



Electrochemical Deposition of Polyaniline into Nanostructured Titanium Dioxide Matrices

by Mr. Syed Hamed Mirabolghasemi

Date: 12th November 2009 (Thursday)

Time: 12:30pm to 1:00pm

Venue: EA-02-11 (Executive Seminar Room)

Abstract

The dye-sensitized solar cell (DSSC) is a new generation that usually consists of a porous matrix of TiO₂ nanoparticles onto which a monolayer of a redox active dye is absorbed. The light is absorbed by the dye and then the excited electron is rapidly injected into the conduction band of the semiconductor. This arrangement can yield solar conversion efficiencies in excess of 10%. However, such high efficiencies are only possible with cells filled liquid electrolytes, whereas an all solid state construction is desirable for practical applications. Although one way to produce a solid state device is to replace the electrolyte with a hole conductor, such as a conductor polymer, conversion efficiencies of such cells have so far been disappointing, only a few percent. One of the main difficulties is the need for the hole conductor to fully penetrate into the nanostructured semiconductor matrix, failure to do so leads to dead areas and thus a poor conversion efficiency. In an attempt to solve this problem the conducting polymer polyaniline has been electrochemically deposited into a porous titanium matrix using a cyclic Voltametric process. However the polymer has not grown in the whole matrix and is seen just in a rather small part of it. So we tried to modify it and solve the problem. An update on the success of our novel approach will be presented.

Mr. Syed Hamed Mirabolghasemi Speaker

Mr. Syed Hamed Mirabolghasemi obtained his bachelors degree in Metallurgical engineering from Shiraz University (Iran) in 1999. Then he did his Master's in Materials science and engineering in Sharif University of Technology between 1999 and 2001 (Iran). Now he is a PhD candidate and working under the supervision of Prof. Daniel John Blackwood in the Department of Materials Science and Engineering at NUS. His research interest focuses on electrochemical deposition of polyaniline into nanostructured titanium dioxide Matrices for solar cell applications.

Dr Xue Jun Min Host

All are Welcome!