

Electronic supplementary information

**A Robust and Low-Cost Strategy to Prepare $\text{Cu}_2\text{ZnSnS}_4$
Precursor Solution and Its Application in $\text{Cu}_2\text{ZnSn}(\text{S,Se})_4$ Solar
Cells**

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Figure S1. A digital photograph of graphite box.

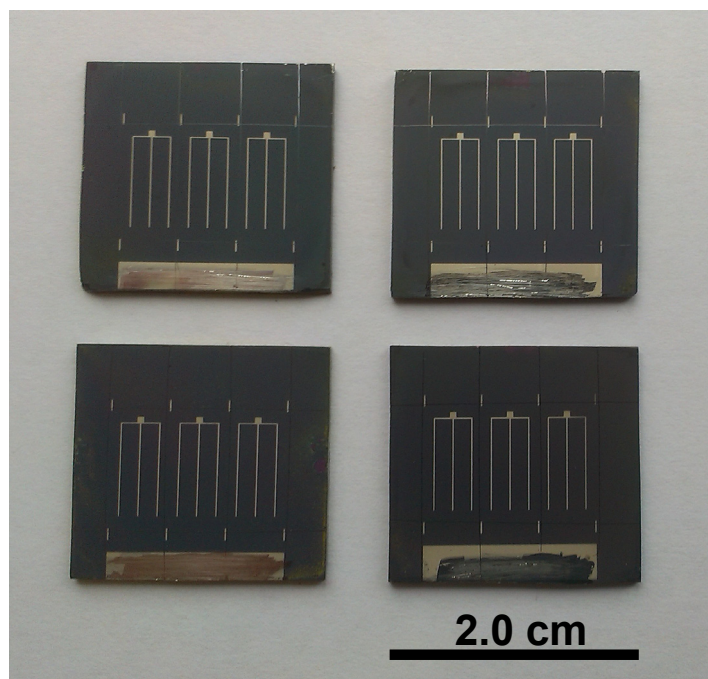


Figure S2. A digital photograph of CZTSSe solar cells.

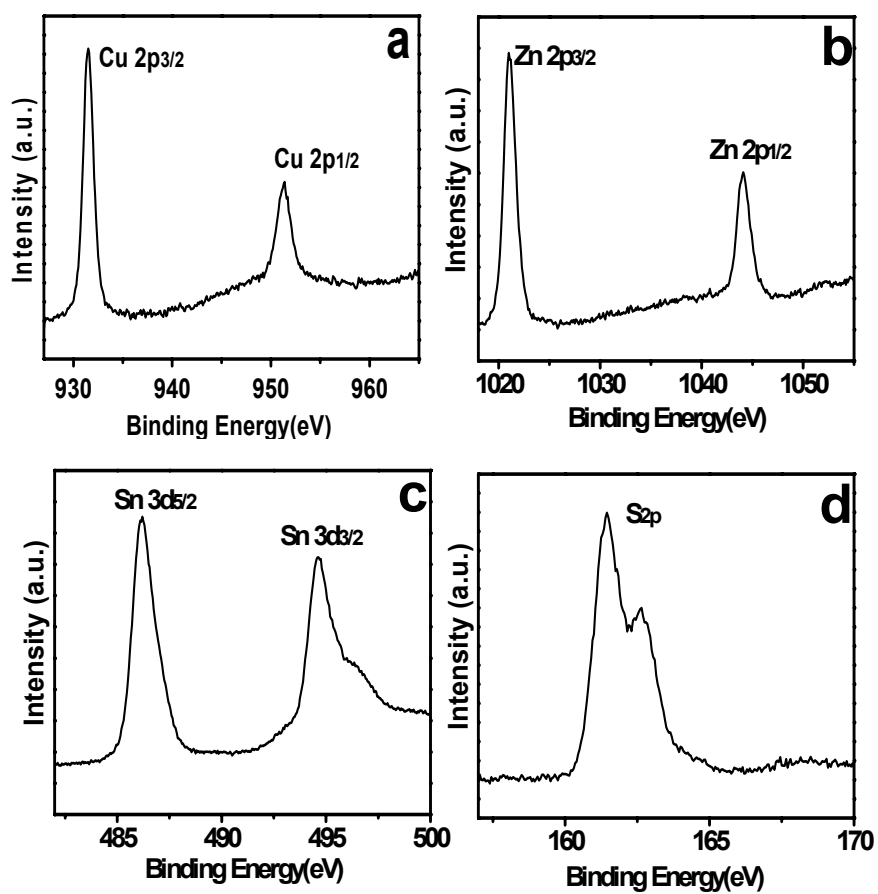


Figure S3. XPS spectra of the as-fabricated CZTS thin film.

