

METAL-DOPING IN TiO₂ PHOTSENSITIZATION

L. Lau, M. Fernandez, B. Donahoo, J. Pak, A. Hunt and R. Rodriguez
Dept. of Chemistry, Idaho State University, Pocatello, ID 83209

Several researchers (Wen 2000, Ko 2005, Lai 2008) have suggested that metal inclusion into the TiO₂ layer of a dye sensitized solar cell (DSSC) may increase cell efficiency. It has been postulated that surface plasmon resonance may improve the efficiency as a result of field enhancement. Silver is often used in surfaced enhanced Raman spectroscopy to increase the effect of the electric field on the adsorbed molecules, and silver doping of the TiO₂ may increase the electron transport from the dye to the TiO₂. A second effect that could enhance the efficiency of a DSSC is an increase in the conductivity of the electrons through the metal-doped TiO₂ particles to the conductive electrode.

Titanium dioxide was doped with metals including silver. DSSCs were constructed using the metal-doped TiO₂. Doped and un-doped TiO₂ was applied to the conductive glass in multiple layers using doctor blade technique. The metal-doped TiO₂ was applied either as only one layer or as all of the layers in the DSSC. Pressure was applied after each layer application. Different metal loadings were used (range 0.25 to 1 wt.%) and the doped and undoped layers were applied in different positions relative to the conductive glass surface. The plates were sensitized with N3 dye. IV curves and efficiencies were compared.

References:

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