Electronic Supplementary Information (ESI)

Solution-synthesis of Sb_2Se_3 nanorods using KSeCN as a molecular selenium source

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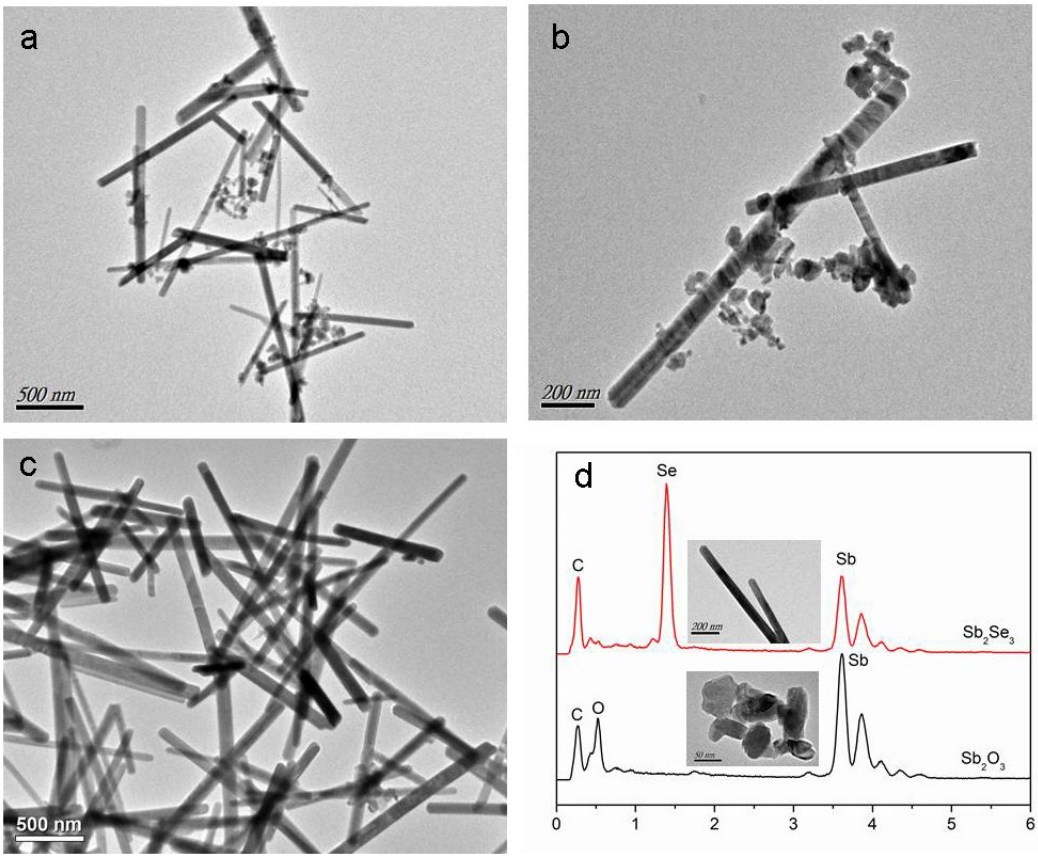

Fig. S1 TEM images of Sb_2Se_3 sample prepared using different $SbCl_3$/KSeCN molar ratios: (a,b) 1:1 and (c) 1:2. It can be clearly seen that 1:1 $SbCl_3$/KSeCN produced a mixture of Sb_2Se_3 NRs and Sb_2O_3 nanoparticles whereas 1:2 $SbCl_3$/KSeCN produced pure Sb_2Se_3 NRs. EDS spectra shown in (d) prove their chemical compositions, which are ~2:3 Sb/Se for Sb_2Se_3 NRs and ~2:3 Sb/O for Sb_2O_3 nanoparticles, respectively.

