

The Summer Undergraduate Research Fellowship (SURF) Symposium  
4 August 2016  
Purdue University, West Lafayette, Indiana, USA

## **Amine-Thiol Solution Route Method for Fabricating $\text{Cd}_x\text{Zn}_{1-x}\text{S}$ Thin Film Solar Cells**

Preston Fernandez, Xianyi Hu, Carol Handwerker, Rakesh Agrawal  
Departments of Chemical and Materials Science Engineering, Purdue University

### **ABSTRACT**

Cadmium zinc sulfide,  $\text{CdZnS}$ , is a promising material for the buffer layer of thin film solar cells because the alloy is considerably more cost effective and more optimizable than pure cadmium sulfide,  $\text{CdS}$ , in terms of band gap. The current fabrication methods of the buffer layer often require expensive equipment or produce undesirable impurities in the alloy. This study investigates a cost effective and scalable solution route method to synthesize the  $\text{CdZnS}$  buffer layer. Molecular precursors of  $\text{CdZnS}$  were dissolved in varying molecular ratios of cadmium and zinc in a mixture of hexylamine and propanethiol. The resulting alloys produced were characterized by XRD and UV-VIS spectroscopy to determine the crystallinity and band gap of the  $\text{CdZnS}$  alloy samples as a function of composition. The results from this investigation show that increasing concentrations of zinc in the precursor solutions and the resulting films increase the band gap of the material. The findings of this study support the feasibility of this solution route to synthesize a  $\text{Cd}_x\text{Zn}_{1-x}\text{S}$  buffer layer, and provokes a need for further investigation and optimization of this method.

### **KEYWORDS**

Thin Film Solar Cells,  $\text{CdZnS}$ , Solution Route, Amine Thiol