

Cuprous oxide thin films for a photoelectrochemical cell of ITO/Cu₂O/PVC-LiClO₄/graphite

Abstract

Cuprous oxide (Cu₂O) thin films were formed onto indium tin oxide (ITO) coated glass substrate by sol-gel spin coating technique using different additives namely polyethylene glycol and ethylene glycol. It was found that the organic additives added had an important influence on the formation mechanism of Cu₂O films and lead to different microstructures and optical properties. The films were characterized by X-ray diffraction (XRD), field emission scanning electron microscopy (FESEM) and ultraviolet-visible spectroscopy (UV-Vis). Based on the FESEM micrographs the grain size of film prepared by polyethylene glycol has smaller grain of about 83 nm with irregular shape. The highest optical absorbance film was obtained by the addition of polyethylene glycol which improved optical properties due to fine crystalline grain and thus decreases the scattering. The prepared cuprous oxide thin films were used as working electrodes for photovoltaic cell of ITO/Cu₂O/PVC-LiClO₄/graphite and tested using current-voltage characteristic under light illumination and also in the dark.