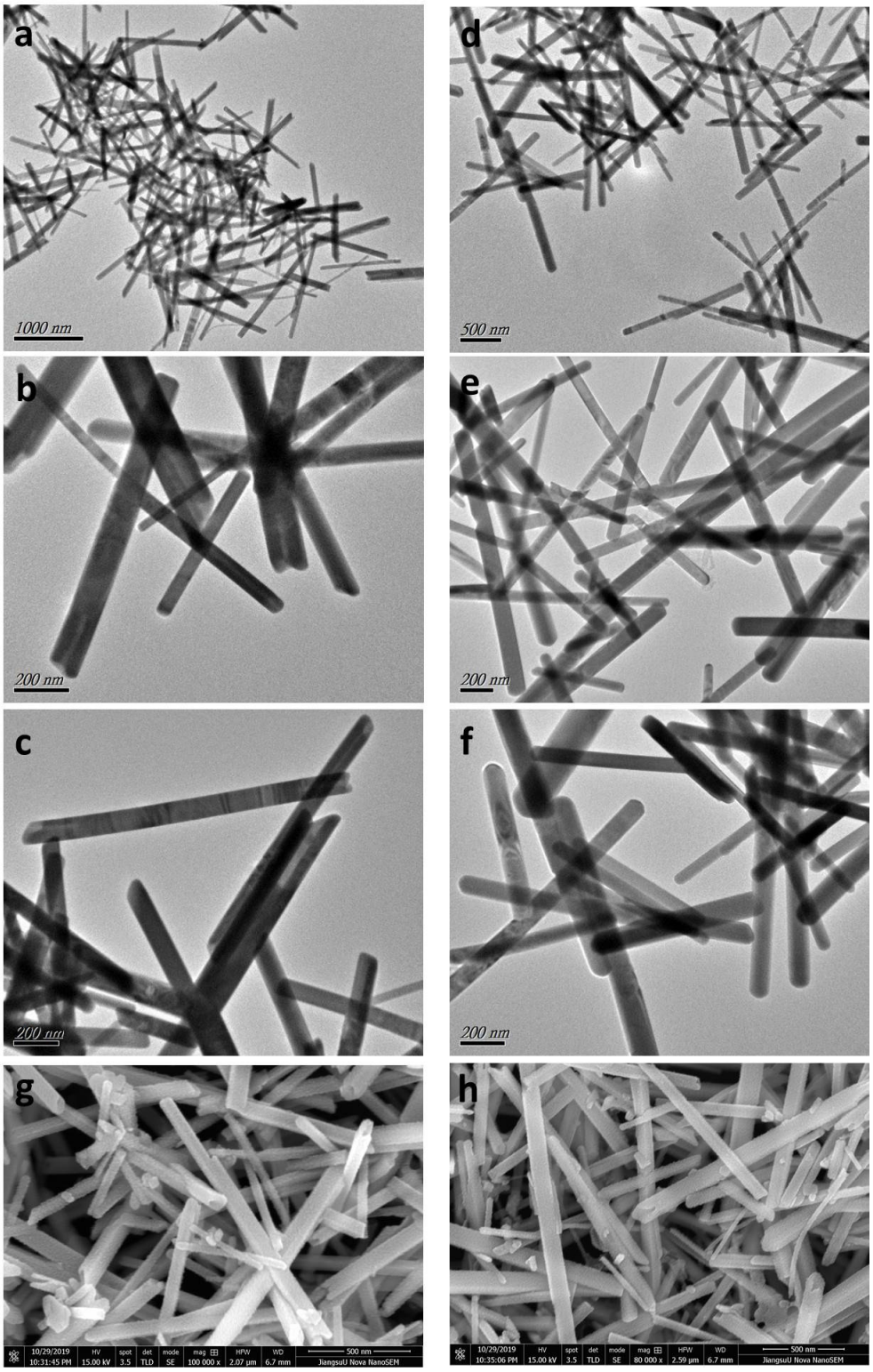

Fig. S2 TEM and SEM images of Sb_2Se_3 samples obtained at different reaction times: (a-c) TEM, 20 min; (d-f) TEM, 40 min; (g,h) SEM, 20 min.

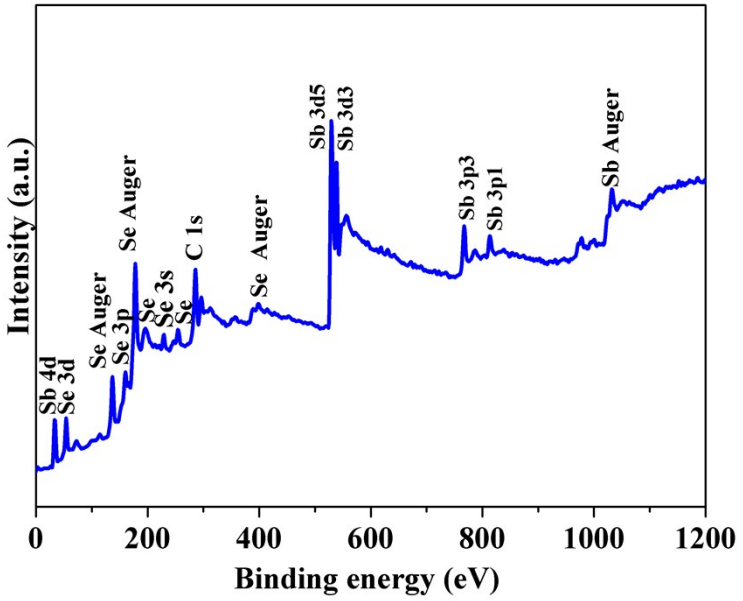

Fig. S3 XPS survey spectrum of Sb_2Se_3 nanorods prepared with the 1:2 molar ratio of $SbCl_3$/KSeCN.

