¹SOCHE; ²UES, Inc.; ³National Research Council Research Associate Program; ⁴Materials and Manufacturing Directorate, Air Force Research Laboratory, WPAFB

Creation and Characterization of Solution-based Chalcogenide Thin Films Using As₂S₃ and As₂Se₃: *Annabella Orsini*¹; ¹Ursinus College

Designing and Manufacturing a Pill Coater for Consumer Use: *Nolan John Clark*¹; ¹McMaster University

Development of Mechanical Characterization Techniques for the Improvement of Aluminum-Cerium Alloy Processing: *Madeline Loveday*¹; ¹University of Tennessee, Knoxville

Development of Thermally Stable, Creep-resistant, Cast Al-Ce-Fe Alloys for High-temperature Applications: *Hyun Sang Park*¹; Clement Ekaputra²; David Dunand²; ¹Duke University; ²Northwestern University

Effect of Transition Metals in Borosilicate Glass Corrosion with Stirred Reactor Coupon Method: *Raine Antonio*¹; Sam Karcher¹; John Bussey¹; Brooke Downing¹; John McCloy¹; ¹Washington State University

Effects of Materials Processing on Electrical Properties of β -Ga₂O₃ Contacts: *Alice Ho*¹; Bethie Favela¹; Kun Zhang¹; Kalyan Das²; Lisa Porter¹; ¹Carnegie Mellon University; ²North Carolina State University

Engineering Sustainability in the World of Glass Art: *Ally Bruno*¹; ¹Alfred University

Enhanced Electrochemical Performance of NCM811 Cathodes with Functionalized PVDF Graft Copolymer Binders: *Rohan Parekh*¹; Tong Liu¹; Piotr Mocny¹; Jay Whitacre¹; Krzysztof Matyjaszewski¹; ¹Carnegie Mellon University

Fabrication of Three-dimensional Ceramic Architectures with Micro-scale Resolution and Near Zero Shrinkage Using Aerosol Jet Printing: *Chunshan Hu*¹; *Caitlyn Santiago*¹; ¹Carnegie Mellon University

Heat Treatment Effect on Microstructural Evolution of Quaternary High Entropy Alloy: *Nilufar Kholmuratova*¹; Malikabonu Sobirova¹; Zulfiya Usmonova¹; Khilola Umarova¹; Elyorjon Jumaev¹; ¹New Uzbekistan University

Impact of Itaconic Acid on the Stabilization Reaction of Poly(Acrylonitrile-co-Itaconic Acid) as Examined Using Solid-State NMR Under Air and Vacuum Conditions: *Jack Beardshear*¹; Jiayang Ma²; Toshikazu Miyoshi²; ¹Carnegie Mellon University; ²The University of Akron

Effects of Part Geometry and Toolpath Sequencing on Melt Pool Temperatures for cCosed-loop Process Control in Laser Powder Bed Fusion: *Ryan Zhou*¹; Conor Porter²; Dominik Kozjek²; Jian Cao²; ¹Georgia Institute of Technology; ²Northwestern University

Investigation of Glasses and Glass-Ceramics Formed in the Ga₂O₃-B₂O₃ Binary: *John Bussey*¹; Benjamin Dutton¹; Kevin Grogan¹; John McCloy¹; ¹Washington State University

Investigation of the Embrittlement Behavior in Alloy 725 with Different H Sources via 3D X-ray Computer Topography: *Jacob Jackson*¹; Mengying Liu¹; ¹Washington and Lee University

Little Known Nylon: Nylon 5,9 Synthesis and Characterization: *Abigail Stanlick*¹; Peter Meyer¹; Ting-Han Lee¹; Prerana Carter¹; Michael Forrester¹; Eric Cochran¹; ¹Iowa State University

Mesoscale Modeling of Domain Wall Behavior in Perovskite Ferroelectrics: *Charles Schwarz*¹; Ashok Gurung¹; John Mangeri²; Serge Nakhmanson¹; ¹University of Connecticut; ²Luxembourg Institute of Science and Technology

Micromagnetic Simulation of the Effect of DMI on Skyrmion Chirality Switching: *Larry Chen*¹; Michael Kitcher¹; Vincent Sokalski¹; ¹Carnegie Mellon University

Mixed Oxy-sulfide Nitride Glassy Solid Electrolyte Materials: Electrochemical Impedance Spectroscopy and Density of Na₄P₂S₇,_{6x}O_{4.62x}N_{0.92x}: *Nicholas Oldham*¹; Madison Olson¹; Steve Martin¹; ¹Iowa State University

Modeling the Density of States for an Incommensurate Trilayer Chain: *Seoyoung Joo*¹; Daniel Massatt²; ¹Carnegie Mellon University; ²Louisiana State University

Molecular Dynamics Simulations with Machine Learning Potential for Amorphous Li₇La₃Zr₂O₁₂: *Ziyao Luo*¹; ¹Carnegie Mellon University

Optical Properties of Halide Perovskite in Polymer Matrices: *Lindsay Jones*¹; Yifan Xu¹; Robert Hickey¹; ¹Pennsylvania State University

Powder Characterization Comparison for Cold Spray Application: *Julia Horrocks*¹; ¹Worcester Polytechnic Institute

Predicting Molecular Gaps with Minimal Data Using Active Learning: *Keltin Grimes*¹; ¹Carnegie Mellon University

Probing Signatures of Transition Metal Defects in Gallium Oxide: *Brooke Downing*¹; Benjamin Dutton¹; John McCloy¹; ¹Washington State University

Quantitative Analysis of the Precipitate Microstructure in the Additive Manufactured Ti-5Al-5Mo-5V-3Cr Alloy Using Scanning Electron Microscopy: *Sydney Fields*¹; Dian Li¹; Yufeng Zheng¹; ¹University of Nevada, Reno

Reactive Cold Sintering Process to Reduce the Thermal Conductivity of La_{0.15}Sr_{0.775}TiO_{3-d}: *Lukas Glist*¹; Stephanie Mudd²; Rebecca Boston²; ¹Carnegie Mellon University; ²University of Sheffield

Scrap Remelting in Chalcogenide Fabrication: *David Vasquez*¹; Casey Schwarz¹; ¹Ursinus College

Simulation-Trained Machine Learning for Segmenting Néel-Type Skyrmions: *Alec Bender*¹; Arthur McCray²; Amanda Petford-Long³; Charudatta Phatak³; ¹Carnegie Mellon University; ²Northwestern University; ³Argonne National Laboratory

Structural Phase Patterning of MoS₂: *Christopher Barns*¹; ¹West Chester University

Surface Difference between Overhang Areas and Solid Areas of 3D-printed Haynes 282 Alloy: *Yiyang Lai*¹; ¹Carnegie Mellon University

Synthesis of Pseudo Lunar Agglutinates from NU-LHT-1M/2M Derivative Simulant: *Megan Elliott*¹; Holly Shulman¹; ¹Alfred University

The Effect of Sewing Stitches on the Mechanical Behavior of Cotton Fabrics: *Harmony Werth*¹; Kazi Hossian¹; Rashed Khan¹; ¹University of Nevada Reno

The Synthesis and Formulation of Silver Nanoparticle Ink for Use in the Electrohydrodynamic Printing of Conductive Circuits in Zero-gravity: *Andrew Ruba*¹; Tyler Kirscht¹; Fei Liu¹; Matthew Marander¹; Adam Eichhorn¹; Liangkui Jiang¹; Yanhua Huang¹; Hantang Qin¹; Shan Jiang¹; ¹Iowa State University

The Usage of Cullet in Chalcogenide Precision Glass Molding: *David Vasquez*¹; ¹Ursinus College

Thermal Analysis and Processing of Properties of Oxide Glass Materials: *Brandon Smith*¹; ¹Ursinus College

Ytterbium-substituted Clathrate Thermoelectrics: Deflection of Phonons Through 'Rattling': *Adam Eichhorn*¹; Naohito Tsujii²; Takao Mori²; ¹Iowa State University; ²National Institute of Materials Science

