

## Supporting Information:

### Phosphine-Free Synthesis of Ag-In-Se Alloy Nanocrystals with Visible Emission

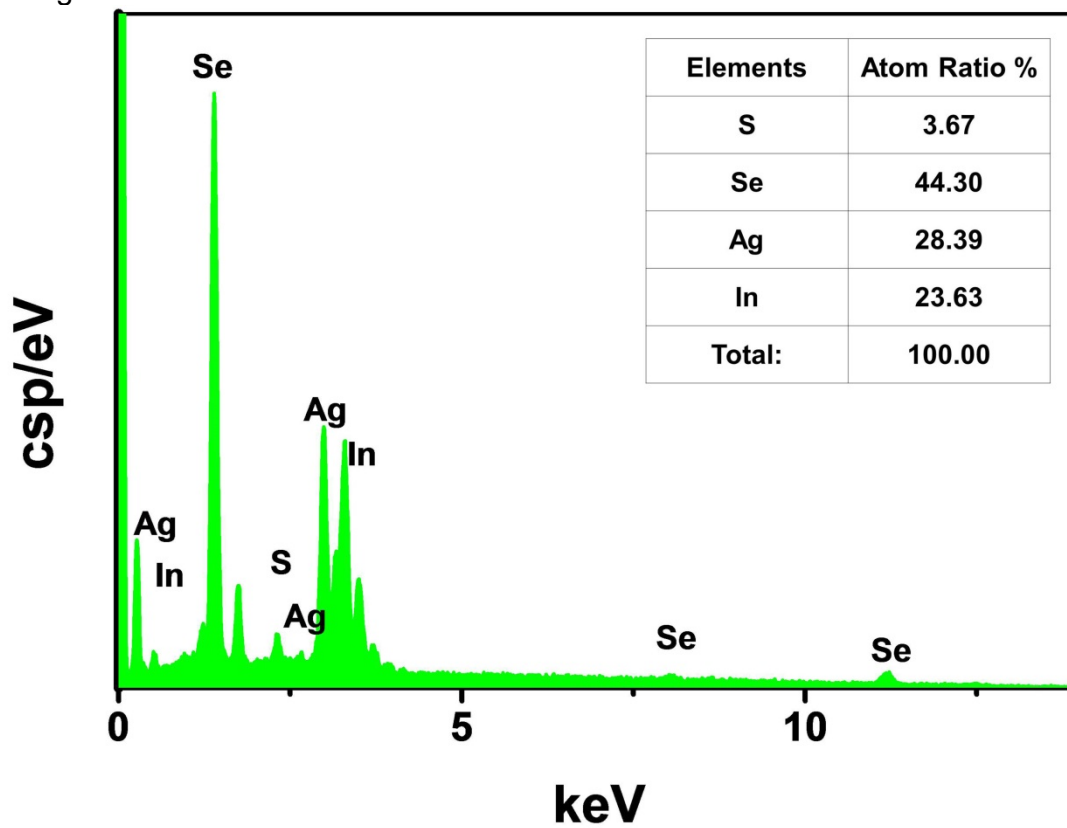
*Dong Yao,<sup>a</sup> Huiwen Liu,<sup>a</sup> Yi Liu,<sup>a</sup> Chunwei Dong,<sup>a</sup> Kai Zhang,<sup>a</sup> Yu Sheng,<sup>\*b</sup> Jianli Cui,<sup>\*c</sup> Hao Zhang<sup>\*a</sup> and Bai Yang<sup>a</sup>*

<sup>a</sup> State Key Laboratory of Supramolecular Structure and Materials, College of Chemistry, Jilin University, Changchun 130012, P. R. China. E-mail: hao\_zhang@jlu.edu.cn.

