Fuel Cell Power Generation and Battery Storage

Overview

The demand for clean and sustainable energy sources has become a strong driving force globally to move towards a sustainable clean environment and in continuing economic development, and hence in the improvement of human living conditions. The search for a clean and green propulsion system has gained new momentum due to increased demand and cost of imported oil, uncertainty in steady supply of oil and increasingly higher emission standards. In this context, fuel cell power generation and electric battery storage have been recognized to be key players of clean energy technologies due to their high efficiency, high energy density, and low or zero emissions. The demand for alternative energy sources and higher efficiency vehicles is driving automotive and energy interests alike to new frontiers. One promising alternative technology that most of the automobile companies are pursuing is the electric vehicle based on fuel cell power generation system and electric battery storage system Recently fuel cells and electric battery storage technology have seen very high growth and applications in various energy sectors including transportation, stationary and portable power, and micro -power. The demands for electric battery storage are increasing for greater use not only in electric vehicles and but also for greater energy storage needs for alternative energy sources and electric grid systems as well.

The rapid advances in fuel cell system development and deployment require basic science and technology as well as advanced information on fuel cell design and analysis. The Polymer Electrolyte Membrane (PEM) fuel cells have gained attention of both vehicle transportation and smaller scale stationary power generation because they are compact, lightweight, operate at relatively lower temperature range, and more responsive to load variations. Fuel cell research are aimed at achieving higher efficiency, lower material and manufacturing cost, reliability and durability of key fuel cell components such membrane electrode assembly (MEA) and bi-polar plates. This presentation includes a summary of simulation and experimental characterization work conducted in an effort to develop high performance PEM fuel Cell for high current density operation. Modelling and simulation analysis of PEM fuel cell is presented to understand the complex internal details in terms of distribution of reactant gases, local current densities, and heat and water transport across the cell, and to evaluate the effects of MEAs and bipolar plate designs on the fuel cell performance. Recent research and development activities, major technical and manufacturing issues, and future research focus of fuel cell key components are reviewed.

Modules	**Fuel Cell Power Generation and Battery Storage : September 16 – 20, 2019** **Number of participants for the course will be limited to thirty (30).**
You Should Attend If…	▪ you are a Mechanical/Chemical Engineer or Research Scholar interested in design, operation and performance characteristics of fuel cell and battery storage. ▪ you are a student or faculty from academic institution interested in learning the fundamentals and basic elements of the fuel cell and electric battery storage.
Fees	The participation fees for taking the course is as follows: **Participants from abroad : US $500** **Participants from Industry : 10000** **Government Research Organization : 5000** **Faculty Participants : 3000** **Student Participants : 1000** The above fee include all instructional materials, computer use for tutorials and assignments, laboratory equipment usage charges, 24 hr free internet facility.
Accommodation	The participants may be provided with hostel accommodation, depending on availability, on payment basis. Further details about accommodation will be communicated with the shortlisted individual participants via email.

The Faculty

Prof. Pradip Majumdar is the Professor and Chair Emeritus, Department of Mechanical Engineering, Northern Illinois University, USA. His research interests include thermo-fluid Sciences; Simulation Modeling and Design; Computational Fluid Dynamics (CFD) and Heat Transfer; Fuel Cell and Battery Storage systems; Solar Thermal Energy Systems; Heat and Mass Transfer in Porous Media; Micro-Nanoscale Fluid Flow and Heat transfer; High Heat Flux Electronics Cooling; Development of Thermal Interface Materials using Nanomaterials; High Energy Laser Material Processing and Additive Manufacturing; Transport Phenomena in Biological Systems; and Blood Flow and Drug Particle Delivery to Targeted Regions of Human Artery/Tissues.

Prof. Amar Nath Mullick is the Professor and former Head of the Department of Mechanical Engineering Department, National Institute of Technology Durgapur. His research interest is experimental and numerical analysis of fluid dynamics and heat transfer problems, bio-fluid mechanics, fuel cell and storage battery.

Course Co-ordinator

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