BIOMATERIALS

3D Printing of Biomaterials and Devices — Poster Session

Sponsored by: ACerS Bioceramic Division

Program Organizers: Sahar Vahabzadeh, Northern Illinois University; Susmita Bose, Washington State University; Amit Bandyopadhyay, Washington State University; Mukesh Kumar, LincoTek Medical; Mangal Roy, Indian Institute of Technology - Kharagpur (IIT-Kgp)

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C-1: Surface Treatment of Titanium by Alkali treatment and Magnesium Deposition for Orthopedic Application

: Sahar Vahabzadeh¹; Dexter Kling¹; Paige Bothwell¹; ¹Northern Illinois University

ADDITIVE MANUFACTURING

Additive Manufacturing and Cellular/Lattice Structures: Designs, Realization and Applications — Poster Session

Sponsored by: TMS Additive Manufacturing Committee, TMS Materials Characterization Committee

Program Organizers: Li Yang, University of Louisville; Allison Beese, Pennsylvania State University; John Carpenter, Los Alamos National Laboratory; Carolyn Seepersad, University of Texas at Austin; Miguel Aguilo, Morphorm LLC

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A-1: Cytotoxicity of Strontium Calcium Polyphosphate on MC3T3-E1 Cells in 3D Printed Alginate/Collagen Scaffolds: Sally Lee¹; Serin Ahn¹; Chris Mathew¹; Abdulhadi Badran¹; Shebin Tharakan¹; Shams Khondkar¹; Michael Hadjiargyrou¹; Azhar Ilyas¹; ¹New York Institute of Technology

ADDITIVE MANUFACTURING

Additive Manufacturing Modeling, Simulation, and Machine Learning: Microstructure, Mechanics, and Process — Poster Session

Program Organizers: Jing Zhang, Indiana University – Purdue University Indianapolis; Brandon McWilliams, US Army Research Laboratory; Li Ma, Johns Hopkins University; Yeongil Jung, Changwon National University

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Session Chairs: Yeon-Gil Jung, Changwon National University; Li Ma, Johns Hopkins University Applied Physics Laboratory; Brandon McWilliams, CCDC Army Research Laboratory; Jing Zhang, Indiana University – Purdue University Indianapolis

A-2: A Data-driven Approach to Identify Structural Characteristics that Connect Macroscale Material Properties: Matthew Beck¹; Mir Al-Masud¹; Ryan Griffith¹; Naji Mashrafi¹; ¹University of Kentucky

A-3: Corrosion and Mechanical Properties of Additively Manufactured 316L Stainless Steel Coated with Epoxy: Xuehui Yang¹; Francisco Rodriguez¹; Hyun-Hee Choi²; Yeon-Gil Jung²; Alan Jones¹; Jing Zhang¹; ¹Indiana University – Purdue University Indianapolis; ²Changwon National University

A-4: Design and Mechanical Properties of 3D Printed Bioinspired Honeycomb Structures: Francisco Rodriguez¹; Jing Zhang¹; ¹Indiana University – Purdue University Indianapolis

A-5: Development a Customized Inkjet 3D Printer for Ceramic Component Fabrication: Haoyee Yeong¹; Zhen Hong Tan¹; Aizat Zazlan¹; Ben Louie Yap¹; Jing Zhang¹; ¹Indiana University – Purdue University Indianapolis

A-6: Fabrication and Characterizations of 3D Printed Lithium-Ion Battery Electrodes: Eli Kindomba¹; Jing Zhang¹; ¹Indiana University – Purdue University Indianapolis

A-7: Layerwise Thermal Process Simulation for Laser Powder Bed Fusion: Calibration and Validation with Infrared Camera: Shawn Hinnebusch¹; Alaa Olleak¹; Christopher Barrett²; Seth Strayer¹; Florian Dugast¹; Albert To¹; ¹University of Pittsburgh; ²Open Additive, LLC

A-8: Modeling of Fatigue Behavior of 3D Printed Polycrystal Metals: Sanket Kulkarni¹; Jing Zhang¹; ¹Indiana University – Purdue University Indianapolis

A-9: Reducing the Order of a Kinetic Monte Carlo Potts Solidification Model with Machine Learning: Gregory Wong¹; Anthony Rollett¹; Gregory Rohrer¹; ¹Carnegie Mellon University

A-10: Smoothed Particle Hydrodynamics Modeling of Charpy Impact Test of A36 Steel: Sugrim Sagar¹; Jing Zhang¹; ¹Indiana University – Purdue University Indianapolis

A-11: Thermal Barrier Coating with Additively Manufactured Nickel Base Superalloy Substrate: Tejesh Dube¹; Junseong Kim²; Yeon-Gil Jung²; Jing Zhang¹; ¹Indiana University – Purdue University Indianapolis; ²Changwon National University

A-12: Utilizing Virtual Reality to Help Educate Additive Manufacturing: Josh Hale¹; Shambhuraj Wadghule¹; Jing Zhang¹; ¹Indiana University – Purdue University Indianapolis

ADDITIVE MANUFACTURING

Additive Manufacturing of Ceramic-based Materials: Process Development, Materials, Process Optimization and Applications — Poster Session

Sponsored by: ACerS Basic Science Division, ACerS Engineering Ceramics Division, ACerS Manufacturing Division

Program Organizers: Lei Chen, University of Michigan-Dearborn; Xuan Song, University of Iowa; Xiangyang Dong, Missouri University of Science and Technology; Yiquan Wu, Alfred University; Paolo Colombo, University of Padova; Rajendra Bordia, Clemson University; Long-Qing Chen, Pennsylvania State University

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Session Chair: Lei Chen, University of Michigan-Dearborn

A-13: Evaluation of Reliability of Using Combined Rheological Methods for the Development of Ceramic Materials for 3D Printing: Francisco Lima¹; Heitor Bernardo¹; Valdecir Quarcioni²; Roberto Cesar Oliveira Romano¹; Rafael Pileggi¹; ¹University of Sao Paulo; ²Instituto de Pesquisas Tecnológicas

A-14: Nanomechanical Characterization of 3D Printed Ceramics: Bryan Regan¹; Shuhan Zhang¹; Nicole Ross²; Nicholas Voellm²; Ryan Fordham²; Shawn Allan²; Udo Schwarz¹; Amit Datye¹; ¹Yale University; ²Lithoz

A-15: Rheological Study of 3D Printable All-inorganic Thermoelectric Inks for Direct Writing of Micro-thermoelectric Generator: Han Gi Chae¹; ¹Ulsan National Institute of Science and Technology

ADDITIVE MANUFACTURING

Additive Manufacturing of Titanium-based Materials: Processing, Microstructure and Material Properties — Poster Session

Program Organizers: Ulf Ackelid, Freemelt AB; Ola Harrysson, North Carolina State University

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A-16: Characteristics of Ti-6Al-4V Component Fabricated by Laser Powder Bed Fusion Process: Youngil Son¹; Seok-Jae Lee²; ¹Advanced Propulsion Technology Center, Agency for Defense Development; ²Jeonbuk National University

A-17: Linking Processing Conditions to Defect Structures, Microstructure, and Mechanical Behavior in Ti-6Al-4V Fabricated by Laser Powder Bed Fusion: Qixiang Luo¹; Allison Beese¹; ¹Pennsylvania State University

ADDITIVE MANUFACTURING

Additive Manufacturing: Equipment, Instrumentation and In-Situ Process Monitoring — Poster Session

Sponsored by: TMS Additive Manufacturing Committee

Program Organizers: Ulf Ackelid, Freemelt AB; Joy Gockel, Colorado School of Mines; Sneha Prabha Narra, Carnegie Mellon University; Ola Harrysson, North Carolina State University

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A-18: Development of an IEP Apparatus for 3D Printing of Thermoelectric Material: Weixiao Gao¹; Fei Ren¹; ¹Temple University