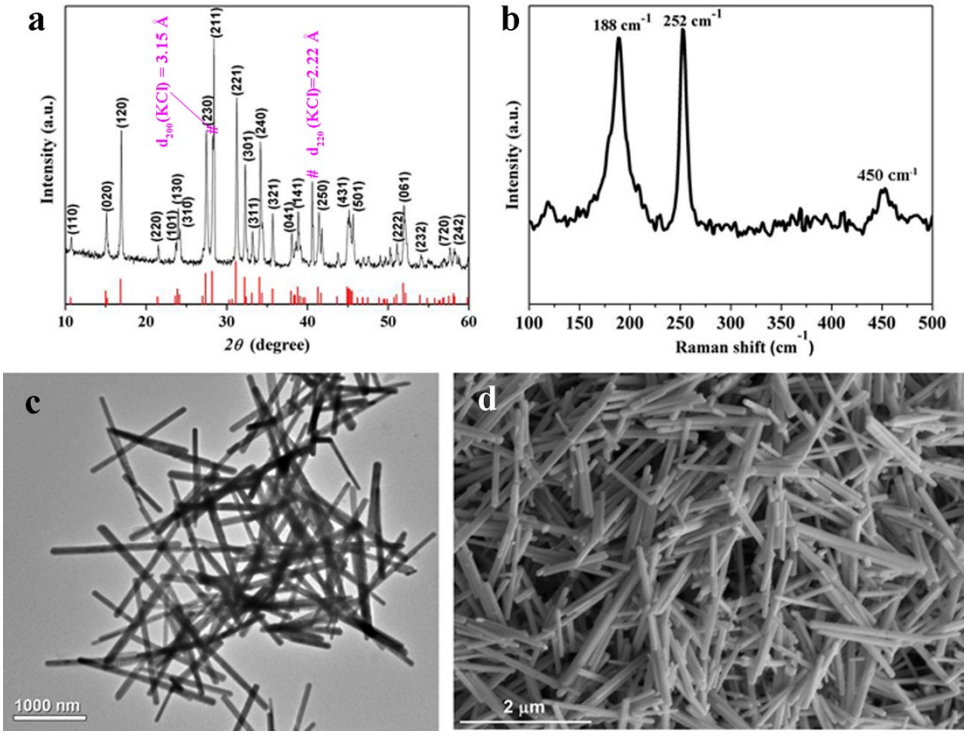

Fig. S4 (a) XRD pattern, (b) Raman spectrum, and (c,d) TEM and SEM images of Sb_2Se_3 NRs prepared with the 1:3 molar ratio of $SbCl_3$/KSeCN. The diffractions due to KCl are present in the XRD pattern, since the sample was not washed with ethanol/water.

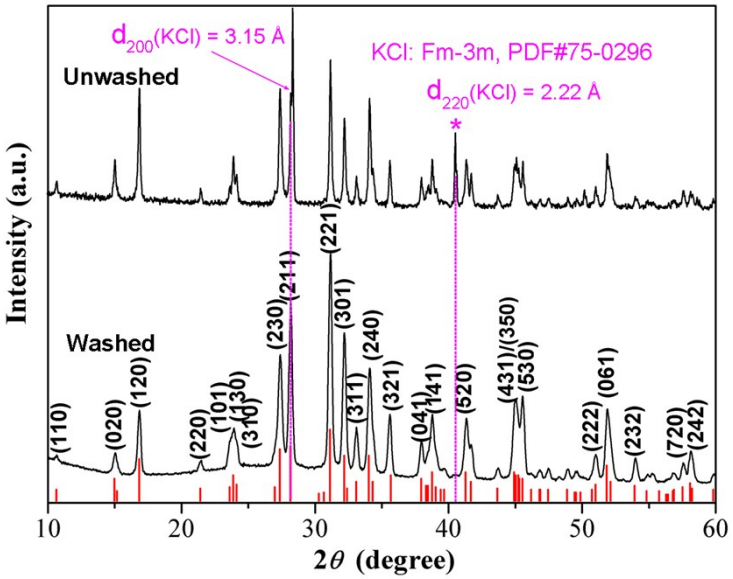

Fig. S5 XRD patterns for the Sb_2Se_3 samples (prepared at 1:2 $SbCl_3$/KSeCN) washed and unwashed with ethanol/water, respectively. The diffraction peaks from KCl, which is formed as a side product of **Reaction (4)** shown in the main text, are detected in the unwashed sample (Top). However, these peaks disappear after the sample is washed with ethanol/water (Bottom) because KCl is highly soluble in water.

