

Supporting Information

Stress-induced phase-alteration in solution processed indium selenide thin films during annealing

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Table S1: Crystallite size and Dislocation densities of synthesized In_3Se_2 and In_2Se_3 thin films.

| Phase | Annealing temperature (°C) | Planes (hkl) | FWHM, β (Rad) $\times 10^{-3}$ | Crystallite Size, D (nm) | Dislocation density, δ (lin/m ²) $\times 10^{14}$ |
|--------------------------|----------------------------|--------------|--------------------------------------|--------------------------|--|
| In_3Se_2 | 250 | 004 | 1.75 | 84.58 | 1.40 |
| | | 006 | 2.44 | 61.83 | 2.62 |
| | | 105 | 3.49 | 44.04 | 5.16 |
| | | 008 | 3.90 | 40.60 | 6.07 |
| | | 0012 | 3.14 | 55.52 | 3.24 |
| | 300 | 004 | 1.75 | 84.58 | 1.40 |
| | | 006 | 3.14 | 48.09 | 4.33 |
| | | 105 | 5.06 | 30.37 | 10.85 |
| | | 008 | 5.94 | 26.27 | 14.49 |
| | | 0012 | 3.14 | 55.52 | 3.24 |
| | 350 | 004 | 2.96 | 49.75 | 4.04 |
| | | 006 | 3.50 | 43.28 | 5.34 |
| | | 105 | 3.14 | 48.90 | 4.18 |
| | | 008 | 4.36 | 35.79 | 7.81 |
| | | 110 | 2.44 | 64.24 | 2.42 |
| 0012 | | 3.14 | 55.55 | 3.24 | |
| In_2Se_3 | 300 | 104 | 4.02 | 36.85 | 7.36 |
| | | 111 | 4.02 | 37.01 | 7.30 |
| | | 112 | 2.62 | 56.86 | 3.09 |
| | | 200 | 2.97 | 50.43 | 3.93 |
| | | 106 | 3.49 | 43.12 | 5.38 |
| | | 306 | 4.89 | 33.08 | 9.14 |
| | 350 | 112 | 2.62 | 56.88 | 3.09 |
| | | 113 | 5.59 | 26.77 | 14.0 |
| | | 203 | 2.79 | 53.98 | 3.43 |
| | | 306 | 4.71 | 34.29 | 8.50 |
| | | 313 | 6.63 | 24.69 | 16.40 |

