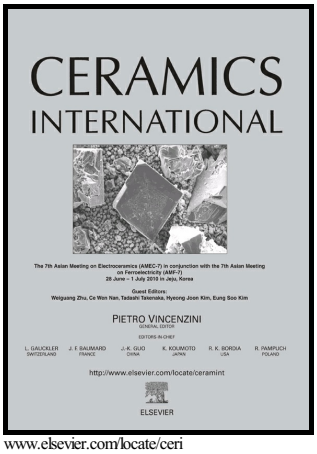
Effect of annealing temperature on structural and morphological studies of electrodeposited CZTS thin films

SK. Shahenoor Basha, M.C. Rao



www.elsevier.com/locate/ceri

PII: S0272-8842(17)32165-X
DOI: https://doi.org/10.1016/j.ceramint.2017.09.224
Reference: CERI16395

To appear in: *Ceramics International*

Received date: 17 September 2017
Revised date: 27 September 2017
Accepted date: 28 September 2017

Cite this article as: SK. Shahenoor Basha and M.C. Rao, Effect of annealing temperature on structural and morphological studies of electrodeposited CZTS thin films, *Ceramics International,* https://doi.org/10.1016/j.ceramint.2017.09.224

Effect of annealing temperature on structural and morphological studies of electrodeposited CZTS thin films

SK. Shahenoor Basha[1] and M.C. Rao[2*]

[1]Solid State Ionics Laboratory, Department of Physics, K. L. University, Guntur – 522502, India

[2]Department of Physics, Andhra Loyola College, Vijayawada- 520008, India

Abstract:

CZTS (Cu_2ZnSnS_4) thin films have been prepared on to ITO coated glass substrates by single bath electrodeposition process. The prepared samples were annealed (calcinated) at different temperatures and subsequently studied for structural, morphological and dielectric properties. XRD pattern showed the characteristic peaks at (112), (200) and (224) planes which correspond to kesterite structure of CZTS thin films. The uniform surface of the film and the increase in grain size of the particles with annealing temperature was confirmed by surface morphology. Dielectric studies revealed that the capacitance of the electrode material in electrolyte comprises the free carrier capacitance across the width of the space charge region. The current-voltage (I-V) characteristics revealed that the current was directly proportional to the applied voltage which resulted in conductivity improvement. Hall measurements showed that the mobility of ions would increase with respect to hall coefficient at different annealed temperatures. The films annealed at 300 ^oC showed p-type semiconducting nature. Based on results, the samples prepared and annealed at 300 ^oC can be used as an absorber layer for the improvement in photoelectric conversion efficiency of a solar cell.

Keywords: CZTS thin films; electrodeposition; Structure; Surface morphology; Raman; Thermo emf.

Corresponding author email: raomc72@gmail.com Ph. No. 0866- 2453485.