Supporting Information

$CuIn(S,Se)_2$ Thin Films Prepared from a Novel Thioacetic Acid-based Solution and Their Photovoltaic Application

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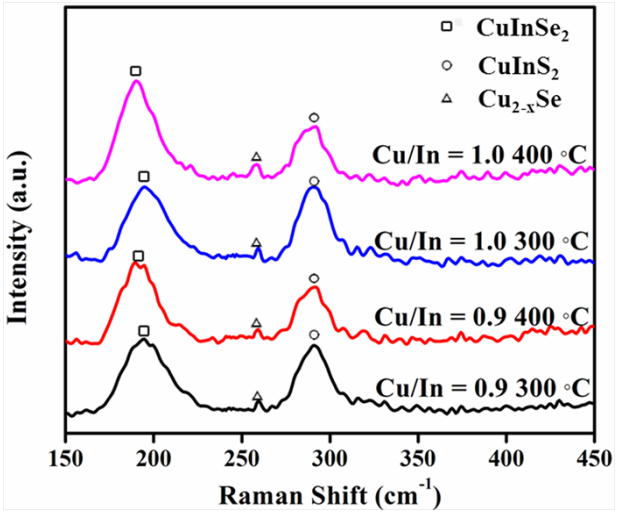

Fig. S1. Raman spectra of CISSe thin films with different Cu/In ratios of 0.9 and 1.0 annealed at 300 ºC or 400 ºC. Copper selenide phase could be detected from all samples.

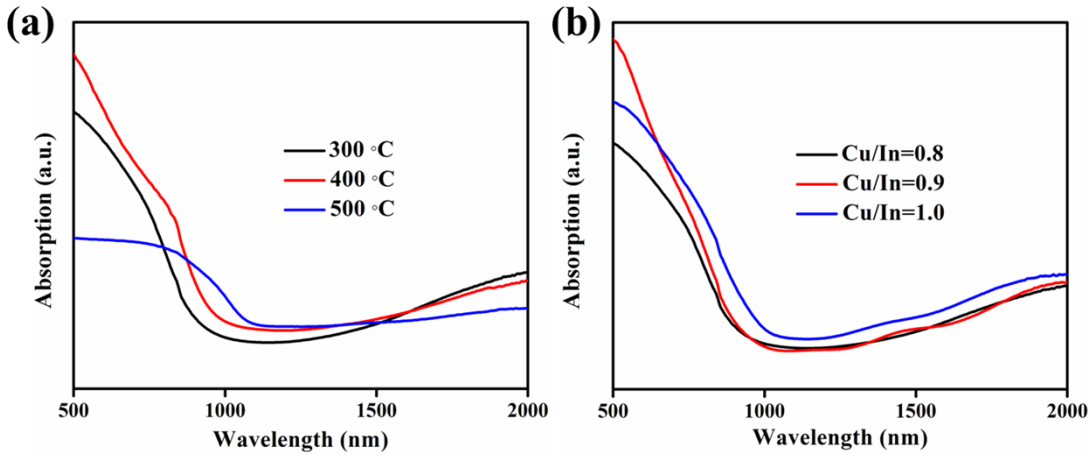

Fig. S2. Absorption spectrum of CISSe thin films with (a) different Cu/In ratios annealed at 500 ºC, (b) different annealing temperature with Cu/In ratio of 0.8 (precursor solution).

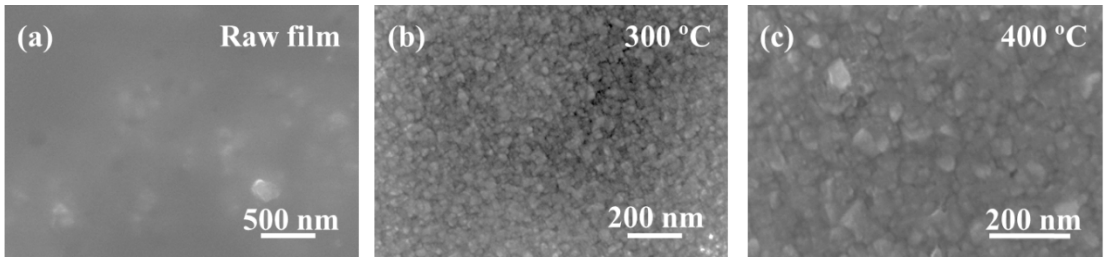

Fig. S3. Top view FESEM images of (a) CIS raw film and CISSe films annealed at (b) 300 ºC and (c) 400 ºC with Cu/In ratio of 0.8.

