



***Platinum Films Deposited by Polyol Reduction of Platinum Salt at Low Temperature and
Their Application as Counter Electrode of High-Performance Dye-Sensitized Solar Cells***

by Mr. Sun Kuan

Date: 20th August 2009 (Thursday)
Time: 12:00pm to 12:30pm
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Abstract

Thin film technology forms the corner stone of the modern civilization since many sophisticated devices, e.g. CPU chips, hard disks and LCD screens are made from thin films or film composites. This new processing method can have huge impact not only to the film per se, but also on the applications of these films. Conventional methods of metal thin film fabrication include physical deposition via magnetron sputtering, chemical vapor deposition or e-beam evaporation, and chemical reduction of metal salt solution, such as by electrochemical deposition, electroless deposition, or pyrolysis at high temperature. Here we demonstrate a new chemical route for the deposition of metal thin films, namely "polyol method". High-quality platinum (Pt) films were deposited on conductive substrates, such as conducting polymer films and indium tin oxide (ITO), by the reduction of H_2PtCl_6 with ethylene glycol (EG) at low temperature. Two types of Pt growths were observed. One is the Pt growth from the substrate immediately after the reduction, which results into dense and continuous Pt with metallic luster and good adhesion to the substrate. The other is the nucleation of Pt in solution, which forms particles. These particles aggregate and finally precipitate as porous Pt on the dense Pt. The factors which affected the quality of the Pt film, including the concentration and pH value of H_2PtCl_6 solution in EG, and the temperature during the reduction were investigated. Pt deposited by this method could be used as the counter electrode of high-performance dye-sensitized solar cells (DSCs). The DSCs exhibited efficiency of 8.1 %, quite close to that of the DSCs with conventional Pt counter electrode. In addition, this low-temperature method enabled the Pt deposition on flexible substrate, which could be used as the flexible counter electrode for DSCs.

Mr. Sun Kuan Speaker

Mr. Sun Kuan graduated with major in Materials Science and minor in Techno-preneurship from National University of Singapore in 2008. He is currently interested in the development of sustainable energy, and is conducting research in improving the performance of the third generation photovoltaics under Dr. Ouyang's guidance.

Dr. Xue Jun Min Host

All are Welcome!