

Electrodeposited ZnO—Nanowire/Cu₂O Photovoltaic Device with Highly Resistive ZnO Intermediate Layer

Abstract

Cl-doped ZnO-nanowire (Cl:ZnO-nws)/Cu₂O photovoltaic devices were prepared by electrodeposition in aqueous solutions, and the effects of the insertion of the highly resistive ZnO (i-ZnO) layer has been demonstrated by an improvement of the photovoltaic performance. The Cl:ZnO-nws and i-ZnO layer were prepared by electrodeposition in a zinc chloride aqueous solution with saturated molecular oxygen and simple zinc nitrate aqueous solution, respectively. The i-ZnO layer was directly deposited on the Cl:ZnO-nws and suppressed the electrodeposition of the Cu₂O layer on the Cl:ZnO-nws. The insertion of the i-ZnO layer between the Cl:ZnO-nws and Cu₂O layers induced an improvement in the photovoltaic performance from 0.40 to 1.26% with a 0.35 V open circuit voltage, 7.1 mA·cm⁻² short circuit current density, and 0.52 fill factor due to the reduction of the recombination loss.

KEYWORDS: [Zinc oxide](#), [Cuprous oxide](#), [Nanowire](#), [Electrodeposition](#), [Photovoltaic device](#)