

The Electrochemical Properties of Photoanode with Liquid PEG-EEM Binder in the Dye-Sensitized TiO₂ Solar Cells

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The preparation of TiO₂ photoanode with monodisperse copolymer binders of styrene, n-butyl acrylate, and methacrylic acid, such as poly(ethylene glycol)-ethyl ether methacrylate (PEG-EEM), were prepared by soap-free emulsion copolymerization using a PEG-EEM macromonomer and their application for dye-sensitized solar cells (DSSCs) were investigated. The samples were characterized by morphology was investigated by field emission scanning electron microscopy (FE-SEM). The photoelectrochemical properties of the thin films and the performance of DSSCs were measured by photovoltaic-current density, AC impedance and monochromatic incident photon-to-current conversion efficiency (IPCE). The good uniformity of TiO₂ thin films used the liquid copolymer binder suggested that the PEG-EEM macromonomer acts as an effective stabilizer in the replacement of surfactant in emulsion polymerization. Energy conversion efficiency of approximately 6.5 % has been achieved for cell with liquid PEG-EEM 2 wt% under illumination with AM 1.5 (100 mWcm⁻²) simulated sunlight.