

Supporting Information

Facile One-pot Synthesis of PbSe and NiSe₂ Hollow Spheres: the Kirkendall Effect Induced Growth and Related Properties

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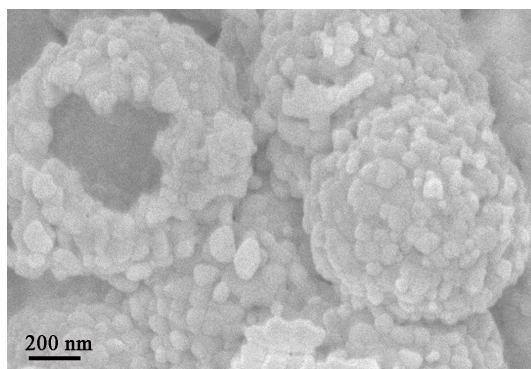


Figure S1. SEM image of PbSe hollow spheres with diameters of about 800 nm.

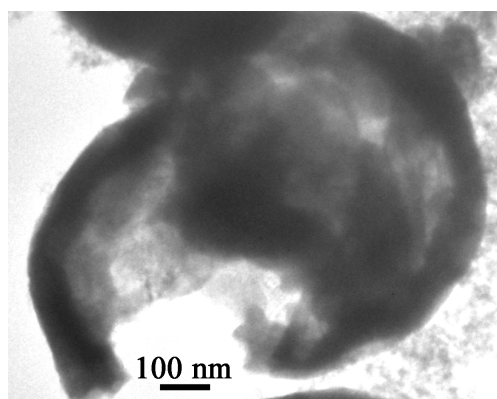


Figure S2. TEM image of the broken NiSe₂ hollow spheres with diameters of about 800 nm after ultrasonic vibration for about 1h.

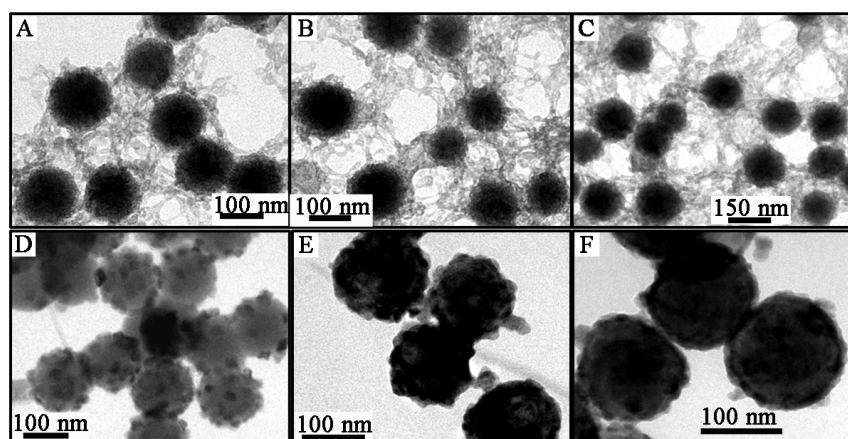


Figure S3. TEM images of the time dependent products obtained at 20 °C with (A-C) NiCl₂·6H₂O and SeO₂ as precursors and (D-F) Pb(CH₃COO)₂·3H₂O and SeO₂ as precursors. (A, D): 10 min; (B, E): 1 h; (C, F): 5 h after the addition of N₂H₄·H₂O at 20 °C.

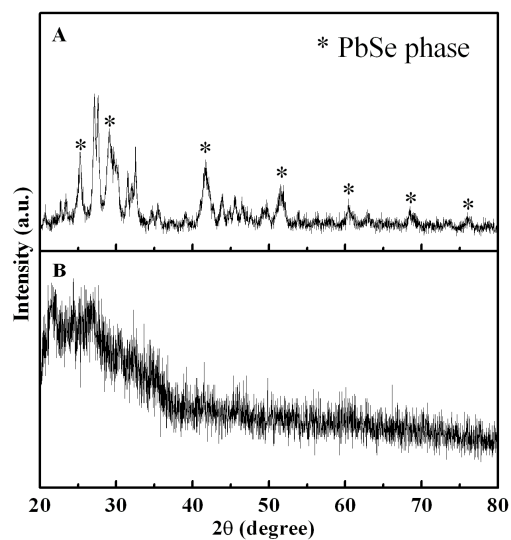


Figure S4. XRD patterns of the time dependent products obtained after reaction for 5 h at 20 °C with (A) $\text{Pb}(\text{CH}_3\text{COO})_2 \cdot 3\text{H}_2\text{O}$ and SeO_2 as precursors and (B) $\text{NiCl}_2 \cdot 6\text{H}_2\text{O}$ and SeO_2 as precursors.

