

Enhancing efficiency of $\text{Cu}_2\text{ZnSn}(\text{S},\text{Se})_4$ solar cells by variable temperature sulfoselenation

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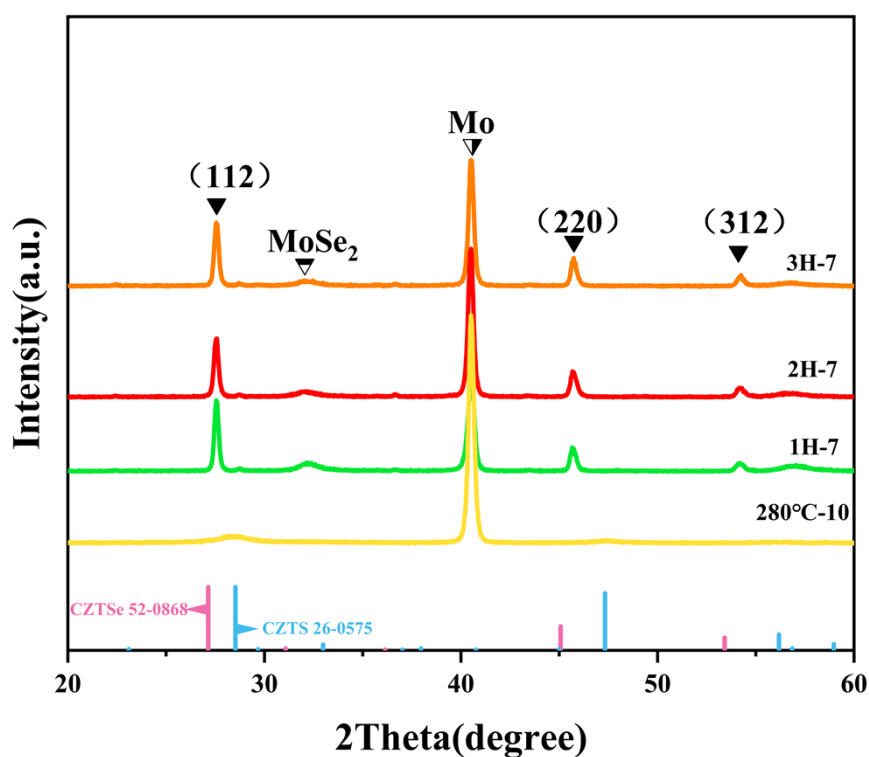


Fig. S1 XRD patterns of CZTSSe films prepared for different sulfoselenation processes.

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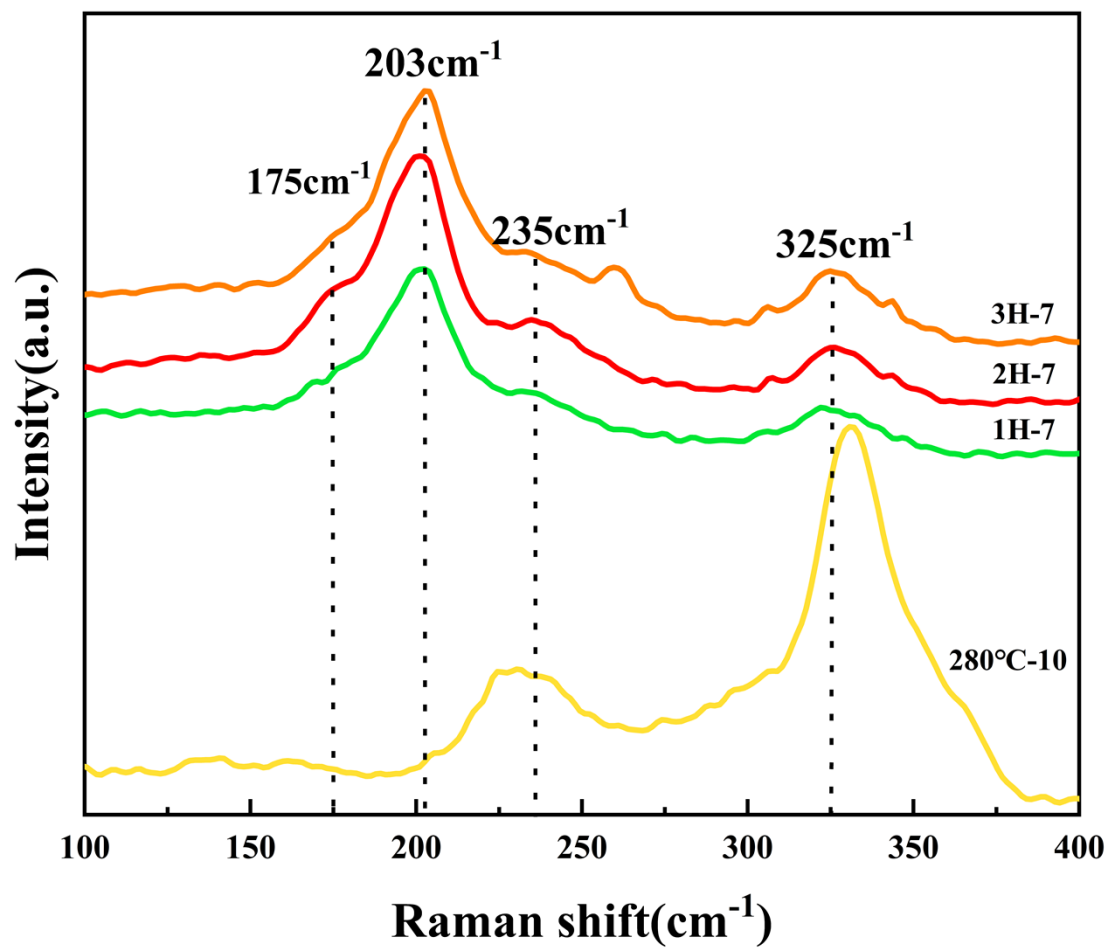