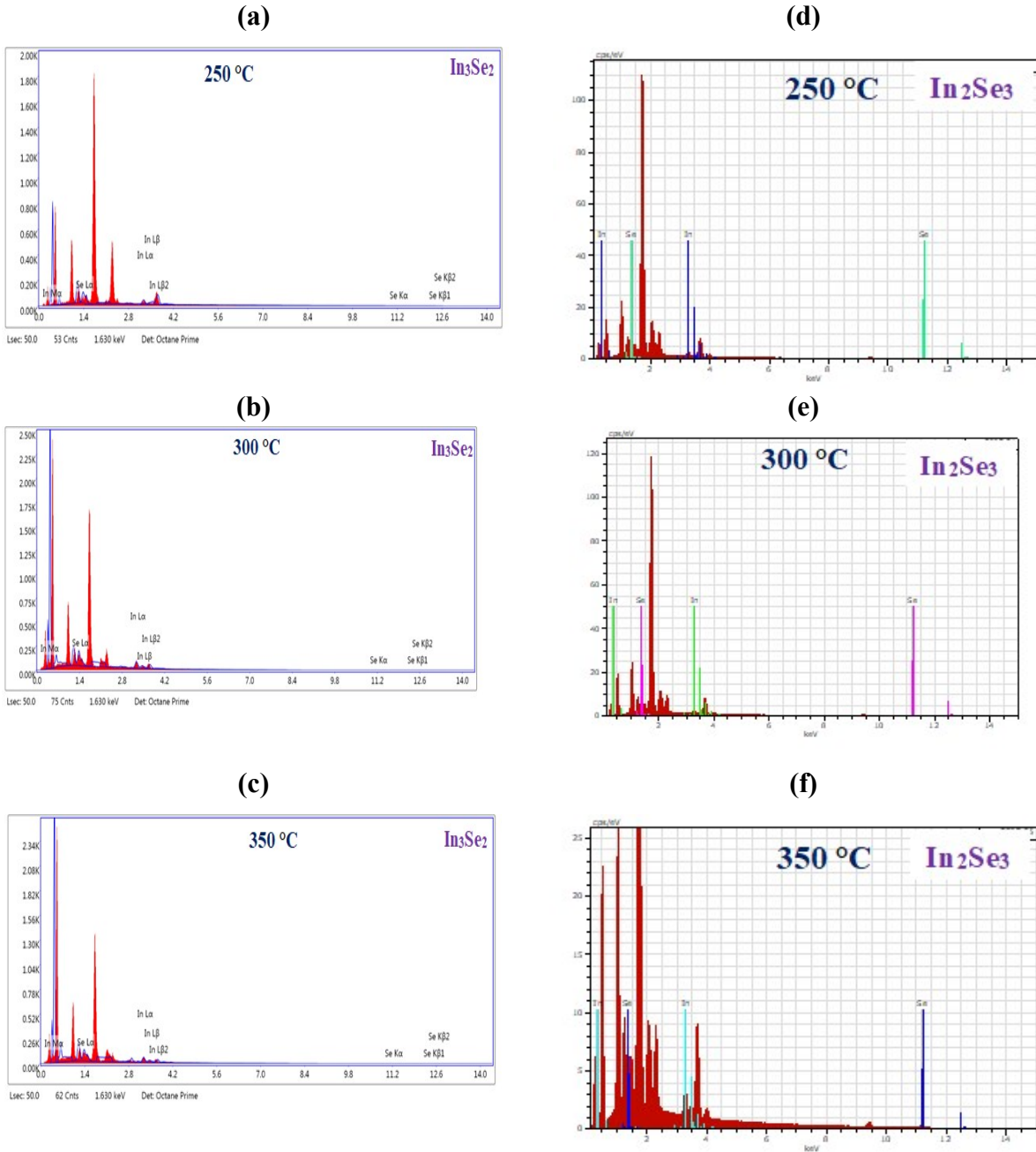
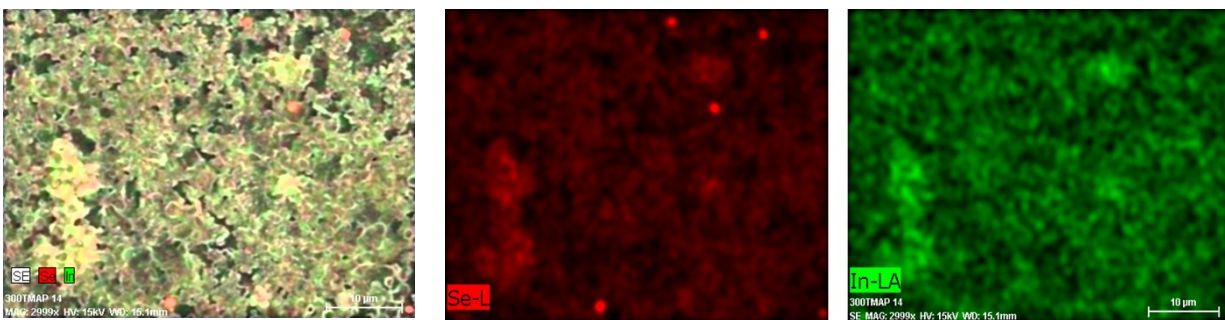
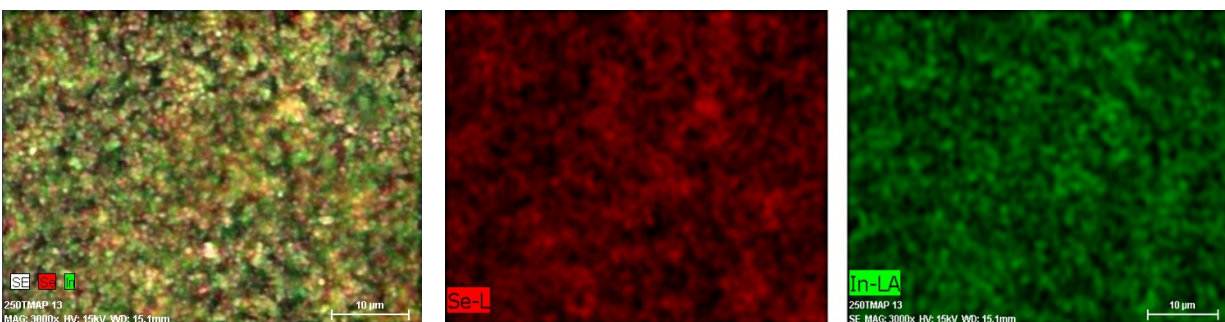