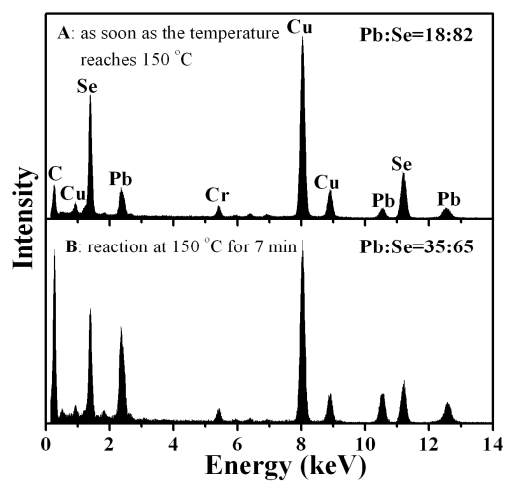


Figure S5. EDS spectra of the time dependent products during the synthesis of PbSe hollow spheres obtained with 0.6 g PVP (A) as soon as the temperature reaches 150 °C and (B) reaction at 150 °C for 7 min.

Figure S6 gives the time dependent products during the synthesis of NiSe₂ hollow spheres. Figure S6C gives the TEM image of an individual sphere that exhibits core/shell structure with voids between them, as shown in Figure S6D (indicated by the arrows). In addition, the corresponding EDS results of the time dependent products obtained as soon as the temperature reaches 150 °C and reaction for 7 minutes at 150 °C (Figure S7) indicates that the atomic ratio of Ni and Se increased from 8:92 to 24:76. Though the evolution process is not as clear as the formation process of the PbSe hollow spheres, it is still reasonable to conclude that the Kirkendall effect induces the formation of NiSe₂ hollow spheres on the basis of the observation of the time dependent products.

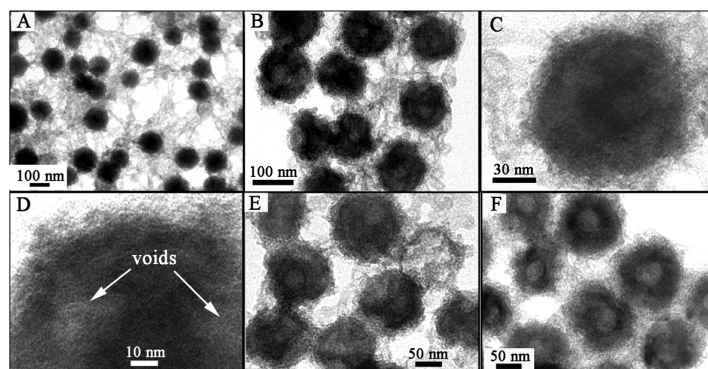


Figure S6. TEM images of the time dependent products during the synthesis of NiSe₂ hollow spheres obtained with 0.6 g PVP (A) as soon as the temperature reaches 150 °C, (B-D) reaction for 3 min, (E) 7 min, and (F) 10 min at 150 °C.

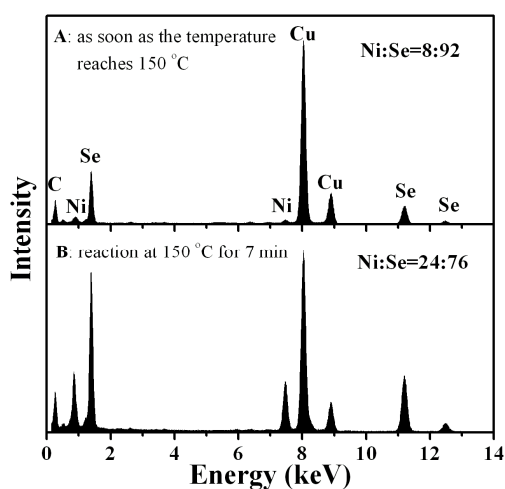


Figure S7. EDS spectra of time dependent products during the synthesis of NiSe₂ hollow spheres obtained with 0.6 g PVP (A) as soon as the temperature reaches 150 °C and (B) reaction at 150 °C for 7 min.