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**TMS 2020**

**149<sup>th</sup> Annual Meeting & Exhibition**

February 23-27, 2020 • San Diego, California, USA



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## **Energy & Environment**

### **Advanced Materials for Energy Conversion and Storage VI**

The intent of this symposium is to provide a forum for researchers from national laboratories, universities, and industry to discuss current understanding of materials science issues in advanced materials for energy conversion and storage including high-temperature processes and to discuss accelerating the development and acceptance of innovative materials, and test techniques for clean energy technology.

#### **Theme 1: Energy Conversion**

Topics include, but are not limited to, experiments and modeling of energy conversion systems including:

- Solid Oxide Fuel Cells and PEM fuel cells
- Hydrogen generation
- The durability of the fuel cell and stack materials
- Thermal-Chemical-mechanical stresses/expansion
- Study of thermo-mechanical degradation mechanisms
- Effect of microstructure evolution on the properties and efficiency
- Role of grain boundary density, grain size, orientation, and grain growth
- Advances in the characterization and modeling techniques

#### **Theme 2: Energy Storage**

- Batteries
- Hydrogen storage
- Physicochemical Interaction in lithium-ion batteries and beyond (e.g., Li-S, Li-air)
- Electrode microstructure - property - performance interplay
- Mesoscale modeling and characterization (e.g., X-ray tomography)
- Degradation (e.g., mechanical, chemical, electrodeposition) characteristics in electrodes

#### **Theme 3: Materials Design for Sustainability and Energy Harvesting**

This component of the symposium will focus on a variety of green

and sustainable technologies for energy harvesting, additive manufacturing, green tribology, next-generation products and processes, and development of advanced instrumentation and control systems, etc. Proposed Session Topics include:

- Solar Energy
- Energy Harvesting
- Nanotechnology and next-generation multifunctional materials
- Additive manufacturing, 3D printing, and sustainability
- Green Tribology
- Life cycle analysis of materials and products

#### **Theme 4: Functional Materials including High-Temperature Ceramics and Alloys**

- Functional Oxides / (SOFC, sensors, others)
- Ceramics and Dielectrics / (battery, insulation Dielectrics, capacitors, sensors)
- Solid State Batteries/Electrolyzers/ Solid oxide fuel cells/Membrane Separation/ electrolysis cells
- Coatings for interconnections
- Membrane Separation Materials, Processes and Systems ( $H_2$ ,  $O_2$ ,  $CO_2$ )
- High-temperature electrolysis cells
- High-temperature performance of functional materials (electrochemical, electronic, optical, etc.)
- In-situ spectroscopy of oxidation state of functional oxides in operation

- Ceramics/Composite Structures/ Alloys- Solid Oxide fuel cells, Thermal Barrier Coatings, Diesel particulate filters, etc.
- Reliability and durability of high-temperature ceramics and alloys, including the effect of residual/ operational stresses, corrosion under oxidizing and reducing environment
- Advances in the characterization and modeling techniques including multiscale and in-situ
- Microstructural reconstruction and mapping onto fundamental mechanistic models for predicting overall performance
- Nano-structuring and infiltration of functional electrode materials (SOFC, battery, capacitor) for electronic/ electrochemical performance

#### **ORGANIZERS**

**Jung Pyung Choi**, Pacific Northwest National Laboratory, USA

**Amit Pandey**, Ansys/Granta Design, USA

**Partha Mukherjee**, Purdue University, USA

**Surojit Gupta**, University of North Dakota, USA

**Kyle Brinkman**, Clemson University, USA

**Soumendra Basu**, Boston University, USA

**Paul Ohodnicki**, National Energy Technology Laboratory, USA

#### **SYMPOSIUM SPONSORS**

TMS Functional Materials Division

TMS Energy Conversion and Storage Committee

**Abstract Deadline is July 1, 2019. Submit online at**  
**[www.programmaster.org/TMS2020](http://www.programmaster.org/TMS2020).**

**Questions?**  
**Contact [programming@tms.org](mailto:programming@tms.org)**