Fig. S1. The EDS spectra of In_3Se_2 and In_2Se_3 thin film deposited by spin coating method using thiol-amine cosolvents.

(a) 250 °C



(b) 300 °C



(c) 350 °C

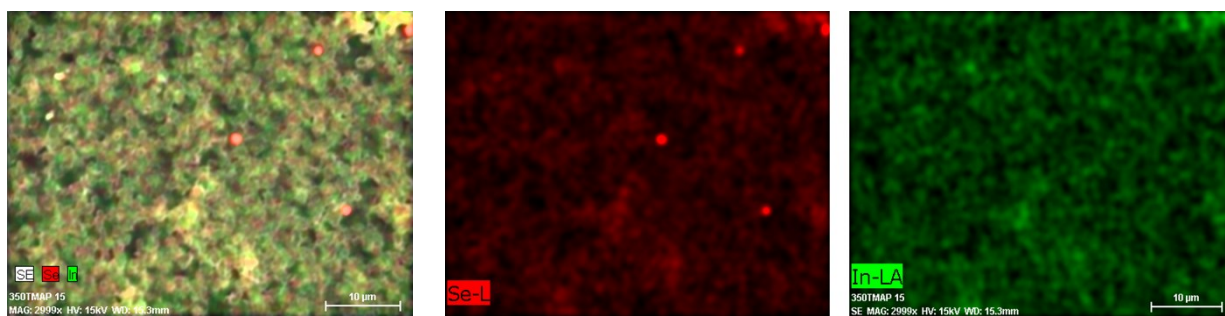


Fig. S2. EDS mapping of In_2Se_3 thin films deposited by spin coating method using thiol-amine cosolvents.

