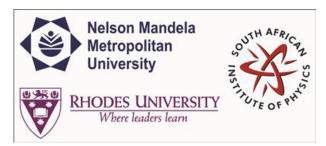
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Selenization dependence of morphological, structural and electrical properties of Cu2ZnSn(S,Se)4 thin films deposited by one-step sputtering

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Abstract content
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Cu2ZnSn(S,Se)4(CZTSSe), a promising absorber material in solar cells, was prepared on Mo/glass substrate by using an environmental friendly and cost-effective process from a self-prepared single ceramic target. Successive selenization for the as-deposited film by radio frequency (RF) magnetron sputtering at a substrate temperature of 200 oC was performed at various temperatures between 400 °C and 600 °C for 1 h without using polluting chemicals or toxic gas. Hall measurements indicated that the as-doposited and selenized films were p-type semiconductor behavior. An improved grain size and crystal quality obtained for CZTSSe film annealed at 600 °C. The hole concentration increased from 1.06 to 2.4 × 1017 cm–3; the hole mobility increased from 2.82 to 6. 9 cm2V-1s-1; and resistivity decreased from 20.92 to 3.7 Ω cm as the precursor film selenized to 600 oC. Both variations can be ascribed to the larger grains with better crystallinity and decreased grain boundary density in the annealed film at 600 °C. An enhanced hole mobility is also important for the cell performance.

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