

Supporting Information

Crystallization mechanism and defect passivation of $\text{Cu}_2\text{ZnSn}(\text{S},\text{Se})_4$ thin film solar cells via in-situ potassium doping

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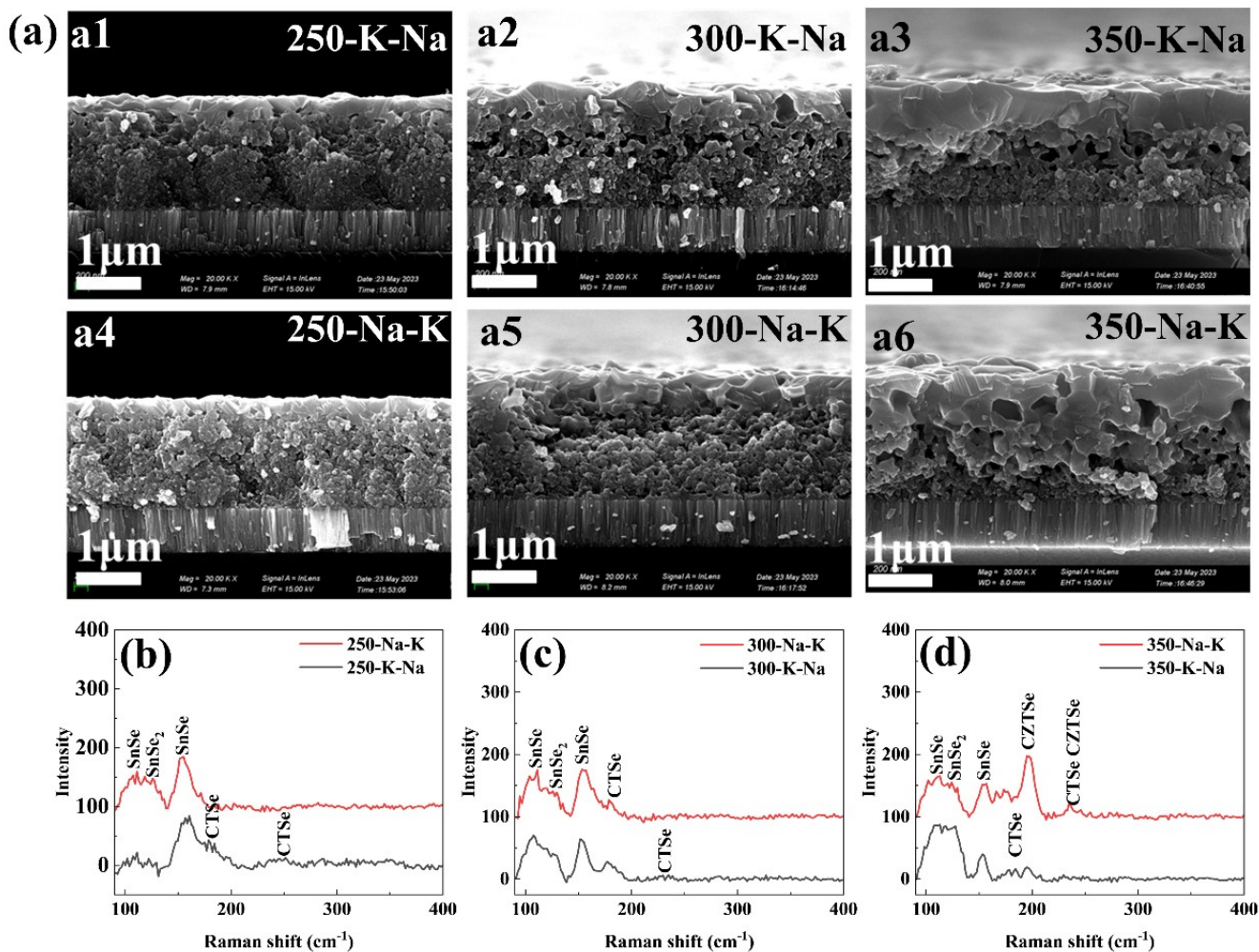


Fig. S1. (a) Cross section SEM images of CZTSSe absorbers annealed at different temperatures (250°C, 300°C and 350°C). Raman spectra of absorbers annealed at (b)250°C, (c)300°C and (d)350°C.

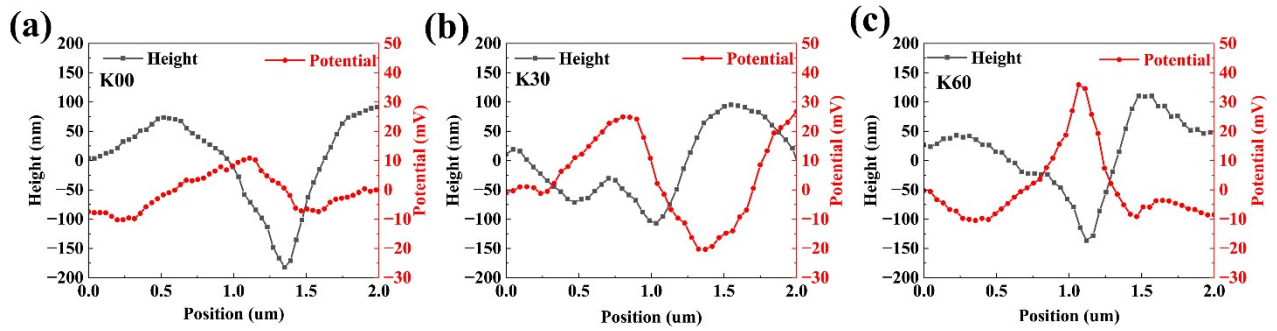


Fig. S2. The line-scan profiles of AFM topography and KPFM potential images of (a) K00, (b) K30 and (c) K60.

Fig. S2(a) (b) (c) are extracted from line-scan shown in the AFM and KPFM images. It is identified that contact potential difference at grain boundaries is improved with the increase of K doping concentration.