

Significance of RTP and its ramp rate effect on the properties of CTS thin films

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To simplify the thin films fabrication process and solve the elements volatility problem, thermal annealing process (RTP) has been widely used for the fabrication of absorber films in two-stage process. In this investigation, Cu₂SnS₃ (CTS) thin films were prepared by two-stage process which involved sputtering and followed by rapid thermal annealing process (RTP). The deposition of CTS thin films was carried out at different heating rates from 10–50 °C/min and the sulfurization temperature of 520 °C. The XRD results confirmed the formation of single-phase monoclinic CTS with high crystalline quality. Raman analysis of sulfurized films showed the Raman modes at 295 cm⁻¹ and 354 cm⁻¹, and these modes confirmed the formation of M-CTS. All the sulfurized films showed Cu/Sn ratio (Cu-poor) close to stoichiometric composition with dense morphology and bandgap energy varied from 0.93–0.95 eV. This article mainly focused and discussed about the influence of heat ramp up rate on the physical properties of M-CTS films.