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Molecular Precursors in Aqueous Solution for CIGSe Solar Cells

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ABSTRACT

Thin film solar cells are one of the most promising alternatives to traditional silicon based solar cells. Copper, indium, gallium, and sulfur/selenium (CIGS) act as the absorber layer in one type of thin films. CIGS films are preferable to silicon because they can have wider applications, such as flexible solar cells. The highest efficiency CIGS solar cells have been made using either expensive vacuum equipment or highly toxic chemicals. This study investigates non-toxic molecular precursor solutions deposited by spray coating. Stoichiometric amounts of CIGS are dissolved in ammonium thioglycolate and ammonium hydroxide to create the molecular precursor solution. This solution is then spray coated onto a molybdenum coated glass substrate. The CIGS coated substrate is then selenized to encourage crystal growth. The selenized substrate is then made into a full solar device. The research concluded that one can successfully dissolve molecular precursors in water-based solvents and deposit the solution onto a substrate. With some improvements in deposition and the solution's ability to wet the molybdenum, CIGS solar cells could be made using nontoxic, water-based solvents.

KEYWORDS

CIGS, water-based, thin film, spray coat