A-19: In-process Microstructure Sensing of Gr91 Powder Bed Fusion Parts Using Ultrasonics: Nathan Kizer¹; Christopher Kube¹; Edward Reutzel¹; Corey Dickman¹; ¹Penn State University

A-20: Real-time Process Monitoring for Multivariate Statistical Process Control in Powder Bed Fusion Metal Additive Manufacturing: Venkatavaradan Sunderarajan¹; Suman Das¹; ¹Georgia Institute of Technology

A-21: Quantification of Melt Pool Variability for L-PBF Additive Manufacturing by High-Speed Imaging: David Guirguis¹; Conrad Tucker¹; Jack Beuth¹; ¹Carnegie Mellon University

MATERIALS-ENVIRONMENT INTERACTIONS

Advanced Materials for Harsh Environments — Poster Session

Sponsored by: ACerS Electronics Division

Program Organizers: Navin Manjorran, Chairman, Solve; Gary Pickrell, Virginia Tech

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Session Chairs: Gary Pickrell, Virginia Tech; Navin Manjorran, Chairman, Solve

G-1: Modeling of High-efficiency Heat Exchanger Pipe with Twisted Tape Inserts: Kshitija Salvi¹; Jing Zhang¹; ¹Indiana University – Purdue University Indianapolis

IRON AND STEEL (FERROUS ALLOYS)

Advancements in Steel Structural Refinement — Poster Session

Sponsored by: AIST Metallurgy — Processing, Products & Applications Technology Committee

Program Organizers: Emmanuel De Moor, Colorado School of Mines; Jose Rodriguez-Ibabe, CEIT and TECNUN; Charles Enloe, CBMM North America

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F-2: Study on Strength and Toughness Matching of 1000 MPa Ultra-high Strength Steel: *Xuewei Zhang*¹; ¹State Key Laboratory for Advanced Metals and Materials, University of Science and Technology Beijing

CERAMIC AND GLASS MATERIALS

Advances in Dielectric Materials and Electronic Devices — Poster Session

Sponsored by: ACerS Electronics Division

Program Organizers: Amar Bhalla, University of Texas; Ruyan Guo, University of Texas at San Antonio; Rick Ubic, Boise State University; Matjaž Spreitzer, Jožef Stefan Institute

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D-1: Electrical Characterization of Vanadium and Yttrium Co-Doped BaTiO₃: *Andrew Aumen*¹; Elizabeth Dickey¹; ¹Carnegie Mellon University

D-2: Fabrication of a Pressure Sensor Using Inkjet Printed Metal-organic Frameworks and Interdigitated Electrodes: *Melinda Duong*¹; Sean Garnsey¹; Paul Flynn¹; Amar Bhalla¹; Ruyan Guo¹; ¹University of Texas at San Antonio

D-3: Nanoscale Dipole Engineering of Barium Titanate Using Dysprosium-Tantalum and Holmium-Tantalum Dipoles: *Victoria Pellegrino*¹; Steven Tidrow¹; ¹Alfred University

D-4: Neural Network Design for Video Based Automation of Drop-on-Demand Inkjet Drop Formation Optimization: *Maximilian Estrada*¹; Ruyan Guo¹; Amar Bhalla¹; Sean Garnsey¹; Paul Flynn¹; Wasim Dipon¹; Matthew Trippy¹; Melinda Duong¹; Carlos Acosta¹; Bryan Gamboa¹; ¹Max Estrada

D-5: Structural and Dielectric Properties Relationship in Strontium-Tantalum Based Oxide Ceramics for DRA applications: *Matthew Julian*¹; Mouad Barzani¹; Mohamad Haydoura¹; Ratiba Benzerga¹; Laurent Le Gendre¹; Ala Sharaiha¹; Francois Chevre²; Claire Le Paven¹; ¹Université de Rennes, CNRS, IETR-UMR 6164, F-35000 Rennes, France; ²Université de Rennes, CNRS, ISCR-UMR 6226, F-35000 Rennes, France

D-6: Synthesis of BT-BNT and BT-BNTN Relaxors by 2D Nanosheets Wrapping Methods: *Taeyeong Song*¹; Hanwool Kim¹; Do-Kyun Kwon¹; ¹Korea Aerospace University

NANOMATERIALS

Advances in Emerging Electronic Nanomaterials: Synthesis, Enhanced Properties, Integration, and Applications — Poster Session

Sponsored by: TMS: Nanomaterials Committee

Program Organizers: Chang-Yong Nam, Brookhaven National Laboratory; Jung-Kun Lee, University of Pittsburgh; Stephen McDonnell, University of Virginia

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Session Chairs: Chang-Yong Nam, Brookhaven National Laboratory; Jung-Kun Lee, University of Pittsburgh; Stephen McDonnell, University of Virginia

H-1: A Molecular Dynamics Study of Additive Nanomanufacturing: Revealing Sintering Mechanisms: *Dourna Jamshideasl*¹; Shuai Shao¹; Masoud Mahjouri-Samani¹; Nima Shamsaei¹; ¹Auburn University

H-2: Optical Engineering of Pbs Colloidal Quantum Dot Solar Cells Via Fabry-Perot Resonance and Distributed Bragg Reflectors: *Sumin Bae*¹; ¹University of Pittsburgh

H-4: Study on Nanostructured Molybdenum Carbide for Hydrogen Evolution Reaction: *Anqi Wang*¹; ¹University of Pittsburgh

H-5: Toward Scalable Fabrication of Stable Metal Halide Perovskite Solar Cells Through Inkjet Printing and Antisolvent Bathing: *Marc Migliozi*¹; ¹University of Pittsburgh

IRON AND STEEL (FERROUS ALLOYS)

Advances in Ferrous Metallurgy — Poster Session

Sponsored by: AIST Metallurgy — Processing, Products & Applications Technology Committee

Program Organizers: Siddhartha Biswas, Big River Steel; Daniel Baker, General Motors Corporation; Lijia Zhao, Northeastern University

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F-4: Simulation Study on the Influence of Magnesia-carbon Material Embedded in Electrode on the Current Distribution and Temperature Distribution: Zhaozhao Yan¹; Jiongming Zhang¹; Yanbin Yin¹; Huayang Liu¹; Xingxing Wu¹; Jiazheng Zhang¹; *Jiahao Cheng*²; ¹University of Science and Technology Beijing; ²Oak Ridge National Laboratory

F-5: Obtaining a Dual-phase Steel by Hot Rolling from a Chemically Modified Commercial Steel: *Victor Gaytan*¹; Nancy López²; José Ramos¹; Emmanuel Gutiérrez²; Constantin Hernández³; ¹Instituto Tecnológico de Morelia; ²Universidad Autónoma de San Luis Potosí; ³CONACYT

ARTIFICIAL INTELLIGENCE

AI for Big Data Problems in Advanced Imaging, Materials Modeling and Automated Synthesis — Poster Session

Sponsored by: TMS Advanced Characterization, Testing, and Simulation Committee

Program Organizers: Mathew Cherukara, Argonne National Laboratory; Subramanian Sankaranarayanan, University of Illinois-Chicago; Badri Narayanan, University of Louisville

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B-1: Autonomous Closed Loop Synthesis of Gold Nanorods via a Modular Chemical-Handling Robotic Platform: *Morgan Chen*¹; Ari Fiorino¹; Aarti Singh¹; Reeja Jayan¹; ¹Carnegie Mellon University

B-2: Logistics Box Recognition in Robotic Industrial De-palletizing Procedure with Systematic RGB-D Image Processing Supported by Multiple Deep Learning Method: *Jonghun Yoon*¹; Jooyeop Han¹; Thong Nguyen¹; Hyunggyu Kim¹; ¹Hanyang University

FUNDAMENTALS AND CHARACTERIZATION

Alloy Phase Transformations at Elevated Temperatures — Poster Session

Sponsored by: TMS High Temperature Alloys Committee, TMS Phase Transformations Committee

