applied sciences

MDPI

Supplementary Material

Cu(In,Ga)Se2:Te Thin Films for Stoichiometric Compensation by Using Co-Sputtering and Rapid Thermal Annealing †

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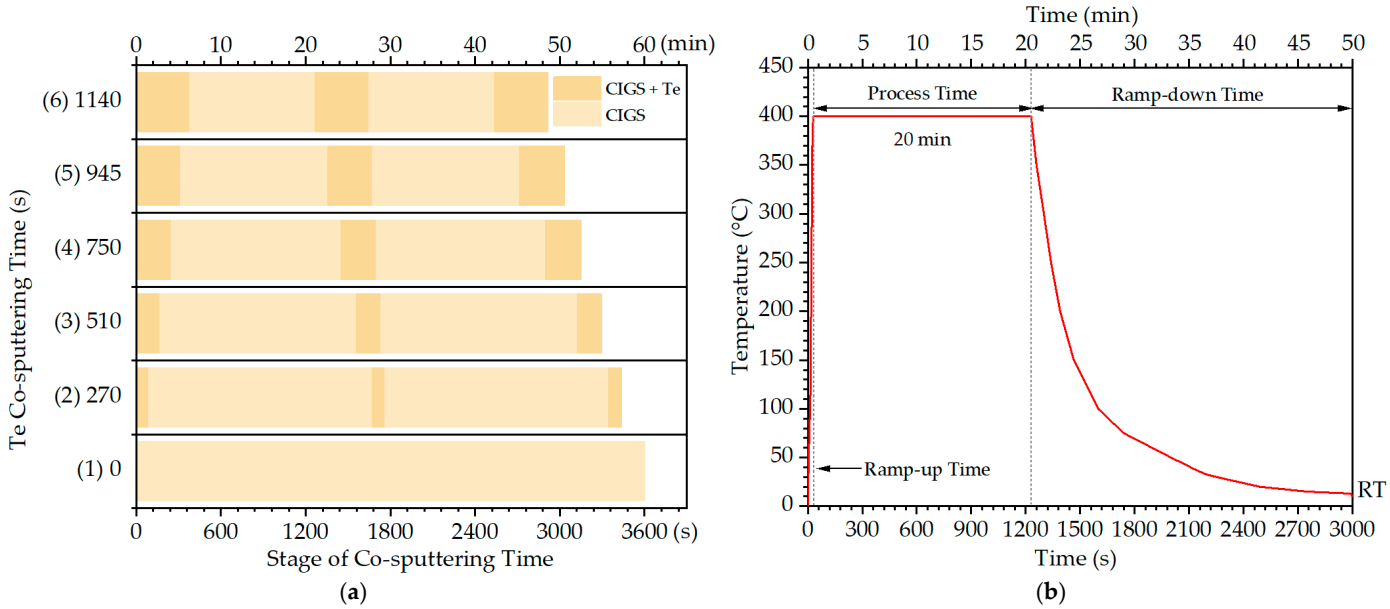
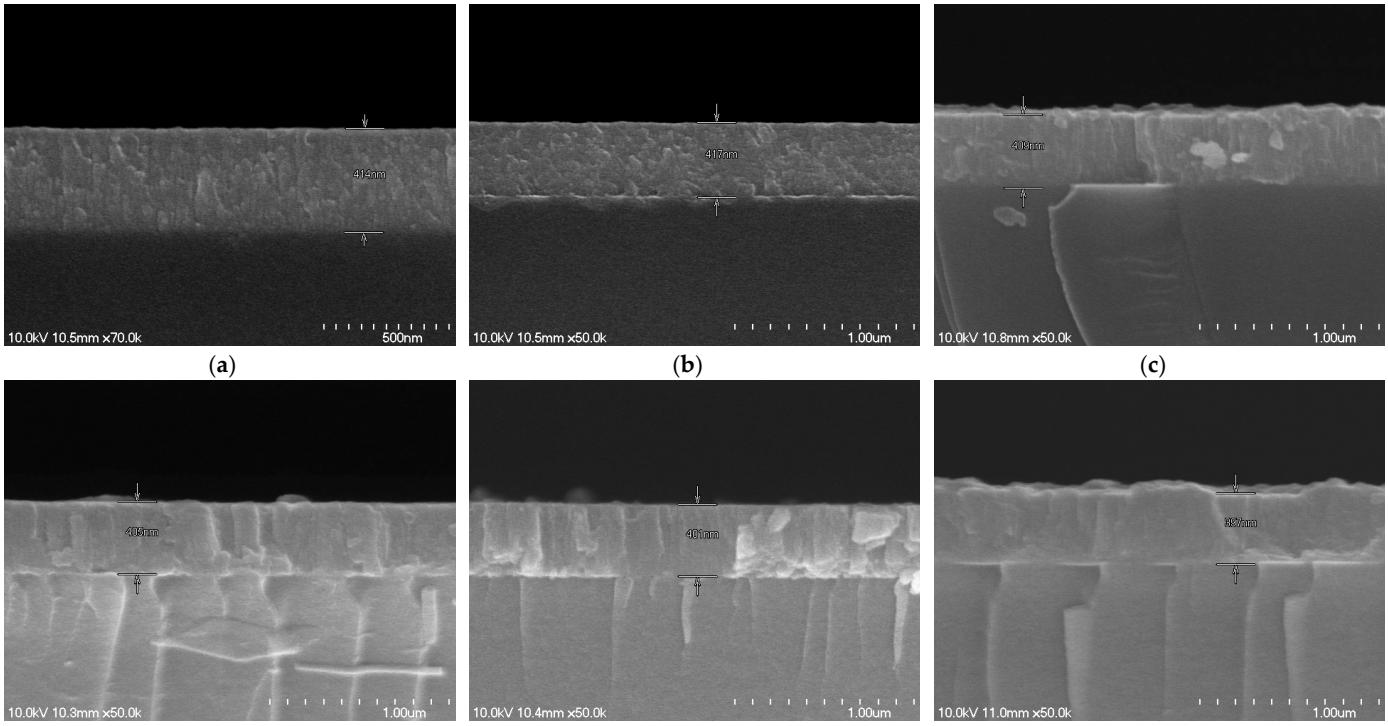


Figure S1. (a) Schematic diagram of the co-sputtering deposition process with different Te co-sputtering times of (1) 0, (2) 270, (3) 510, (4) 750, (5) 945, and (6) 1140 s to prepare CIGS:Te thin films with a total thickness of 400 nm considering the deposition rates of Te and CIGS. All precursors were transferred to a rapid thermal annealing (RTA) system and subjected to heat treatment at 400 °C for 20 min under N_2 ambient. (b) Temperature-time profile of the RTA process for 20 min at 400 °C.



(**a**) (**b**) (**c**)

(**d**) (**e**) (**f**)

Figure S2. Cross-sectional field emission scanning electron microscopy (FESEM) images of the CIGS:Te thin films with Te co-sputtering times of: (**a**) 0, (**b**) 270, (**c**) 510, (**d**) 750, (**e**) 945, and (**f**) 1140 s, corresponding to (a) 414, (b) 417, (c) 409, (d) 405, (e) 401, and (f) 397 nm, respectively. Note the different magnification of the images from (a).