Reaction Pathways for the Formation of Cu₂ZnSn(Se,S)₄ Absorber Materials from Liquid-Phase Hydrazine-based Precursor Inks

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Electronic Supplementary Information

S. 1.

Raman spectra of (a) SnSe₂-Se solution with SnSe₂ : Se = 1: 1 and (b) Cu₂S-S solution with Cu₂S : S = 1: 2.
S. 2.

Powder XRD pattern of the powder prepared by (a) drying Cu$_2$S-S and SnSe$_2$-Se mixed solution annealing at 200°C, and (b) filtering and drying CZTSe precursor solution. Cu$_2$Sn(Se,S)$_3$ or kesterite is marked by “o” (reference code 01-089-2879); SnSe$_2$ is marked by “*” (reference code 00-023-0602); CuSe is marked by “#” (reference code 00-049-1457); Se is marked by “+” (reference code 00-042-1425); hexagonal ZnX is marked by “@”