Program Organizers: Dinc Erdeniz, University of Cincinnati; Benjamin Adam, Oregon State University; Jonah Klemm-Toole, Colorado School of Mines; Eric Lass, University of Tennessee-Knoxville; Ashley Paz y Puente, University of Cincinnati; Sophie Primig, University of New South Wales; Chantal Sudbrack, National Energy Technology Laboratory

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E-1: Multiscale Modeling of Solidification Processes for Metal & Alloys: Mohamad Daeipour¹; *Mohammad Ishtiyag*¹; Ashok Gurung¹; Serge Nakhmanson¹; Harold Brody¹; ¹University of Connecticut

SPECIAL TOPICS

Art and Cultural Heritage: Discoveries during the Pandemic Year — Poster Session

Sponsored by: ACeRS Art, Archaeology, and Conservation Science Division

Program Organizers: Marie Jackson, University of Utah; Jamie Weaver, National Institute of Standards and Technology

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Session Chairs: Marie Jackson, University of Utah; Jamie Weaver, National Institute of Standards and Technology

M-1: Standard Artifacts: Reference Materials for Glass Cultural Heritage Research: *Jamie Weaver*¹; ¹National Institute of Standards and Technology

CERAMIC AND GLASS MATERIALS

Ceramics and Glasses Modeling by Simulations and Machine Learning — Poster Session

Sponsored by: ACeRS Glass & Optical Materials Division

Program Organizers: Mathieu Bauchy, University of California, Los Angeles; Peter Kroll, University of Texas at Arlington; N. M. Anoop Krishnan, Indian Institute of Technology Delhi

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Session Chair: Mathieu Bauchy, UCLA

D-7: Development of Structural Descriptors to Predict Dissolution Rate of Volcanic Glasses: Molecular Dynamic Simulations: *Kai Gong*¹; Elsa Olivetti¹; ¹Massachusetts Institute of Technology

D-8: Molecular Dynamic Simulations of Polymer Derived Ceramics: *Harrison Chaney*¹; Kathy Lu¹; ¹Virginia Tech

NUCLEAR ENERGY

Ceramics for a New Generation of Nuclear Energy Systems and Applications — Poster Session

Sponsored by: TMS Nuclear Materials Committee, ACerS Energy Materials and Systems (EMSD) Division

Program Organizers: Ming Tang, Clemson University; Enrique Martinez Saez, Clemson University; Yongfeng Zhang, University of Wisconsin; Krista Carlson, University of Nevada, Reno; Yutai Katoh, Oak Ridge National Laboratory; Jean Paul Crocombette, CEA Saclay; Erofilis Kardoulaki, Los Alamos National Laboratory; Levi Gardner, Argonne National Laboratory; Jian Zhang, Xiamen University; Charmayne Lonergan, Pacific Northwest National Laboratory

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Session Chair: Ming Tang, Clemson University

J-1: Development and Characterization of Ga/Ta Doped $\text{Li}_7\text{La}_3\text{Zr}_2\text{O}_{12}$ for Direct LiT Electrolysis: *Rahul Rajeev*¹; Shraddha Jadhava¹; Brenda Garcia-Diaz²; Christopher Dandeneau²; Dale Hitchcock²; Kyle Brinkman¹; ¹Clemson University; ²Savannah River National Laboratory

J-2: Evaluation of In-Flow Mechanical Robustness of Metal-Functionalized Porous Silica Materials: *Muhammad Ali*¹; Karthikeyan Baskaran¹; Casey Elliott¹; Dave Cohrs¹; Brian Riley²; Krista Carlson¹; ¹University of Reno; ²Pacific Northwest National Laboratory

J-3: Preparation of High Entropy Zirconate and Titanite Pyrochlores and Further Radiation Damage Study: *Adam Gootgeld*¹; Roberto Menchaca¹; Ming Tang¹; ¹Clemson University

NANOMATERIALS

Controlled Synthesis, Processing, and Applications of Structural and Functional Nanomaterials — Poster Session

Sponsored by: ACerS Basic Science Division, ACerS Electronics Division, ACerS Engineering Ceramics Division

Program Organizers: Haitao Zhang, University of North Carolina at Charlotte; Gurpreet Singh, Kansas State University; Kathy Lu, Virginia Polytechnic Institute and State University; Edward Gorzkowski, Naval Research Laboratory; Jian Shi, Rensselaer Polytechnic University; Michael Naguib, Tulane University; Sanjay Mathur, University of Cologne

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H-6: Carbon Fiber-reinforced CMCs for Ultra-high Temperature Applications: *Shakir Bin Mujib*¹; Sonjoy Dey¹; Gurpreet Singh¹; ¹Kansas State University

H-7: Electrodeposition of MnO₂ Nanosheet Networks for Charge Storage: *Yuxuan Sun*¹; Nathaniel Skeele¹; Abraham Ebunu¹; Madeleine Flint¹; Kun Wang¹; Scott Mixture¹; ¹Alfred University

H-8: Fast Microwave-assisted Synthesis of Nanosctructured High Entropy Spinel: Andre Cardoso¹; Claudia Perdomo¹; Rodolfo Gunnewiek¹; Beatriz Foschiani¹; Julia Xaraba¹; ¹Federal University of Sao Carlos

H-9: Lithium Storage Capacity of Carbon-rich Polymer-derived Ceramic Electrodes: *Shakir Bin Mujib*¹; Sonjoy Dey¹; Gurpreet Singh¹; ¹Kansas State University

H-10: Synthesis of Nanoscale Layered Oxides for Charge Storage Applications: *Abraham Ebunu*¹; River Pao¹; Flint Madeleine¹; Kun Wang¹; Scott Mixture¹; ¹Alfred University

H-11: The Synaptic Devices Based on Ferroelectric Hf_{0.72}Zr_{0.302} Thin Film: *Hojin Lee*¹; Joonbong Lee¹; Taekjib Choi¹; ¹Sejong University

SUSTAINABILITY, ENERGY, AND THE ENVIRONMENT

Energy Materials for Sustainable Development — Poster Session

Sponsored by: ACerS Energy Materials and Systems Division

Program Organizers: Krista Carlson, University of Nevada, Reno; Armin Feldhoff, Leibniz University Hannover; Kyle Brinkman, Clemson University; Eva Hemmer, University of Ottawa; Nikola Kanas, BioSense Institute; Kjell Wiik, Norwegian University of Science and Technology; Lei Zuo, Virginia Tech; Joshua Tong, Clemson University; Danielle Benetti, Institut National de la Recherche Scientifique; Katherine Develos-Bagarinao, National Institute of Advanced Industrial Science and Technology; Soumi Chatterjee, Aditya Birla Science & Technology Company, Ltd

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L-14: Effects of Activation on Generated Biochar from Co-pyrolyzed Soursop Seeds (*Annona muricata*) and Mango Seeds (*Mangifera indica*) Biomass: Joshua Onaifo¹; Esther Ikhuoria¹; ¹University of Benin, Nigeria

L-15: Electrochemical Properties of a Titanium-Substituted KVPO_4F Cathode for K-Ion Batteries: *Xiaoran Yang*¹; Jae Chul Kim¹; ¹Stevens Institute of Technology

L-16: Nucleation and Growth of Cu_2O : Effect of pH, Potential and Substrate: Akhilender Singh¹; Garima Aggarwal¹; Sushobhita Chawla¹; Chandan Das¹; *Balasubramaniam Kavaipatti*¹; ¹Indian Institute of Technology

L-17: Proton Conducting Layered Perovskites of the Form $\text{Ba}_x\text{Er}_2\text{Al}_2\text{ZrO}_{13}$: *Joshua Willoughby*¹; Yuqing Meng¹; Kyle Brinkman¹; ¹Clemson University

