

**[1][2][3]Electrodeposition and Characterization of CuInSe<sub>2</sub> on Flexible Polymer for Applications in Thin film Solar Cells**

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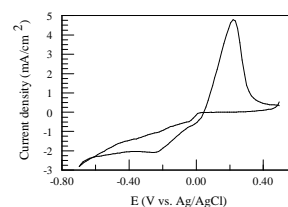


Fig. 1: Cyclic voltammogram of CIS obtained with a rotating (400rpm) platinum disc electrode (0.707 cm<sup>2</sup>) in aqueous solution of sodium acetate; pH 2, Scan rate 10 mV/s

The electrodeposition of copper indium diselenide (CuInSe<sub>2</sub>) (CIS) thin films for solar cell applications has attracted a lot of interest as a low cost approach to producing films over large area at room temperature.<sup>1-3</sup> Several published works demonstrate a considerable influence of the deposition potential and bath composition on the atomic composition of In, Se and Cu present in the film. Despite the efforts and progress made in the electrodeposition of CuInSe<sub>2</sub>, many other fundamental aspects of electrodeposition of the thin film are not known precisely – including the influence of substrates other than Mo, bath transport properties etc. In addition to these is the issue of producing films over a large area that can easily be scaled up to a commercial process at a low cost. In this paper, we present results on the characterization of electrodeposited CIS thin films on flexible polymer substrate. Influence of plating conditions are studied. Our method involves a combination of electroless and electrolytic routes and does not involve use of expensive sputter coating equipment. The process of producing large area solar cells can be accomplished at a very low cost with the method.

A flexible polymer (polyimide, mylar) was catalyzed and electroless nickel plated on it. The electroless nickel served as the electrode for the deposition of CIS. Fig. 1 shows a typical voltammogram from a CIS bath – 10 mM Cu<sup>2+</sup>, 5 mM In<sup>3+</sup> and 10 mM Se<sup>4+</sup> at pH 2.5 in aqueous solution. Figure 2 shows SEM image of CIS electrodeposited on electroless nickel at a constant applied potential of -0.7 V (vs. Ag/AgCl). The details of the effect of plating conditions on the composition, microstructure of the CIS thin films will be presented.

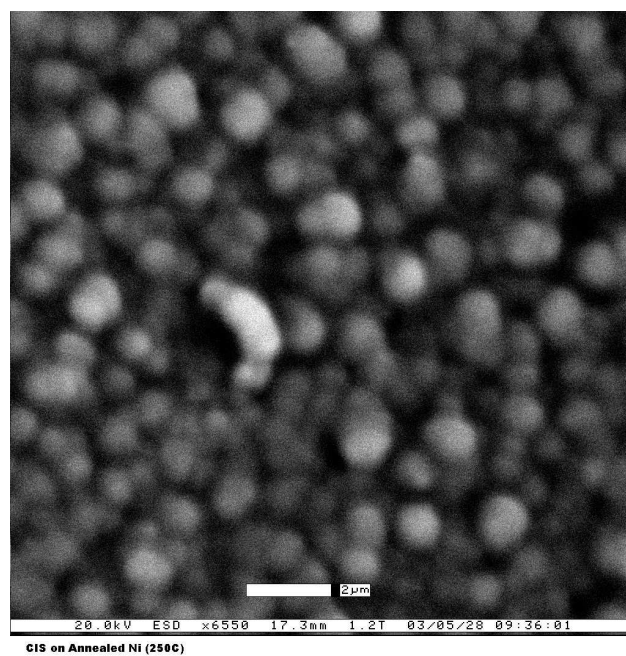


Fig.2: SEM image of electrodeposited CIS on electroless nickel

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