Effect of pH on Electrodeposited CZTS Thin Films on ITO Substrates

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Abstract

In this study, Cu2ZnSnS4 (CZTS) thin films were deposited on ITO substrates by using single step electrodeposition method. CZTS absorber layers have been tried to be obtained at four different pH values of 4.70, 5.10, 5.70 and 6.23 which are commonly used in literature. Trisodium citrate was used as a complexing agent for co-electrodeposition. CZTS thin films annealed for recrystallize in stoichiometric kesterite structure after deposition at 580 °C in sulfur powder and N2 atmosphere for 60 min. It is clear that a highquality film can be obtained in cathodic potential with -1.1 V and deposition time with 2700 seconds, pH value with 5.7 at room temperature respectively. The structural, morphological and optical properties of CZTS thin films have been investigated by using X-ray diffraction (XRD), optical absorption techniques, scanning electron microscopy (SEM), atomic force microscopy (AFM) and Raman spectroscopy measurements, respectively. This indicates that quaternary co-electrodeposition method is a very convenient process for growth of CZTS films for the application in photovoltaic devices.