Supporting information

Precise Synthesis of Copper Selenide Nanowires with Tailored Cu Vacancies through Photo-Induced Reduction for Thermoelectric applications

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Supporting Figures

**Fig. S1** (a) Surface and (b) cross sectional SEM images of Cu$_{2.00}$Se NW films after pressing.

**Fig. S2** A SEM image of Cu$_{2.00}$Se NW with high magnification.
Fig. S3 (a) Seebeck coefficient ($S$) and (b) Hall mobility ($\mu$) as a function of carrier concentration of Cu$_{2+x}$Se NWs and bulk Cu$_2$Se [S1, S2].

Fig. S4 $S^2\sigma$ of Cu$_{2.00}$Se NWs (this work) as a function of the fabrication temperature, where the data of polycrystalline films [S3-S5] and epitaxial films [S6] were plotted.
Fig. S5 XRD patterns of the samples synthesized by light irradiation for 0-12 hours.

Fig. S6 XRD patterns of (a) Cu$_{1.8}$Se NWs and (b) CuSe NWs. Cu$_{1.8}$Se (CuSe) NWs were synthesized with used Cu/Se ratio of 1.8 (1.0) by light irradiation for 12 (30) hours.
Fig. S7 (a) $S$ and (b) $S^2\sigma$ as a function of $\sigma$ of $\alpha$-Cu$_{2+x}$Se NWs, $\beta$-Cu$_{1.8}$Se NWs and CuSe NWs.
References

(S1) Yu, J.; Zhao, K.; Qiu, P.; Shi, X.; Chen, L. Thermoelectric Properties of Copper-Deficient $\text{Cu}_{2-x}\text{Se}$ ($0.05 \leq x \leq 0.25$) Binary Compounds. *Ceram. Int.* **2017**, *43*, 11142-11148.