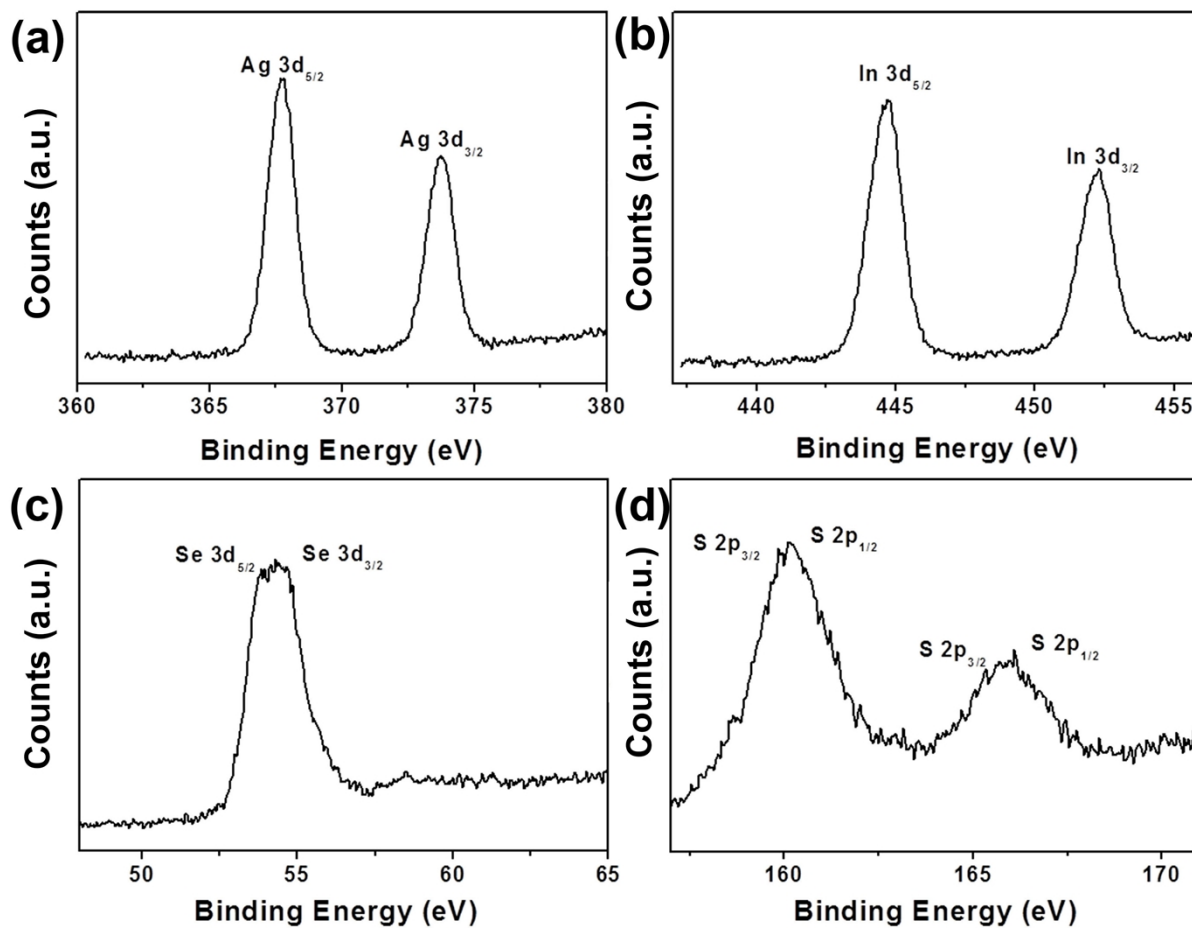
<sup>b</sup> Department of Dermatology, First Affiliated Hospital, Harbin Medical University, Harbin 150001, P. R. China. E-mail: sf555812@163.com.

<sup>c</sup> Department of Hand & Foot Surgery, The First Hospital of Jilin University, Changchun 130021, P. R. China. E-mail: tsuijianli@126.com.