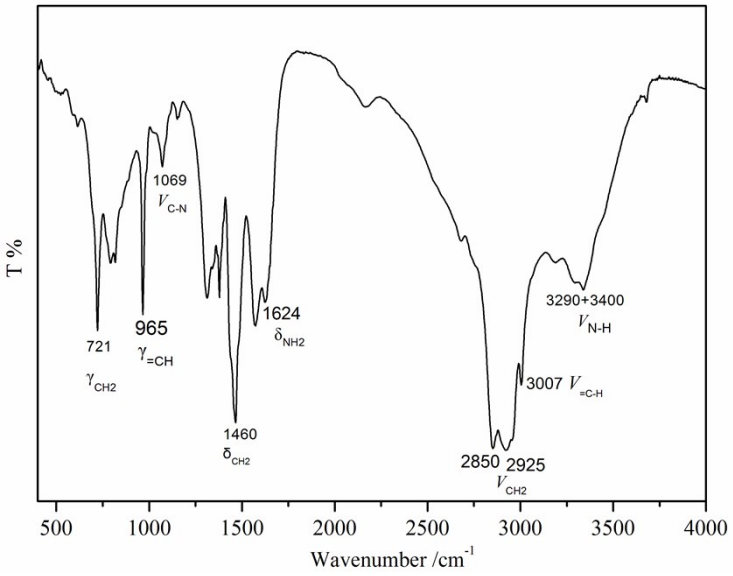

Fig. S6 FT-IR spectrum of liquid-state reaction solution obtained after the synthesis of Sb_2Se_3 nanorods at 200 °C for 1 h. The IR active vibration peaks for OLA [cis-9-Octadecenylamine; $CH_3(CH_2)_7CH{=}CH(CH_2)_7CH_2NH_2$] can be clearly assigned, while the characteristic peak (often appearing at ~2190 cm^{-1}) for C≡N bonds is not detected.

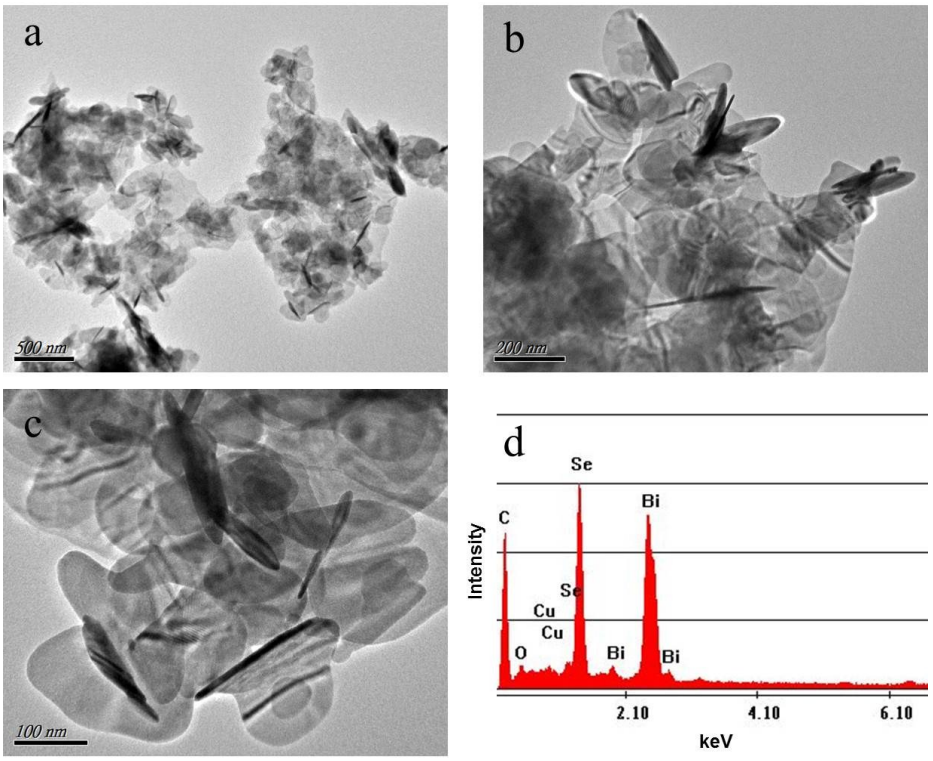

Fig. S7 TEM and EDS results of Bi_2Se_3 nanosheets prepared using KSeCN as a Se source ($BiCl_3$/KSeCN = 0.5 mmol : 1 mmol; 200 ^oC, 1 h, 10 mL OLA).