Multiphysics Coupling in Energy Storage

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Overview

Recent years have witnessed a critical imperative to accelerate innovation toward improved performance (energy/power), safety and life of energy storage devices for vehicle electrification, renewable energy integration and grid storage. Lithium-ion batteries, for example, are leading the race for electric drive vehicles. These are complex, dynamical systems, which include a multitude of coupled physicochemical processes encompassing electronic, ionic, diffusive transport in solid/electrolyte phases, electrochemical and phase change reactions and stress generation in multi-scale porous electrodes. The performance and lifetime of such electrochemical energy storage devices is dependent on complex reaction/transport processes spanning across multiple length and time scales. Computational models and characterization of mechanical, thermal and electrochemical processes play an important role in providing insight into the coupled multiphysics interactions.

Course participants will learn these topics through lectures. Also case studies and assignments will be shared to stimulate research motivation of participants.

Modules	**A: Multiphysics Coupling in Energy Storage: June 26 - 30, 2017**
You Should Attend If…	• Executives, engineers and researchers from manufacturing, service and government organizations including R&D laboratories. • Student students at all levels (BTech/MSc/MTech/PhD) or Faculty from reputed academic institutions and technical institutions.
Fees	The participation fees for taking the course is as follows: **Participants from abroad : US $500** **Industry/ Research Organizations: Rs. 30000** **Academic Institutions:** **Student Participants: Rs 1000** (Refundable subjected to joining of course) **Faculty Participants: Rs 10000** The above fee include all instructional materials, computer use for tutorials and assignments, laboratory equipment usage charges, 24 hr free internet facility. The participants will be provided with accommodation on payment basis.

The Faculty

Dr. Partha P. Mukherjee is currently an Assistant Professor and Morris E. Foster Faculty Fellow of Mechanical Engineering at Texas A&M University (TAMU). Before joining TAMU in 2012, he worked for four years in the U.S. Department of Energy Labs; as a staff scientist (2009-2011) at Oak Ridge National Laboratory and as a Director's research fellow (2008-2009) at Los Alamos National Laboratory. He received his Ph.D. in Mechanical Engineering from the Pennsylvania State University. Prior to PhD studies, he worked as a consulting engineer for four years at Fluent India Pvt. Ltd, a fully-owned subsidiary of Fluent Inc., currently Ansys Inc. His research interests include physics and stochastics relevant to the transport, materials and manufacturing aspects in energy storage and conversion (e.g., batteries and fuel cells).

Dr. Amaresh Dalal is currently an Associate Professor of Mechanical Engineering at Indian Institute of Technology, Guwahati. He has research interests in the area of computational fluid dynamics and heat transfer, finite volume methods and unstructured grid techniques, multiphase flows, natural and mixed convection flows.

Course Co-ordinators

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