ENERGY & ENVIRONMENT

MATERIALS FOR ENERGY CONVERSION AND STORAGE

This symposium is organized into the following themes:

Energy Conversion with Emphasis on SOFCs
Co-organizers: Kyle S Brinkman, Clemson University; Hitoshi Takamura, Tohoku University; Xingbo Liu, West Virginia University; Soumendra Basu, Boston University; Jung Pyung Choi, Pacific Northwest National Laboratory; Prabhakar Singh, University of Connecticut.

Topics include experiments and modeling of the above-mentioned systems including:
- Durability of fuel cell and stack materials
- Thermal-chemical-mechanical stresses/expansion
- Study of thermo-mechanical degradation mechanisms
- Effect of microstructure evolution on properties and efficiency
- Role of grain boundary density, grain size, orientation and grain growth
- Advances in characterization and modeling techniques

Energy Storage with Emphasis on Batteries
Co-organizers: Partha P. Mukherjee, Texas A&M University; Leela M.R. Arava, Wayne State University; George Nelson, University of Alabama in Huntsville

Topics will include:
- Physicochemical interaction in lithium-ion batteries and beyond (e.g. Li-S, Li-air, Na-ion)
- Electrode microstructure - property - performance interplay
- Meso-scale modeling and characterization

Materials Design for Sustainability and Energy Harvesting
Co-organizers: Surojit Gupta, University of North Dakota; Indrajit Dutta, Corning Inc.; Hamidreza Mohseni, BOSCH; D. Wen, University of Leeds

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. 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

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Functional Materials including High Temperature Ceramics and Alloys
Co-organizers: Paul Ohodnicki, National Energy Technology Laboratory; Jung Pyung Choi, Pacific Northwest National Laboratory; Reza Shahbazian-Yassar, University of Illinois at Chicago; Soumendra Basu, Boston University; Dwayne Arola, University of Washington; Josh Gladden, Olemiss; Rajeev Gupta, University of Akron

Materials/Applications:
- 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

Topics will include:
- Coatings for interconnections
- Membrane separation materials, processes and systems (H2, O2, CO2)
- 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
- Nanostructuring and infiltration of functional electrode materials (SOFC, battery, capacitor) for electronic/electrochemical performance

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 high-temperature processes and accelerate the development and acceptance of innovative materials and test techniques for clean energy technology.

ORGANIZERS
Amit Pandey, LG Fuel Cell Systems Inc., USA

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TMS Energy Conversion and Storage Committee