

Photon-assisted electrochemical construction of <0001>-n-ZnO/<111>-p-Cu₂O photovoltaic devices with intermediate TiO₂ layer

Abstract

The <111>-Cu₂O/<0001>-ZnO photovoltaic (PV) device has been constructed by a photon-assisted electrochemical reaction in aqueous solutions, and the effect of the insertion of the TiO₂ layer prepared by a sol-gel technique on the photovoltaic performance was investigated. The structural, optical, and electrical characterizations were carried out with XRD, FE-SEM, UV-Vis-NIR spectrophotometer, and solar simulator. The <0001>-ZnO/TiO₂/<111>-Cu₂O PV-devices showed a photovoltaic performance under AM1.5 illumination, and the performance changed depending on the preparation condition for the TiO₂ layer. The substrate-type <0001>-ZnO/TiO₂/<111>-Cu₂O PV device prepared under optimized condition showed a photovoltaic performance with the short-circuit current density of 2.14 mAcm⁻²

Keywords; Photons; Electrochemical reactions; Photovoltaic devices; Sol-gel technique