Electrochemical Properties of Fluorescence Added TiO_2 Photoelectrode on Dye-Sensitized Solar Cells

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The dye-sensitized solar cells (DSSCs) were fabricated by TiO_2 and fluorescence yttrium aluminum garnet ($Y_3Al_5O_{12}$:Ce, YAG:Ce) mixed oxide electrode significantly improved solar energy conversion efficiency when compared to a cell that was fabricated only pure component of TiO_2. Their structural and morphology characterization have been performed using XRD, photoluminescence spectroscopy and field emission scanning electron microscopy. The photoelectrochemical properties of the thin films and the performance of DSSCs were measured by photovoltaic-current density and monochromatic incident photon-to-current conversion efficiency (IPCE). YAG:Ce is a known phosphor showing an efficient long-wavelength, broad luminescence located around 530 nm. The absorption of dye and luminescence properties of YAG:Ce improve photovoltaic properties in TiO_2 photoelectrode. Energy conversion efficiency of approximately 9.1 % have been achieved for cell with conductive glass under illumination with AM 1.5 (100 $mWcm^{-2}$) simulated sunlight.