

Exploring Optoelectronic and Electrochemical Behavior of γ -CuI Thin films Prepared by Solid Iodination Process

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Abstract

A simple and efficient solid iodination method is reported for the fabrication of p-type γ -CuI thin films. The structural, morphological, optical, electrical and electrochemical properties are studied in order to utilize γ -CuI thin films as effective hole transporting layer in solid state solar cells. The fabricated films exhibited p-type conductivity with resistivity of $7.0 \times 10^{-2} \Omega\text{cm}$, hole concentration of the film was around 10^{19}cm^{-3} and the mobility was found to be in the range of 15.07 to $18.34 \text{cm}^2 \text{V}^{-1} \text{s}^{-1}$. The cyclic voltammetry result shows a maximum specific capacitance of 43mFcm^{-2} at scan rate of 10mVs^{-1} . The cyclic stability and capacitance retention was found to be 99.7%. These findings would assist γ -CuI film as a potential candidate for multiple applications, such as hole transporting material for solid state solar cells and electrochemical supercapacitors.

Keywords: Copper Iodide, Solid Iodination, Hole mobility, Cyclic voltammetry