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Photo conductive response of In^2S^3 film derived from ultrasonic spray pyrolysis

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Indium Sulfide (In_2S_3) is used commonly as a buffer layer in thin film solar cells. In_2S_3 is primarily used as a buffer layer in copper-indium-diselenide, $CuInS_2$ (CIS) photovoltaic solar cells. In the last decade, researchers focused on environmental friendly In_2S_3 buffer layer in solar cells because of its property of stability at room temperature, photo response and replacement to toxic materials such as CdS, PbS, etc. and heavy metals like Mn, Pb etc. Indium Sulfide was deposited by ultrasonic spray pyrolysis at 3300C to form a thin film to separate the active material layer from the transparent conductive oxide (TCO) thin film. Aqueous solution of indium chloride ($InCl_3$) and thiourea (NH_2CSNH_2) in the molar ratio of 1.2:8 were used to deposit the binary In-s film. Moreover, it is very important to mention here that the ultrasonic impact nozzle used in this study enabled using very little amount of solution. The deposited thin films were annealed at 3500C temperature and characterized structurally, optically using RDX, X-ray diffraction, UV-visible-IR spectroscopy and Raman spectroscopy. In this study we report novel way of use of In_2S_3 as a photo sensor photo conductivity and rapid photo response for pure In_2S_3 thin films on a glass substrate. This promising result can be the key for large-area manufacturing of $CuInS_2$ based solar cells.

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