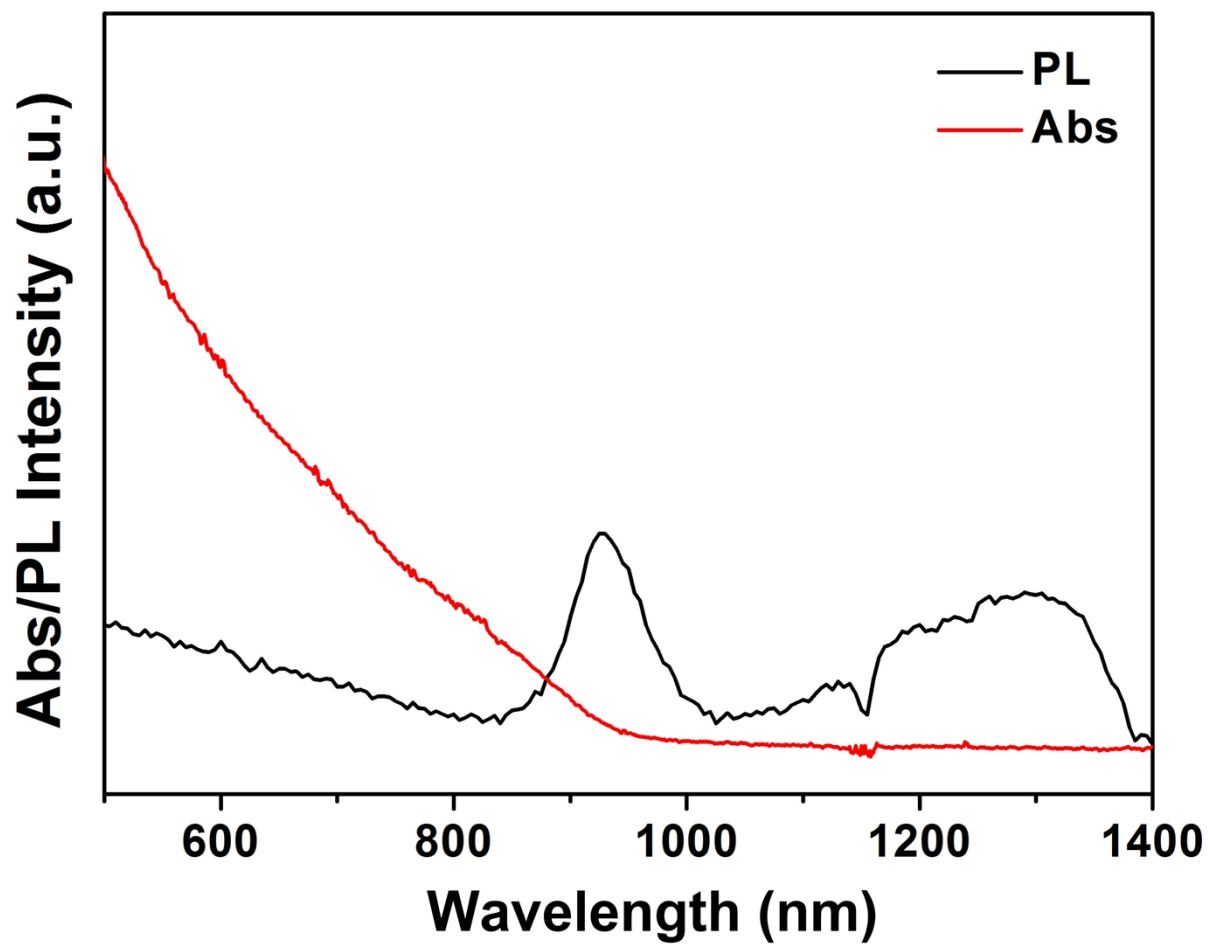
**Fig. S1** EDX spectrum of the Ag-In-Se NCs shown in Figure 1. The molar elemental ratio of Ag/In/Se is 1.00/0.83/1.56.



