
Date: June 22
Time: 10:15 – 11:15
Room: SL 165

Everyone is invited

Electrochemical Power Sources for Global Energy Sustainability

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Abstract. Worldwide dependence on fossil fuels is inherently non-sustainable; contribute to environmental degradation and adverse human health impacts. Moreover, estimates of a 50 % increase in global energy demand and carbon dioxide emissions are projected over the next two decades. A revolutionary change towards more sustainable methods for energy production from renewable sources is needed. Undoubtedly, this will require the use of myriad energy sources, converted to a variety of energy carriers suited to meet different end uses. Electrochemical power sources offer the potential of clean energy from a variety of renewable sources. Such devices include fuel cells, batteries, bio-fuel cells, photo-voltaic cells and hydrogen producing electrolytic cells to name a few.

Fuel cells which produce electricity from hydrogen and air are highly efficient, environment friendly and would play an important role in the future. Hydrogen used by the fuel cells can be derived from renewable sources. Also most forms of renewable energy (e.g. wind, solar) are constrained by the variable and intermittent nature of their output, and cannot be easily transported or stored without first being converted into electricity. Energy storage systems such as batteries match sporadic supply to demand by storing the electricity generated by the renewable and hence are also very important to achieve energy sustainability. Microbial bio-fuel cells directly convert biomass waste into electricity offsetting the portion of energy invested for waste treatment, thus playing a dual role in energy and environmental sustainability. However these technologies need major breakthroughs before they can be successfully implemented. The seminar will focus on the issues ahead and the path towards the success of these technologies.

About the Speaker. Dr. Ramasamy is a Faculty Research Associate at the Department of Mechanical and Nuclear Engineering of the Penn State University, where he leads a team of seven graduate students at the Fuel Cell Dynamics and Diagnostics Laboratory since 2005. His has more than seven years of research experience in electrochemical energy devices such as fuel cells, batteries, bio-fuel cells and hydrogen electrolyzers. His lab is currently being funded by NSF and automotive manufacturers. He is writing a book chapter for Elsevier for the encyclopedia for electrochemical power sources. He has reviewed a fuel cell book for John Wiley and serves as a referee for four electrochemical journals. He is a member of the Electrochemical society, International society of electrochemistry, American chemical society and Sigma Xi.