Fig. S2 Raman spectra of CZTSSe films prepared using different sulfoselenization processes.

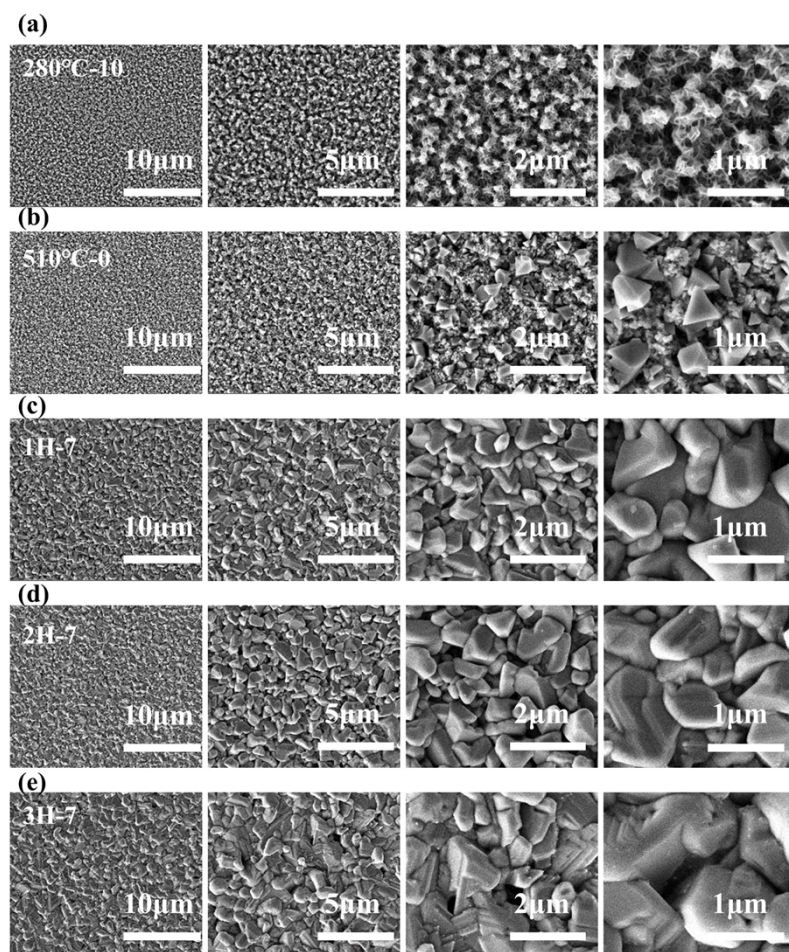


Fig. S3 Top views of different scales of CZTSSe films, (a) 280°C -10, (b) 510°C-0, (c) 1H-7, (d) 2H-7, (e) 3H-7.