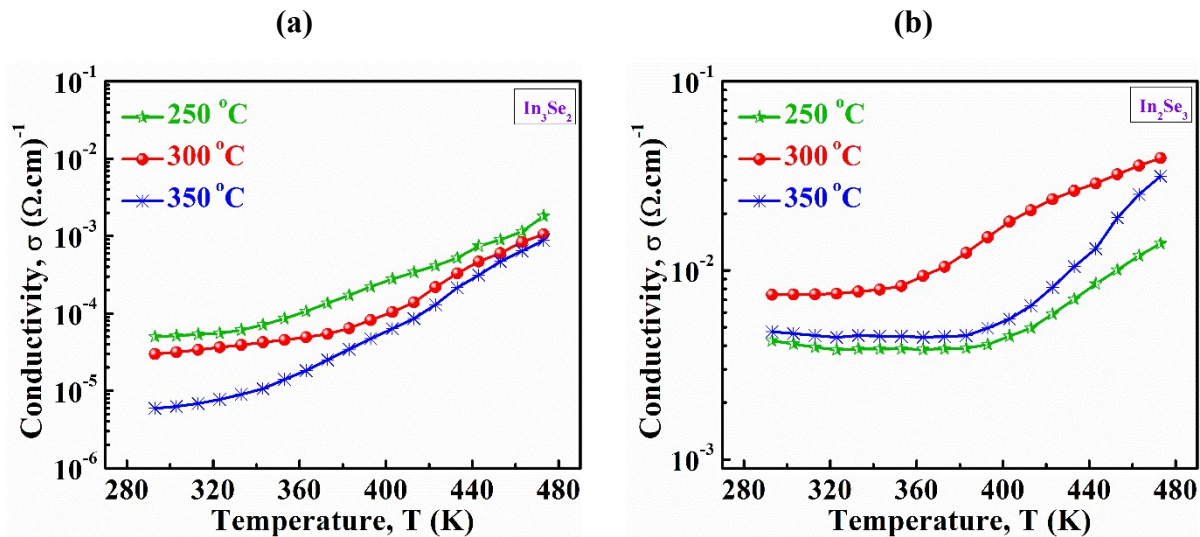


Fig. S3. The electrical study (a-b) temperature dependent conductivity of In_3Se_2 and In_2Se_3 thin films, respectively deposited by spin coating method using thiol-amine cosolvents.

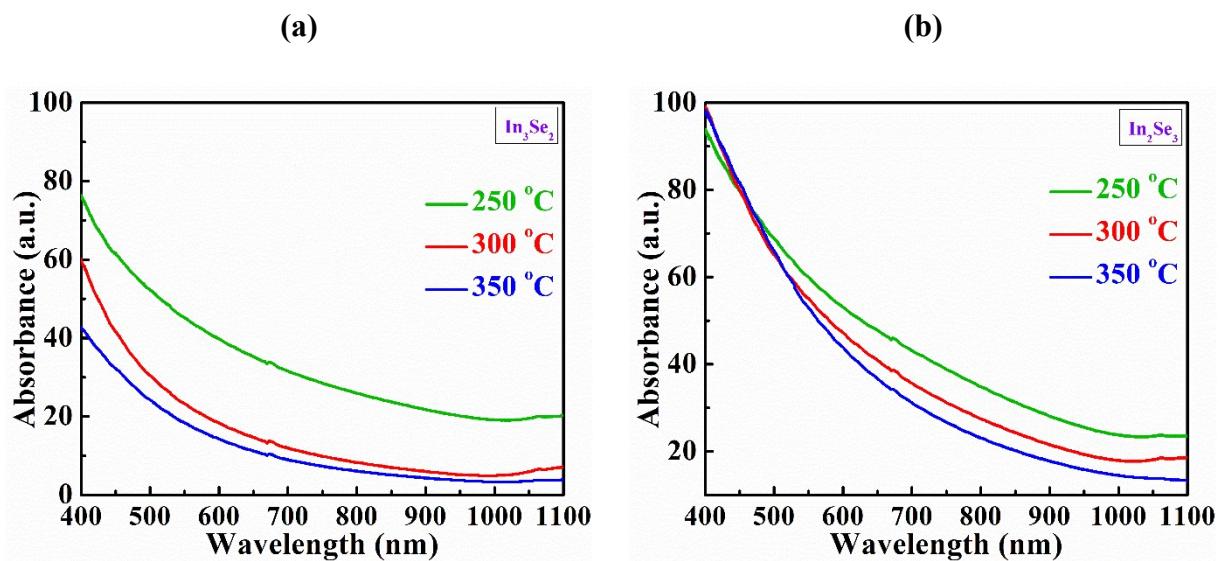


Fig. S4. The (a-b) optical absorbance spectra of spin coated In_3Se_2 and In_2Se_3 thin films, respectively prepared using thiol-amine co-solvents