L-13: Cu_2O Single Crystal Synthesis via Strain-Induced Abnormal Grain Growth: Garima Aggarwal¹; Akhilender Singh¹; *Balasubramaniam Kavaipatti*¹; ¹Indian Institute of Technology Bombay

L-18: Thin-Film Glassy Solid Electrolytes Enabling High Energy Density Li Solid State Batteries: *Steve Martin*¹; ¹Iowa State University

CERAMIC AND GLASS MATERIALS

Engineering Ceramics: Microstructure-Property-Performance Relations and Applications — Poster Session

Sponsored by: ACerS Engineering Ceramics Division

Program Organizers: Young-Wook Kim, University of Seoul; Hua-Tay Lin, Guangdong University of Technology; Junichi Tatami, Yokohama National University; Michael Halbig, NASA Glenn Research Center

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Session Chair: Young-Wook Kim, University of Seoul

D-9: Characteristics of YSZ-WC Composite Ceramics: Seongwon Kim¹; Hyeon-Tae Kim¹; ¹Korea Institute of Ceramic Engineering and Technology

D-10: Crystal Orientation Dependence of Mechanical Properties of β -Si₃N₄ Grains in High Thermal Conductive Silicon Nitride Ceramics Measured Using Microcantilever Beam Specimens: Mami Tanabe¹; Junichi Tatami¹; Motoyuki Iijima¹; Hiromi Nakano²; Tatsuki Ohji¹; Tukahō Yahagi³; Takuma Takahashi³; Daichi Minami³; ¹Yokohama National University; ²Toyohashi University of Technology; ³Kanagawa Institute of Industrial Science and Technology

D-11: High Energy X-ray Characterization and Modeling of Residual Strain Evolution in a Ceramic-metal Composite: John Ferguson¹; Armand Beaudoin²; Gregory Scofield¹; J. Y. Peter Kob²; Kelly Nygren²; Yujie Wang¹; Kenneth Sandhage¹; Michael Sangid¹; ¹Purdue University; ²Cornell High Energy Synchrotron Source

CERAMIC AND GLASS MATERIALS

Glasses and Optical Materials: Current Issues and Functional Applications — Poster Session

Sponsored by: ACerS Basic Science Division, ACerS Glass & Optical Materials Division

Program Organizers: Doris Möncke, Alfred University; Mathieu Hubert, Corning Incorporated

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D-13: Flow Dissolution of Lithium Disilicate Glass under Aqueous Conditions: Ben Dillinger¹; Carlos Suchicital¹; David Clark¹; ¹Virginia Polytechnic Institute and State University

D-15: Natural Glasses – Findings from an Undergraduate Project: Kenneth Berlin¹; Doris Möncke¹; Jessica Domino¹; Lucas Greiner¹; ¹Alfred University

D-16: Studying the Scratch-induced Damage of Graphene-coated Silica Glass by Molecular Dynamics Simulations: Sourav Sahoo¹; Utkarsh Tiwari¹; Romit Kaware¹; Sajid Mannan¹; Nitya Gosvami¹; N. M. Anoop Krishnan¹; ¹Indian Institute of Technology (IIT) Delhi

D-17: Sulfur Blue Glasses - S₃⁻ Anion Charge Transfer Transitions: Lucas Greiner¹; Jacob Kasprzyk¹; Doris Möncke¹; ¹Alfred University

D-18: Tungsten Borate – A Replacement for Lead in Glass: Elizabeth Tsekrekas¹; Alexis Clare¹; ¹Alfred University

D-19: Unusual High Oxidation States of Transition Metal Ions in Silicate Glasses of High Optical Basicity: Trivalent Co³⁺ and Ni³⁺: Lucas Greiner¹; Jacob Kasprzyk¹; Randall Youngman²; Alix Clare¹; Doris Möncke¹; ¹Alfred University; ²Corning Inc.

FUNDAMENTALS AND CHARACTERIZATION

Grain Boundaries, Interfaces, and Surfaces: Fundamental Structure-Property-Performance Relationships — Poster Session

Sponsored by: ACerS Basic Science Division

Program Organizers: Shen Dillon, University of California, Irvine; Wolfgang Rheinheimer, Julich Research Center; Catherine Bishop, University of Canterbury; Ming Tang, Rice University; John Blendell, Purdue University; Wayne Kaplan, Technion - Israel Institute of Technology; Melissa Santala, Oregon State University

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E-2: Effect of Interfacial Microstructure on Tensile Property and Fracture Behaviour of Bicrystal and Polycrystal Fe/Ni Interface: Sien Liu¹; Shoichi Nambu¹; ¹The University of Tokyo

E-3: Fundamentals of Recrystallization in Binary Nb-Alloys: Will Waliser¹; M. Carl¹; Kester Clarke¹; Amy Clarke¹; ¹Colorado School of Mines

E-4: Grain Boundary Energy Variation Related to the GBPD in Forsterite, Mg₂SiO₄, as a Function of Grain Size: Alexandra Austin¹; Marina Sedlak¹; Louise Rossett¹; Sanae Koizumi²; Katharina Marquardt¹; ¹Imperial College; ²University of Tokyo

E-5: Investigating the Relationship between Magnetic Barkhausen Noise, Microhardness, and Microstructural Development during Aging in HY-80 Steel: Michael Roberts¹; Jason Schibler¹; Charles D'Ambra¹; Michele Manuel¹; Thomas Krause²; Aroba Saleem¹; ¹University of Florida; ²Royal Military College of Canada

E-6: Mesoscale Modeling for Time Dependent Grain Boundary Evolution: Lucero Lopez¹; Meizhong Lyu¹; Anqi Qui¹; Elizabeth Holm¹; ¹Carnegie Mellon University

E-7: Molecular Dynamics Study of the Deformation Behavior of Metallic Substrates under Shear/Vibration: Milad Khajehvand¹; Henri Seppänen²; Panthea Sepehrband¹; ¹Santa Clara University; ²Kulicke & Soffa Industries, Inc.

E-8: Theoretical and Machine Learning Studies of Grain Boundary Segregation and Solute Drag Effects: Malek Alkayyal¹; ¹Clemson University

E-9: Viscoelastic Bandgap and Thermal Transport in Inorganic-organic Nanolaminates: Rajan Khadka¹; Pawel Koblinski¹; ¹Rensselaer Polytechnic Institute

FUNDAMENTALS AND CHARACTERIZATION

High Entropy Materials: Concentrated Solid Solutions, Intermetallics, Ceramics, Functional Materials and Beyond III — Poster Session

Sponsored by: TMS: Nanomaterials Committee

Program Organizers: Yu Zhong, Worcester Polytechnic Institute; Michael Gao, National Energy Technology Laboratory; Xingbo Liu, West Virginia University; Peter Liaw, University of Tennessee; Jian Luo, University of California, San Diego; Yiquan Wu, Alfred University; Mitra Taheri, Johns Hopkins University; Amy Clarke, Colorado School of Mines

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E-10: Characterization of Microstructure and Properties of Al₂FeCoNiCu High-entropy Alloy: Lucy Hunter¹; Matthew Kestenbaum¹; Juan Palominos¹; Ryan Thompson¹; Mohsen Kiviy¹; ¹California Polytechnic State University

E-11: Development of Oxide Melt Solution Calorimetry for High Entropy Ceramics: Stuart Ness¹; Scott McCormack¹; ¹University of California, Davis

E-12: Exploration of High-ductility Ternary Refractory High-entropy Alloys Using First-principle Calculations and Machine Learning: Hyo-Sun Jang¹; Jin-Woong Lee²; Kee-Sun Sohn²; Jiwon Park¹; Chang-Seok Oh¹; ¹Korea Institute of Materials Science (KIMS); ²Sejong University

E-13: High-throughput Design, Synthesis and Characterization of W-based Refractory High-entropy Alloys: Cafer Acem¹; William Trehern¹; Eli Norris¹; Brent Vela¹; Raymundo Arroyave¹; Ibrahim Karaman¹; ¹Texas A&M University