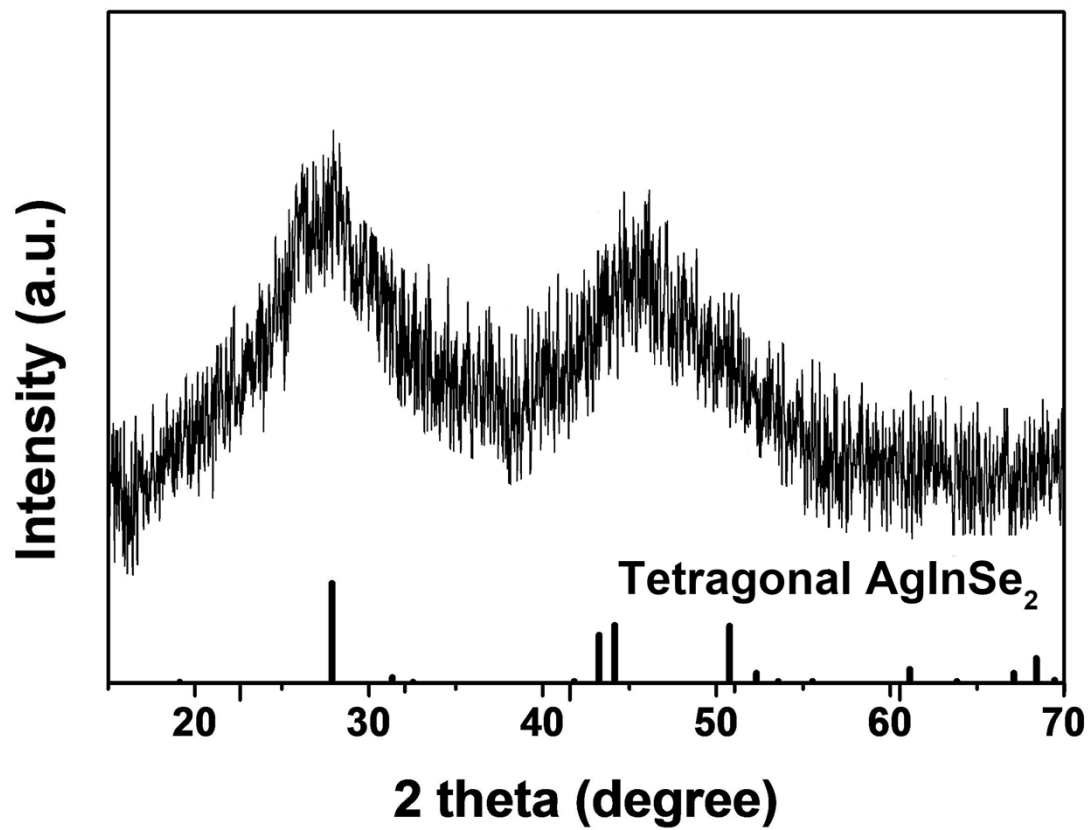
**Fig. S2** XPS Ag3d (a), In3d (b), Se3d (c), and S2p (d) spectra of the as-synthesized Ag-In-Se NCs.



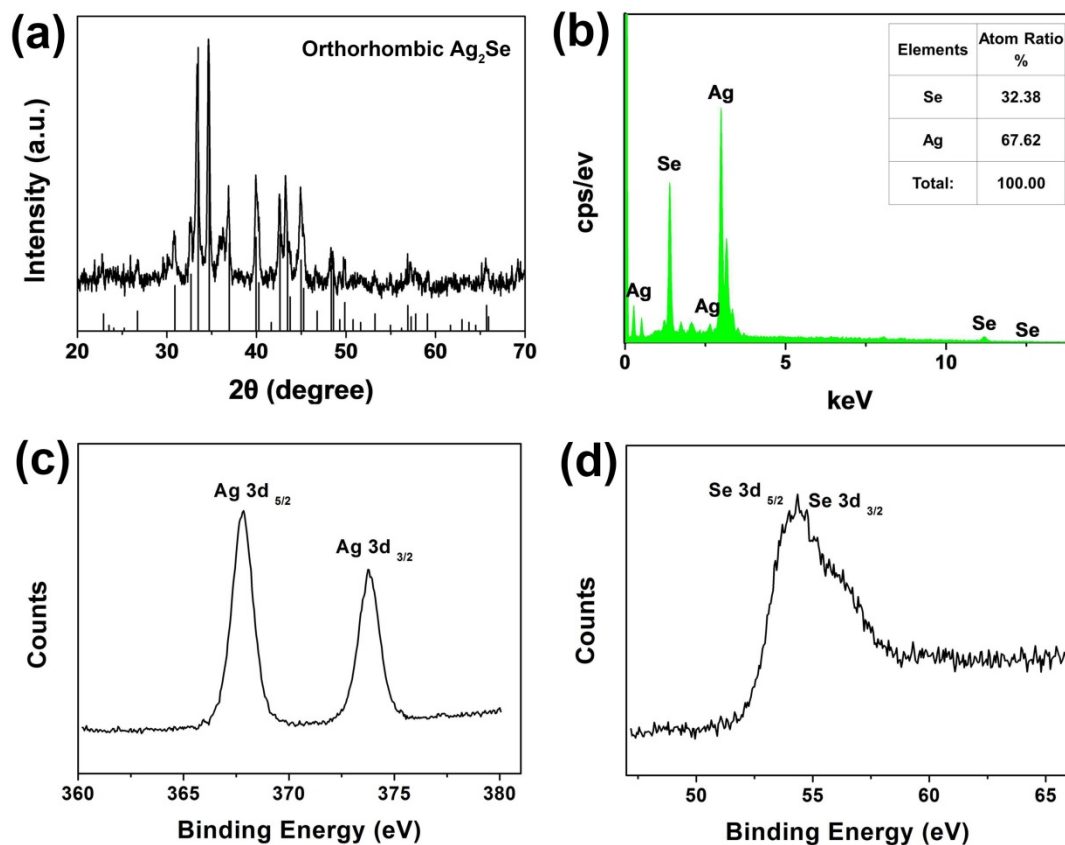
**Fig. S3** Absorption and PL spectra of the Ag-In-Se NCs that are synthesized at 200 °C for 20 min.



