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# Thin film solar cell using Earth abundant $\text{Cu}_2\text{SnS}_3$ (CTS) fabricated through spray pyrolysis: influence of precursors

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## Abstract

This paper reports optimization and characterization of  $\text{Cu}_2\text{SnS}_3$  (CTS) thin films prepared using simple and economical Chemical Spray Pyrolysis (CSP) technique. Effect of tin precursor (stannic / stannous chloride) on the structural, optical, electrical and morphological properties of CTS thin films were studied. Films have tetragonal structure. It was observed that films prepared using stannic chloride had optimum band gap for solar cell application. Hall measurement results proved that all samples were p-type having electrical resistivity of  $\sim 10^{-3}$  ohm.cm. Using these films,  $\text{Cu}_2\text{SnS}_3$  (CTS)/  $\text{In}_2\text{S}_3$  (InS) solar cells were prepared (with structure ITO/CTS/InS/Ag). Solar cell fabricated with stannic chloride precursor shows four times enhancement in cell efficiency.

Keywords:  $\text{Cu}_2\text{SnS}_3$ ; chemical spray pyrolysis; thin film solar cell;

## 1. Introduction

One of the major reasons that hinder widespread use of solar cells is its high cost. Currently researchers focus on developing cost effective and eco-friendly techniques for the production of photovoltaic devices. Another major challenge is the selection of suitable materials for photovoltaic applications since the power conversion efficiency mainly depends on the materials

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