E-14: High Throughput Multi-principal Element Alloy Exploration Using a Novel Composition Gradient Sintering Technique: Brady Bresnahan¹; David Poerschke¹; ¹University of Minnesota

E-15: Study on Texture Evolution In Cold Rolled High Entropy Alloy during Annealing: Lalit Kaushik¹; Wi-Geol Seo²; Joo-Hee Kang³; Dong-Ik Kim⁴; Jin-Yoo Suh⁴; Shi-Hoon Choi²; Jaiveer Singh⁵; ¹Sunchon National University; ²Sunchon National University, Suncheon; ³Korea Institute of Materials Science; ⁴Korea Institute of Science and Technology; ⁵Indian Institute of Technology Jodhpur

E-16: The Effect of Local Composition on the Initiation Mechanism of Adiabatic Shear Banding in WFeNiMo: Sarah O'Brien¹; Matthew Beck¹; ¹University of Kentucky

MATERIALS-ENVIRONMENT INTERACTIONS

High Temperature Oxidation of Metals and Ceramics — Poster Session

Sponsored by: TMS Corrosion and Environmental Effects Committee

Program Organizers: Kenneth Kane, Oak Ridge National Laboratory; Elizabeth Sooby, University of Texas at San Antonio; Patrick Brennan, General Electric Research; Lavina Backman, U.S. Naval Research Laboratory; Kinga Unocic, Oak Ridge National Laboratory; Richard Oleksak, National Energy Technology Laboratory; David Shifter, Office of Naval Research; Raul Rebak, GE Global Research

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G-2: Oxidation Behaviour of Ultra-high Temperature Polymer-derived Ceramic-matrix Composites: Elia Zancan¹; ¹University of Birmingham

PROCESSING AND MANUFACTURING

Innovative Process Design and Processing for Advanced Structural Materials — Poster Session

Program Organizers: Ju-Young Kim, UNIST; Jae-il Jang, Hanyang University; Sung-Tae Hong, University of Ulsan; Rongshan Qin, The Open University

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Session Chairs: Ju-Young Kim, UNIST; Sukbin Lee, UNIST

K-2: Automated Process Design for Heat Shrink Casing of Welded Parts of Buried District Heating Pipe: Hyung-Gyu Kim¹; Jooyong Kim²; Hae-Yong Lee²; Jonghun Yoon¹; ¹Hanyang University; ²Korea District Heating Corporation (KDHC)/Frontier Research & Training Institute

K-3: Developing NiTi for a Stable Two-way Shape Memory Behavior: Mitchell Bauer¹; Mohammad Mahtabi¹; ¹University of Tennessee at Chattanooga

K-4: Development of a Gradient Structural Material Using Electrically Assisted Pressure Joining of Fe-Mn-Al-C Lightweight Steels: Siwhan Lee¹; Howook Choi¹; Chanwoo Jeong¹; Joonoh Moon²; Heung Nam Han¹; ¹Seoul National University; ²Changwon National University

K-5: Development of a Self-heated Composite Tool for Out of Autoclave and Out of Oven Cure of Thin Ply Composite Structures: Dwayne R. Morgan¹; ¹Touchstone Research Laboratory

K-6: Development of Highly Stretchable and Impermeable Encapsulation by Applying Wavy-structure to Thermally Grown Silicon Dioxide: Hangeul Kim¹; Gyeong-Seok Hwang¹; Hyeonji Yoo¹; Sohyeon Lee¹; Ju-Young Kim¹; ¹UNIST

K-7: Discontinuous Yielding Behavior Due to Twinning Accompanied by Abnormal Grain Growth in Fine-grained Copper: Byeong-Seok Jeong¹; Woojin Cho¹; Siwook Park¹; Leeju Park²; Keunho Lee²; Heung Nam Han¹; ¹Seoul National University; ²Agency for Defense Development

K--8: Effect of Heat Treatment in 9% Ni Steels on Cryogenic Impact Toughness: Younghoon Kim¹; Eunji Song¹; Sohyeon Lee¹; Minho Park²; Hyunbo Shim²; Ju-Young Kim¹; ¹UNIST (Ulsan National Institute of Science and Technology); ²Hyundai Steel

K-9: Enhanced Flaw-tolerance of Nanoporous Gold with Grain Boundary Plasticity: Eunji Song¹; Younghoon Kim¹; Gyeong-Seok Hwang¹; Ju-Young Kim¹; ¹UNIST

K-12: Improvement of Structural Stability and Characterization of Nanoscale Defects in Amorphous Alumina Thin Film: Jeong-Hyun Woo¹; Gyeong-Seok Hwang¹; Hyeonji Yoo¹; Ju-Young Kim¹; ¹UNIST

K-13: Integrated Welding and Thermal Processing for Ferritic/Martensitic Steels: Daniel Codd¹; Joseph McCrink²; ¹KVA Stainless/University of San Diego; ²KVA Stainless

K-14: MatILDa® - Application of a User-oriented Material Database: Michael Kruse¹; Margarita Bambach²; Kristin Helas²; Doris Wehage²; ¹Friedrich Kocks GmbH & Co. KG; ²GMT- Gesellschaft für metallurgische Technologie- und Softwareentwicklung mbH

K-15: Porous Silicon Carbide (SiC) for Composite Core Sandwich Structures: Dwayne R. Morgan¹; ¹Touchstone Research Laboratory

K-16: Solid-state Bulk Joining of Dissimilar Metal Alloys by Electrically Assisted Pressure Joining: Shengwei Zhang¹; Thanh Thuong Do¹; Bui Thi Tu Anh¹; Sung-Tae Hong¹; Howook Choi²; Heung Nam Han²; ¹University of Ulsan; ²Seoul National University

K-17: Study on the Behavior of Fine Particles by the Vibration of the Medium with Polluted Air Inside the Rigid Housing: Hyo-Soo Lee¹; Hai-Joong Lee¹; Tae-Hoon Park¹; Ki-Buem Kim²; Taek-Jib Choi²; Jin-Kyu Lee³; ¹KITECH; ²Sejong University; ³Kongju National University

K-18: The Friction and Product Quality in Dry Metal Forming with Volatile Media: Lihong Cai¹; Sung-Tae Hong¹; Jincheol Kim¹; ¹University of Ulsan

ARTIFICIAL INTELLIGENCE

Materials Informatics for Images and Multi-dimensional Datasets — Poster Session

Sponsored by: ACerS Basic Science Division, ACerS Electronics Division

Program Organizers: Amanda Krause, Carnegie Mellon University; Alp Sehirlioglu, Case Western Reserve University; Daniel Ruscitto, GE Research

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Session Chair: Alp Sehirlioglu, Case Western Reserve University

B-3: 3D Computer Vision and Machine Learning for Porosity Analysis in Additive Manufacturing: Daniel Diaz¹; Yuheng Nie¹; Anthony Rollett¹; Elizabeth Holm¹; ¹Carnegie Mellon University

ARTIFICIAL INTELLIGENCE

Materials Processing and Fundamental Understanding Based on Machine Learning and Data Informatics — Poster Session

Program Organizers: Kathy Lu, Virginia Polytechnic Institute and State University; Jian Luo, University of California, San Diego; Xian-Ming Bai, Virginia Polytechnic Institute and State University; Yi Je Cho, Sunchon National University

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B-5: Using Computer Vision and Machine Learning to Characterize Melt Pool Geometry in Additive Manufacturing: Han Chien¹; Bo Lei¹; Bryan Webler¹; Elizabeth Holm¹; ¹Carnegie Mellon University

CERAMIC AND GLASS MATERIALS

Mesoscale Phenomena in Functional Polycrystals and Their Nanostructures — Poster Session

Sponsored by: ACerS Electronics Division

Program Organizers: Serge Nakhmanson, University of Connecticut; Edward Gorzkowski, Naval Research Laboratory; James Wollmershauser, U.S. Naval Research Laboratory; Seungbum Hong, KAIST; Javier Garay, UCSD; Pierre-Eymeric Janolin, CentraleSupélec