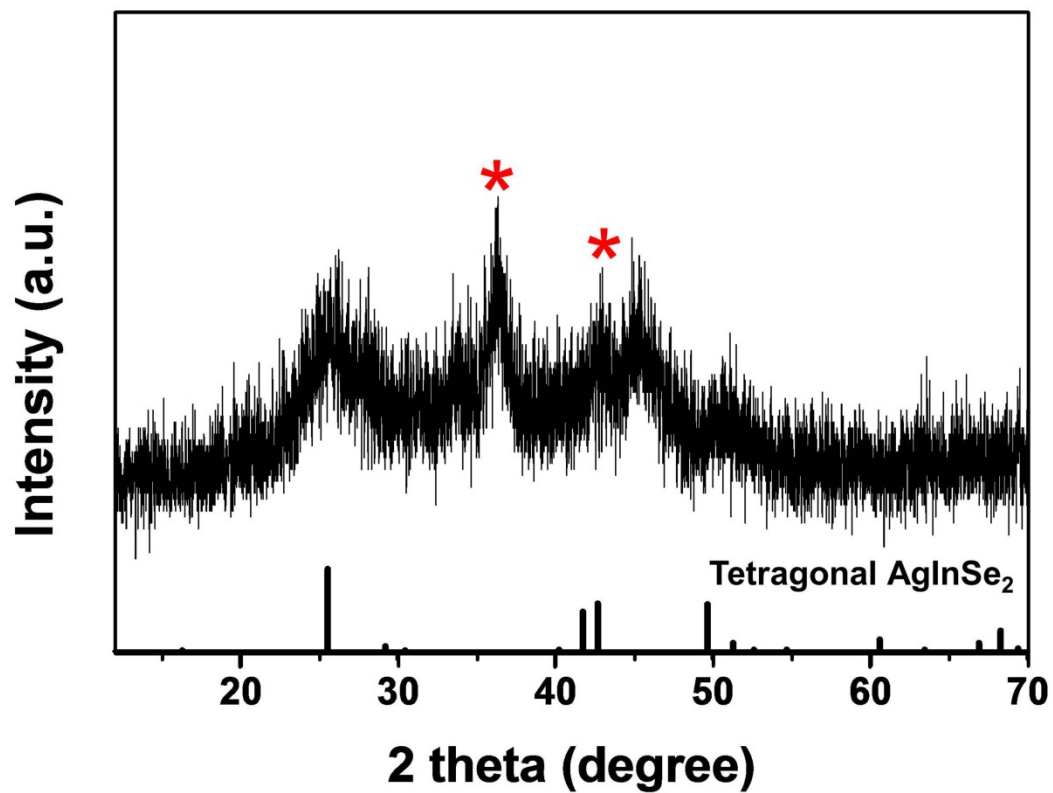
**Fig. S4** XRD pattern of the NCs synthesized at 88 °C for 200 s. The shift of peak positions towards small angle is attributed to the Ag-rich composition.



