Modeling and Simulation in Energy Storage

……

Overview

Energy storage is a key enabler in the energy sustainability eco-system. Lithium-ion batteries have transformed the modern rechargeable world with footprint in the portable electronics, vehicle electrification and grid-scale storage. The importance of modeling and simulation in accelerating innovation and design toward improved performance (energy/power), safety and life of lithium-ion batteries is critical. These are complex, dynamical systems, which include coupled physical and electrochemical processes encompassing electronic, ionic, diffusive transport in solid/electrolyte phases, electrochemical and phase change reactions and stress generation in porous electrodes. The performance, thermal safety and lifetime is predicated on fundamental understanding of the underlying reaction and transport processes. This course will lay out the details of a comprehensive computational modeling framework of thermo-electrochemical interactions in lithium-ion batteries toward predicting performance life and safety.

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

Modules	**A: Modeling and Simulation in Energy Storage** **May 25 - 29, 2020**
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. 30,000** **Academic Institutions:** **Student Participants: Rs 1,000** (Refundable subject to joining of course) **Faculty Participants: Rs 10,000** 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 Associate Professor of Mechanical Engineering at Purdue University. Before moving to Purdue, he was an Assistant Professor and Morris E. Foster Faculty Fellow of Mechanical Engineering at Texas A&M University (TAMU). Prior to starting his academic career at TAMU in 2012, he worked for four years at 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 in 2007. Prior to PhD studies, he worked as an engineer for four years at Fluent India Pvt. Ltd, a fully-owned subsidiary of Fluent Inc., currently Ansys Inc. He received the Scialog Fellow recognition from the Research Corporation for Science Advancement, TMS Young Leaders Award, International Center for Theoretical Physics (ICTP, Trieste, Italy) visiting faculty lectureship, Purdue College of Engineering Excellence for Early Career Research award, Purdue Seed for Success in Research award, TAMU Engineering Young Faculty Award, TAMU Dean of Engineering Excellence Award, and Emerging Investigator distinctions from Journal of Coordination Chemistry and the Institute of Physics' Materials Research Express, to name a few. His research interests are focused on mesoscale physics and stochastics of physicochemical transport, chemistry and microstructure interactions, including an emphasis in the broad spectrum of energy storage and conversion.

Dr. Amaresh Dalal is currently a Professor of Mechanical Engineering at the Indian Institute of Technology, Guwahati. He received his Ph.D. degree from the Indian Institute of Technology, Kanpur in 2009 and he was a Post-doctoral Research Associate at the School of Mechanical Engineering, Purdue University from Sep 2008 - Dec 2009. 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. Dr. Dalal is now deeply involved in developing a general purpose, versatile and robust computational fluid dynamics solver over hybrid unstructured grid which can solve a wide range of real-life fluid flow, heat transfer, and problems involving transport phenomena over complex geometries. He received the Prof. K.N. Seetharamu Medal and Prize for the Best Young Researcher in Heat Transfer-2017 from the Indian Society of Heat and Mass Transfer.

Course Coordinator

Dr. Amaresh Dalal
Department of Mechanical Engineering
IIT Guwahati
Phone: 0361-2582677
E-mail: amaresh@iitg.ac.in

.....

http://www.gian.iitkgp.ac.in/GREGN

.....

Subject Expert

Dr. Partha P. Mukherjee
School of Mechanical Engineering
Purdue University, USA
E-mail: pmukherjee@purdue.edu
Web: https://engineering.purdue.edu/ETSL/