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D-20: Asymmetric Tribology of Symmetric Polarization: Seongwoo Cho¹; Iaroslav Gaponenko²; Kumara Cordero-Edwards²; Jordi Barceló-Mercader³; Irene Arias³; Jiwon Yeom¹; Loic Musy²; Céline Lichtensteiger²; Gustau Catalan⁴; Patrycja Paruch²; Seungbum Hong¹; ¹KAIST; ²University of Geneva; ³Universitat Politècnica de Catalunya; ⁴ICN2

D-21: Machine-learned Large-scale Model for Layered Amorphous Graphene: A Study of Its Structure and Thermodynamics: Chinonso Ugwumadu¹; Rajendra Thapa¹; Kishor Nepal¹; David Drabold¹; Jason Tremblay¹; ¹Ohio University

D-22: Mesoscale Modeling of Domain Wall Behavior in Perovskite Ferroelectrics: Charles Schwarz²; Ashok Gurung¹; John Mangeri²; Serge Nakhmanson¹; ¹University of Connecticut; ²Luxembourg Institute of Science and Technology

FUNDAMENTALS AND CHARACTERIZATION

Metal Powder Synthesis and Processing — Poster Session

Sponsored by: TMS Powder Materials Committee

Program Organizers: James Paramore, US Army Research Laboratory; Iver Anderson, Iowa State University Ames Laboratory; Kyle Tsakopoulos, Worcester Polytechnic Institute

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Session Chair: James Paramore, United States Army Research Laboratory

E-17: Powder Production of Structural or Functional Two-phase from Metal Materials with an Intermetallic Structure: *Borys Sereda¹; Iryna Kruhlak¹; Dmytro Sereda¹; Yuriy Belokon¹; Dmytro Kruhlak¹;*
¹Dneprovsky State Technical University

NANOMATERIALS

Nanotechnology for Energy, Environment, Electronics, Healthcare and Industry — Poster Session

Program Organizers: Navin Manjooran, Chairman, Solve; Gary Pickrell, Virginia Tech

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Session Chairs: Gary Pickrell, Virginia Tech; Navin Manjooran, Chairman, Solve

H-13: Impedimetric Determination of Cortisol Using Gold Nanoparticles Functionalized Laser Induced Graphene Electrode: *Kyle Duke¹; Jose Gonzalez-Garcia¹; Jennah Markovitch¹; Kyle Preusser¹; Victoria Messuri¹; Anthony Romeo¹; Bhargavi Mummareddy¹; Pedro Cortes¹; Byung-Wook Park¹;* ¹YSU

H-14: Multi-Element Surface Acoustic Wave (SAW) Sensors for Methane Detection: *Daejin Kim¹; Jeffrey Culp¹; Jagannath Devkota¹; Ruishu Wright²;* ¹National Energy Technology Laboratory/NETL Support Contractor; ²National Energy Technology Laboratory

H-15: Transition Metal Doped Cerium Oxide Nanozymes: Physical and Biological Characterizations for Interactions with Oxidative Stress: *Samantha Stoltz¹; Sudipta Seal¹; Elayaraja Kolanthai¹; Craig Neal¹; Yifei Fu¹;* ¹UCF AMPAC Lab

BIOMATERIALS

Next Generation Biomaterials — Poster Session

Sponsored by: ACerS Bioceramics Division

Program Organizers: Roger Narayan, University of North Carolina; Sanjiv Lalwani, Lynntech, Inc.

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Session Chair: Roger Narayan, NC State University

C-2: 4D Printed Bilayer Vascular Grafts with Sustained Ionic Dissolution Products and Heparin Release for Rapid Endothelialization: *Shangsi Chen¹; Min Wang¹;* ¹University of Hong Kong

C-3: Electrochemically Responsive Drug Delivery Systems with Ferrocene-containing Polyelectrolyte Complex Hydrogels for Controlled Release: *Victoria Messuri¹; Prakriti Dhungana¹; Asma Allababdeh¹; Cassidy Lyons¹; Kyle Duke¹; Bhargavi Mummareddy¹; Byung-Wook Park¹;* ¹Youngstown State University

C-4: Mechanical Evaluation of Polymeric Substrates for Use in Flexible Electronic Applications: *Mitchell Melander¹; Janet Gbur²;* ¹Case Western Reserve University; ²U.S. Department of Veterans Affairs

C-5: Synthesis and Characterization of Naturally Derived SiO₂ and CaO for 45S5 Bioactive Glass for Wound Healing Applications: *Samadhan Gaikwad¹; Vijay Ingole²;* ¹Shivaji University Kolhapur; ²Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

CERAMIC AND GLASS MATERIALS

Phase Transformations in Ceramics: Science and Applications — Poster Session

Program Organizers: Pankaj Sarin, Oklahoma State University; Scott McCormack, University of California, Davis; Waltraud Kriven, University of Illinois at Urbana-Champaign; Theresa Davey, Tohoku University; Sanjay V. Khare, University of Toledo

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D-23: Environmental Conical Nozzle Levitator Equipped with Dual Lasers: *Fox Thorpe¹; Elizabeth Sobalvarro Converse²; Jesus Rivera²; Harry Charalambous²; Scott McCormack³;* ¹University of California, Davis; ²Lawrence Livermore National Laboratory; ³University of California, Davis

D-24: Relationship of Bonding Strength with Stability of Ternary Oxide Phases of MgSnO₃: A First-principles Study: *Bishal Dumre¹;* Sanjay Khare¹; ¹University of Toledo

PROCESSING AND MANUFACTURING

Processing and Performance of Materials Using Microwaves, Electric and Magnetic Fields, Ultrasound, Lasers, and Mechanical Work – Rustum Roy Symposium – Poster Session

Sponsored by: ACerS Basic Science Division, ACerS Manufacturing Division

Program Organizers: Morsi Mahmoud, King Fahd University of Petroleum & Minerals; Dinesh Agrawal, Pennsylvania State University; Guido Link, Karlsruhe Institute of Technology; Motoyasu Sato, Chubu University; Rishi Raj, University of Colorado; Christina Wildfire, National Energy Technology Laboratory; Zhiwei Peng, Central South University

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K-19: Effect of Plasma Shielding in Laser Irradiation of Metal Targets with Bursts of Ultrashort Pulses: *Michael Stokes*¹; Zhibin Lin²; Alexey Volkov¹; ¹The University of Alabama; ²MKS Instruments Inc

SPECIAL TOPICS

Resisting Degradation from the Environment: A Symposium Honoring Carolyn M. Hansson's Research and Pioneering Experiences as a Woman in STEM – Poster Session

Sponsored by: TMS: Corrosion and Environmental Effects Committee, TMS: Steels Committee

Program Organizers: Jenifer Locke, Ohio State University; Brendy Rincon Troconis, University of Texas at San Antonio; Ashley Paz y Puente, University of Cincinnati; George Gray, Los Alamos National Laboratory; Suveen Mathaudhu, Colorado School of Mines; David Shifler, Office of Naval Research

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Funding support provided by: Office of Naval Research

5:00 PM Please refer to "Talks to Introduce Posters I and II" in the program for the poster titles.