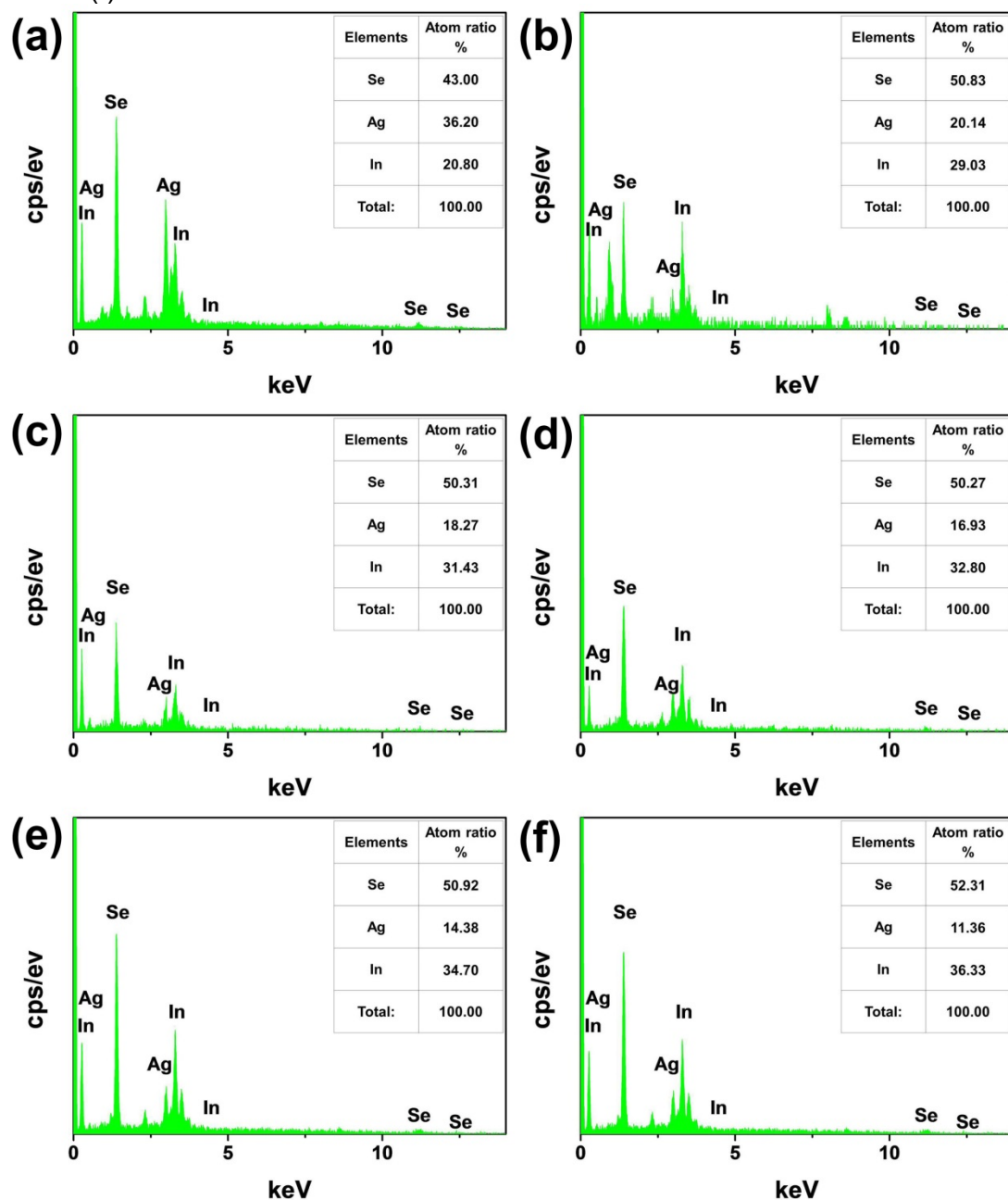
**Fig. S5** (a) XRD pattern of the  $\text{Ag}_2\text{Se}$  NCs synthesized at 88 °C for 150 s. (b) EDX spectrum of the  $\text{Ag}_2\text{Se}$  NCs. XPS Ag3d (c) and Se3d (d) spectra of the  $\text{Ag}_2\text{Se}$  NCs. The products are orthorhombic  $\text{Ag}_2\text{Se}$  NCs with Ag/Se molar ratio of 2.09/1.00.



**Fig. S6** XRD pattern of Ag-In-Se NCs that are synthesized by mixing Ag<sub>2</sub>Se NCs and In-OLA complex at 88 °C. The peaks marked with \* belong to orthorhombic Ag<sub>2</sub>Se.



**Fig. S7** EDX spectra of the Ag-In-Se NCs that are synthesized with the Ag/In molar feed ratio of 1/1 (a), 1/2 (b), 1/3 (c), 1/4 (d), 1/5 (e), and 1/6 (f). The Ag/In ratio of the products are 1.00/0.57 (a), 1.00/1.45 (b), 1.00/1.72 (c), 1.00/1.94 (d), 1.00/2.41 (e), and 1.00/3.19 (f).





**Fig. S8** TEM images (a, c, e), absorption and PL spectra (b, d, f) of the Ag-In-Se NCs that are prepared at 130 (a, b), 160 (c, d), and 200 (e, f) 200 °C for 150 s. The scale bar is 50 nm.