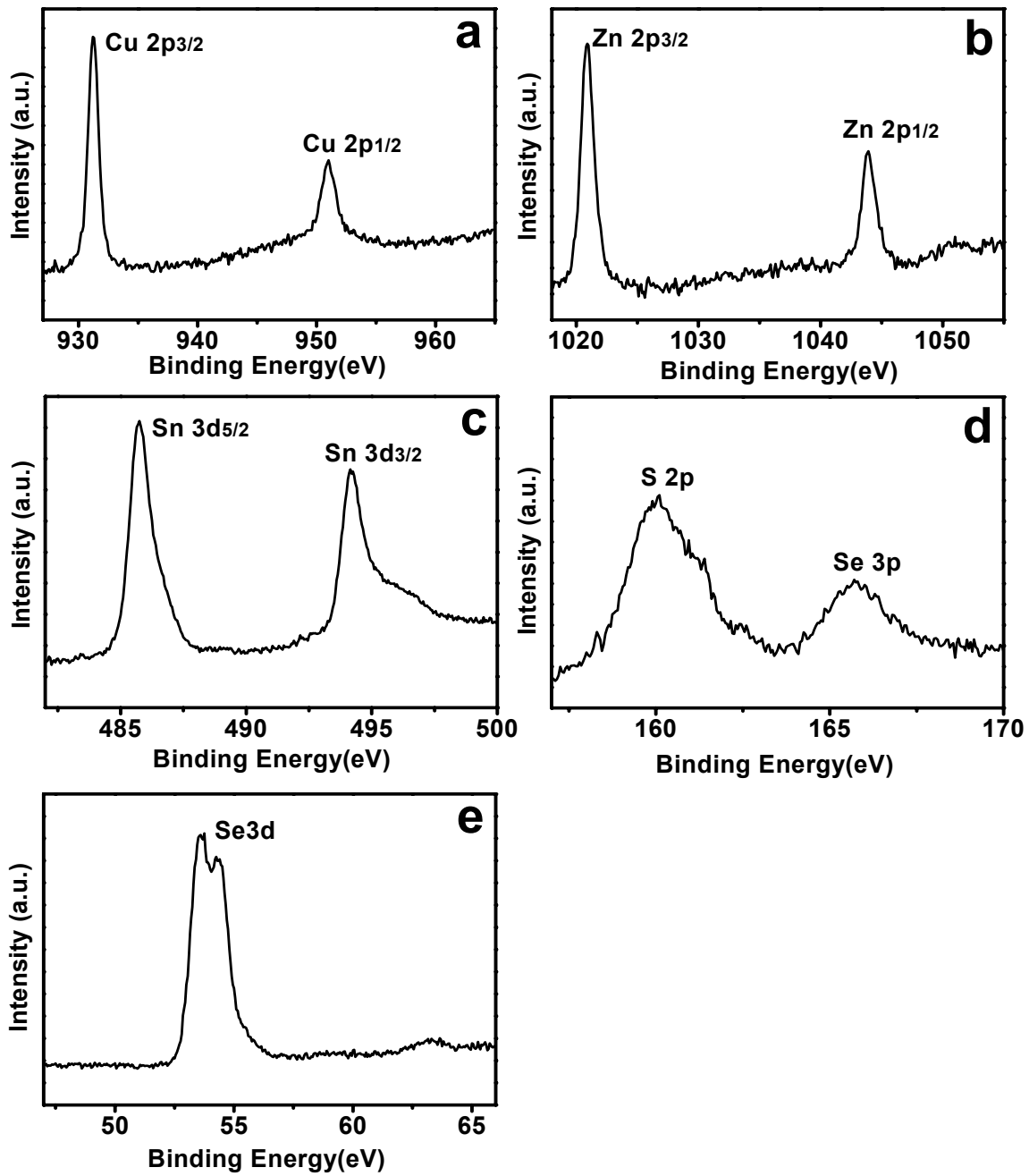


Figure S4. XPS spectra of the selenized CZTSSe thin film.

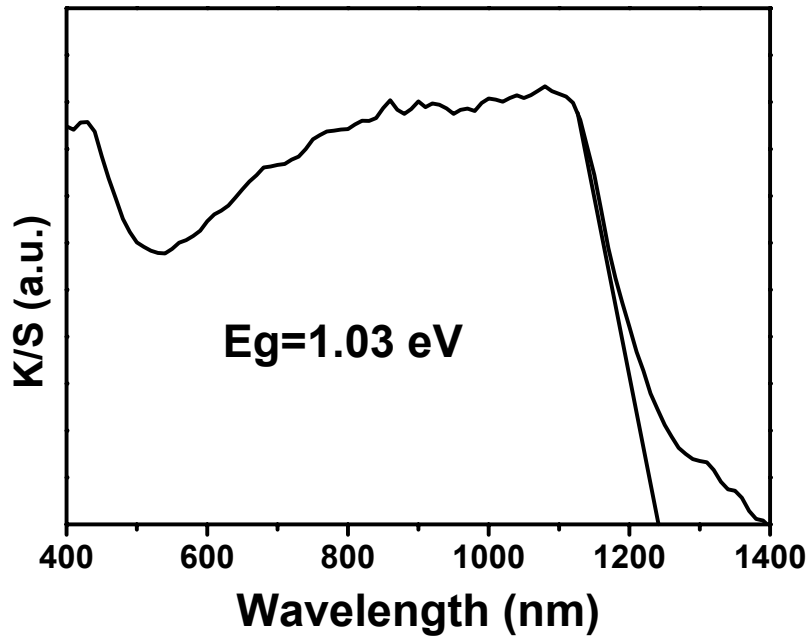


Figure S5. The band gap of selenized CZTSSe thin film was calculated by extrapolating the Kubelka-Munk function to $K/S=0$.