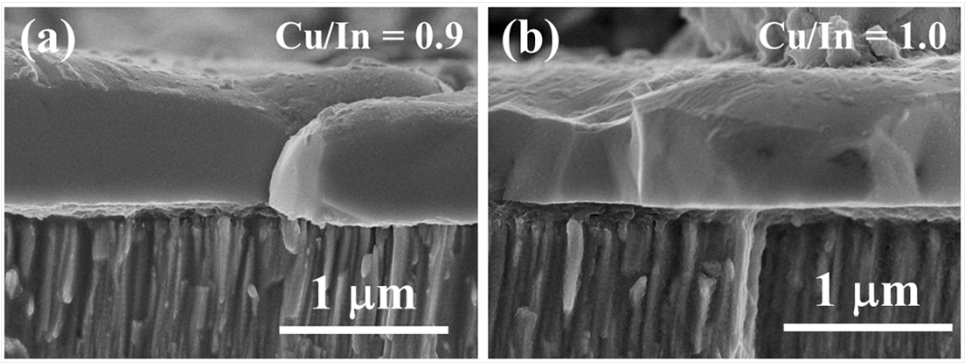

Fig. S4. Cross sectional FESEM images of CISSe thin films with Cu/In ratios of (a) 0.9 and (b) 1.0 after annealing at 500 ºC for 30 minutes.

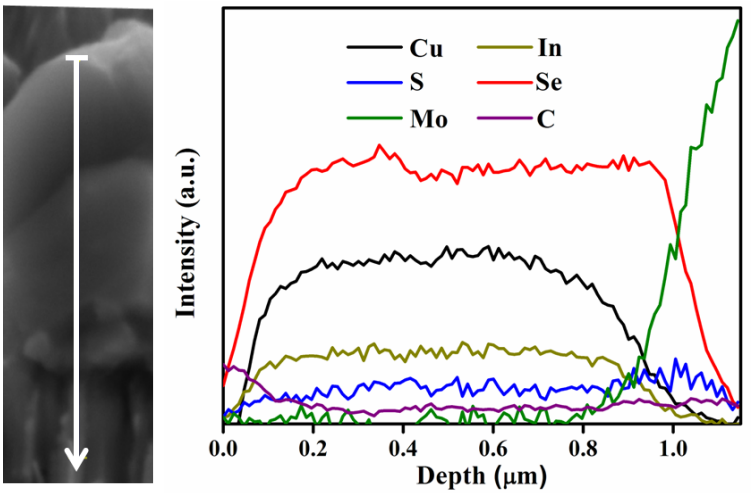

Fig. S5. EDS line-scan profile of CISSe thin film along the direction.

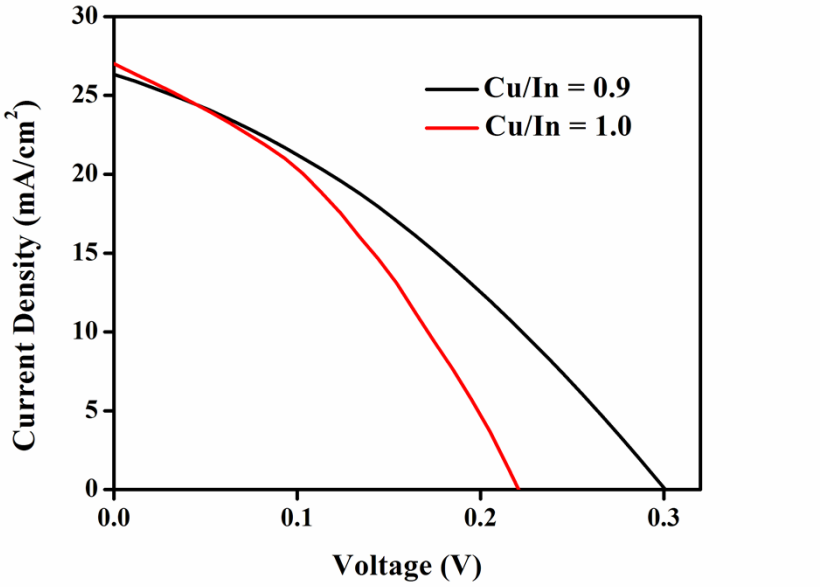

Fig. S6. Current-voltage (J-V) curves of the CISSe-based thin film solar cells with Cu/In ratios of 0.9 and 1.0 under a standard AM 1.5 solar illumination at an intensity of 100 mW/cm^2