Studies on SnS_2 nanoparticles synthesized by chemical process for photovoltaic and photocatalytic applications

알하마디 살레, Sreedevi Gedi, 문보경,
Abdelrahman M Rabie, 심재진, 김우경†
영남대
(wkim@ynu.ac.kr†)

A simple binary metal chalcogenide, tin disulfide (SnS_2) has been proposed as a promising material for solar energy applications as a result of its earth abundant, low-cost, and non-toxic nature. The present work shows the precipitation of SnS_2 nanoparticles (NPs) and the deposition of SnS_2 thin films by a simple chemical precipitation method and spin coating technique, respectively. The presence of Sn and S in the deposited films along with identical composition were confirmed from XPS results, which the appeared peaks at binding energies of 486.3 eV, 494.6 eV; and 162.5 eV assigned to Sn $3d_{5/2}$, Sn $3d_{3/2}$ and S $p_{3/2}$ of SnS_2 films respectively. The characteristic vibrational modes at ~310 cm^{-1}, assigned to hexagonal SnS_2 were confirmed from Raman spectrum results. The current density–voltage (I–V) measurements of the CIGS solar cell showed open circuit voltage (V_{OC}) of 0.41 V, short circuit current density (J_{SC}) of 25.67 mA cm^{-2}, fill factor (FF) of 49% and conversion efficiency (η) of 5.14%. Also, as prepared SnS_2 NPs are found to be an efficient photocatalytic for degradation of organic pollution in water.