BIOMATERIALS

Society for Biomaterials: Biological Response to Materials and Material's Response to Biological Environments – Poster Session

Program Organizers: Thomas Dziubla, University of Kentucky; Christopher Siedlecki, Penn State College of Medicine; Jeffrey Capadona, Case Western Reserve University; Lynne Jones, Johns Hopkins Orthopaedics

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C-6: Cell-scaffold Interactions in Bijels-derived Porous Membranes: Haoran Sun¹; Min Wang¹; ¹University of Hong Kong

C-7: Modeling a Portable Ventilator Design for Optimal Performance: Yafeng Li¹; Lei Wang¹; Peng Yi¹; *Francisco Rodriguez*²; Jing Zhang²; ¹Tiangong University; ²Indiana University – Purdue University Indianapolis

C-8: Osteoblast Cell Interaction with Iron-deposited Titanium for Orthopedic Applications: *Dexter Kling*¹; Paige Bothwell¹; Sahar Vahabzadeh¹; ¹Northern Illinois University

BIOMATERIALS

Society for Biomaterials: Biomaterial Applications in Today's Industry: Development, Translation & Commercialization – Poster Session

Program Organizers: Bob Hastings, Depuy Synthes, J&J; SuPing Lyu, Medtronic

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C-9: Color Lens Fabricated from Pad Printing: *Anthony Chen*¹; Shihua Chen²; Yongjun Chen³; ¹Los OSOS High School; ²Johns Hopkins University; ³JH Research USA

BIOMATERIALS

Society for Biomaterials: Student Poster Contest + Rapid Fire — Society for Biomaterials: Student Poster Contest + Rapid Fire

Program Organizers: Roger Narayan, University of North Carolina; Thomas Dziubla, University of Kentucky; Jessica Jennings, University of Memphis; Bob Hastings, Depuy Synthes, J&J

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C-10: 3D Printing of Zirconia-alumina Composites via Digital Light Processing: Optimization of the Slurry and the Debinding Process: *Barbara Inserra*¹; ¹Politecnico di Torino

C-11: Applying Bioactive Glass to Long-term Drug Delivery: *Marie Sykes*¹; *Casey Schwarz*²; ¹Ursinus College

C-12: Aqueous Chemical Deposition of K_{0.5}Na_{0.5}NbO₃ Ferroelectric Thin Films for Biomedical Applications: *Ahmed Mohammed*¹

C-13: Blood Coagulation Response to Four Medical Grade Polyurethanes Biomaterials: *Lan Nguyen*¹; *Li-Chong Xu*²; *Christopher Siedlecki*²; ¹Gettysburg College; ²Penn State College of Medicine

C-14: Characterization of the Microstructure, Microhardness and Electrochemical Corrosion Behavior of a NbTiCr Multicomponent Alloy: A First Step Toward an Orthopedic-implant Application: *Isabela Dainezi*¹; *João Passos*²; *Carlos Rovere*¹; ¹Federal University of São Carlos; ²EESC/USP

C-15: Controlling Biofilm Formation on Biomaterials by Small Molecules that Interfere with Nucleotide Second Messenger Signaling: *Alyssa Ochetto*¹; *Christopher Siedlecki*¹; *Li-Chong Xu*¹; ¹Penn State College of Medicine

C-16: Decanoic Anhydride-modified Chitosan Membranes Loaded with Bupivacaine and cis-2-decanoic Acid Affect Cytokine Expression of Keratinocytes: *Emily Montgomery*¹; *Zoe Harrison*¹; *J. Amber Jennings*¹; ¹The University of Memphis

C-17: Effect of Strain on the Thermoelectric Properties of Epitaxial La_{0.8}Sr_{0.2}CoO₃ Thin Films: *Mohammad El Loubani*¹; *Gene Yang*¹; *David Hill*¹; *Dongkyu Lee*¹; ¹University of South Carolina

C-18: Engineering 18F-Thermo-Responsive Assembled Protein through Bioconjugation to a Bimodal Fluorescent/PET Probe for Theranostic Purposes: *Aparajita Bhattacharya*¹; ¹NYU

C-19: Polymerized High Internal Phase Emulsions Derived from Photocurable Polycaprolactone for Tissue Engineering Applications: *Sierra Kucko*¹; *Timothy Keenan*¹; ¹Alfred University

C-20: Understanding of Interface-property Relationships of Vertically Aligned Mixed Ionic Electronic Conductor-ionic Conductor Heterostructures: *Gene Yang*¹; *Mohammad El Loubani*¹; *Dongkyu Lee*¹; ¹University of South Carolina

C-21: Villi Inspired Elastomeric Interlocking Device for Intestinal Retentive Applications: *Durva Naik*¹; ¹Carnegie Mellon University

CERAMIC AND GLASS MATERIALS

Solid-state Optical Materials and Luminescence Properties — Poster Session

Sponsored by: ACeRS Basic Science Division

Program Organizers: Yiquan Wu, Alfred University; Jas Sanghera, Naval Research Laboratory; Akio Ikesue, World-Lab. Co., Ltd; Rong-Jun Xie, Xiamen University; Mathieu Allix, Laboratoire CEMHTI; Kiyoshi Shimamura, National Institute for Materials Science; Liangbi Su, Shanghai Institute of Ceramics; Dariusz Hreniak, Institute of Low Temperature and Structure Research

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D-25: Crystallite Growth of Eu-doped Lanthanum Zirconate Pyrochlores Investigated via XRD Line Broadening: *Petra Simonova*¹; *Roman Skala*²; *Jan Mrazek*³; *Willi Pabst*¹; ¹University of Chemistry and Technology, Prague; ²Institute of Geology of the Czech Academy of Sciences; ³Institute of Photonics and Electronics of the Czech Academy of Sciences

IRON AND STEEL (FERROUS ALLOYS)

Steels for Sustainable Development — Poster Session

Sponsored by: TMS Steels Committee

Program Organizers: Ian Zuazo, ArcelorMittal Global R&D - Industeel; Matthias Militzer, University of British Columbia; Jonah Klemm-Toole, Colorado School of Mines; Kester Clarke, Colorado School of Mines

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F-3: Suitability of 17-4 PH Stainless Steels as Choice Material for Compression Pumps Used in CCS (Carbon Capture And Storage) Systems: *José Calderón Hernández*¹; *Caroline De Souza Carvalho Machado*¹; *Hercilio Gomes de Melo*¹; *Helio Goldenstein*¹; ¹São Paulo University

FUNDAMENTALS AND CHARACTERIZATION

Synthesis, Characterization, Modeling and Applications of Functional Porous Materials — Poster Session

Sponsored by: ACerS Basic Science Division

Program Organizers: Lan Li, Boise State University; Winnie Wong-Ng, National Institute of Standards and Technology; Kevin Huang, University of South Carolina

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Session Chair: Lan Li, Boise State University

E-18: Carbon Fibers Based Ultra-porous Epoxy Composites for Planar Multilayer Absorber Application: Hanadi Breiss¹; Aicha El Assal¹; *Ratiba Benzerga*²; Ala Sharaiha¹; Ali Harmouch²; Akil Jrad²; ¹University of Rennes, IETR; ²Université Libanaise, EDST

E-19: Variation in the Bulk Elasticity of Nanoporous Materials from Solid Structure Mechanical Properties: *Ryan Griffith*¹; Naji Mashrafi¹; Matthew Beck¹; ¹University of Kentucky

MATERIALS-ENVIRONMENT INTERACTIONS

Thermodynamics of Materials in Extreme Environments — Poster Session

Sponsored by: ACerS Basic Science Division, ACerS Energy Materials and Systems Division

Program Organizers: Xiaofeng Guo, Washington State University; Kristina Lilova, Arizona State University; Kyle Brinkman, Clemson University; Alexandra Navrotsky, Arizona State University; Jake Amoroso, Savannah River National Laboratory; Xingbo Liu, West Virginia University; Gustavo Costa, NASA Glenn Research Center

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Session Chair: Kristina Lilova, Arizona State University

G-3: Effect of Desulfurizer on Hot Metal Pretreatment: *Liang Tian*¹; Wufeng Jiang¹; Suju Hao¹; Yuzhu Zhang¹; ¹North China University of Science and Technology

G-4: Investigation of the Thermodynamics of Intermetallic Materials in the Simulation of Synthesis in the Ti-Al system: *Borys Sereda*¹; Iryna Kruhliak¹; Dmytro Sereda¹; Yuriy Belokon¹; ¹Dneprovsky State Technical University

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