

Electronic Supplementary Information (ESI) for:

Synthesis of Water-dispersible One-Dimensional Te@ZnTe Core-Shell nanoparticles

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Experimental Section

Materials. All materials used in this work were analytical reagents. $\text{Zn}(\text{NO}_3)_2$, NaBH_4 , and NaOH were commercial available in China. 1-Thioglycerol (TG) and Te powder were purchased from Aldrich. NaHTe solution was prepared by using Te and NaBH_4 according to the reference methods.^{S1}

Synthesis of ZnTe Nanoparticles. Aqueous 1-thioglycerol (TG)-capped ZnTe nanoparticles were first prepared by using our recent reported method.^{S1} The mixture of $\text{Zn}(\text{NO}_3)_2$ solution and TG was adjusted to pH 11.5 by using NaOH solution. Freshly prepared NaHTe solution was injected into the mixture after the solution was degassed by using N_2 bubbles for 30 min. The feed ratio of $\text{Zn}^{2+}/\text{Te}^{2-}/\text{TG}$ was 1.0: 0.20: 2.4, and the concentration of Zn was 0.01mol/L during the synthesis of ZnTe nanoparticles.

Synthesis of 1D Te@ZnTe Core-Shell Nanoparticles. Freshly prepared ZnTe nanoparticles were refluxed in the open air under moderate stirring. After 30 min's refluxing, TG-capped 1D Te@ZnTe core-shell nanoparticles were prepared.

To examine the dispersibility of as-prepared 1D Te@ZnTe core-shell nanoparticles in water, re-dispersed nanoparticles were used. To prepared re-dispersed nanoparticles, freshly prepared nanoparticles were purified via 2-propanol based purification technique as shown in **Characterization** section below. Then, the powder of nanoparticles was re-dispersed into water.

To examine the stability of as-prepared nanoparticles, freshly prepared 1D

Te@ZnTe core-shell nanoparticles were stored in the open air under room temperature. Then UV-vis absorption spectra were used for monitoring the samples after different storage time.

Characterization. UV-vis absorption spectra were recorded with a Shimadzu 3600 UV-vis near-infrared spectrophotometer. All optical measurements were performed at room temperature under ambient conditions.

Transmission electron microscopy (TEM) and energy dispersion X-ray spectroscopy (EDX) were recorded by Tecnai F20 electron microscope with an acceleration voltage of 200 kV. The as-prepared sample was directly used for TEM and EDX measurement without further post-synthesis treatment.

X-ray photoelectron spectroscopy (XPS) was investigated by using a PHI550 spectrometer with a Mg K α excitation (1253.6 eV). Binding energy calibration was based on C 1s at 284.6 eV. Before XPS measurement, as-prepared sample has been purified on the basis of 2-propanol-based purification technique.^{S2} After addition of 2-propanol into the sample with a volume ratio of 2:1, as-prepared nanoparticles were precipitated, leaving excess ligands and unconsumed reactant in the supernatant solution. Purified nanoparticle powder was obtained after separation of these precipitates from the supernatant solution and then dryness in vacuum.

X-ray powder diffraction (XRD) investigation was carried out by using the D/max-2500/PC diffractometer with Cu K α radiation ($\lambda = 1.5418 \text{ \AA}$). Purified nanoparticle powder was used in XRD measurement.

References

- S1. S. H. Xu, C. L. Wang, Q. Y. Xu, H. S. Zhang, R. Q. Li, H. B. Shao, W. Lei and Y. P. Cui, *Chem. Mater.*, 2010, **22**, 5838.
- S2. (a) D. V. Talapin, A. L. Rogach, E. V. Shevchenko, A. Kornowski, M. Haase and H. Weller *J. Am. Chem. Soc.*, 2002, **124**, 5782; (b) C. L. Wang, M. Fang, J. S. Han, H. Zhang, Y. P. Cui and B. Yang, *J. Phys. Chem. C*, 2009, **113**, 19445; (c) C. L. Wang, M. Fang, S. H. Xu and Y. P. Cui, *Langmuir*, 2010, **26**, 633.

Fig. S1 EDX result of ZnTe nanoparticles before refluxing. The results indicated the main composition of small nanoparticles in Fig. 2a of the text was ZnTe.

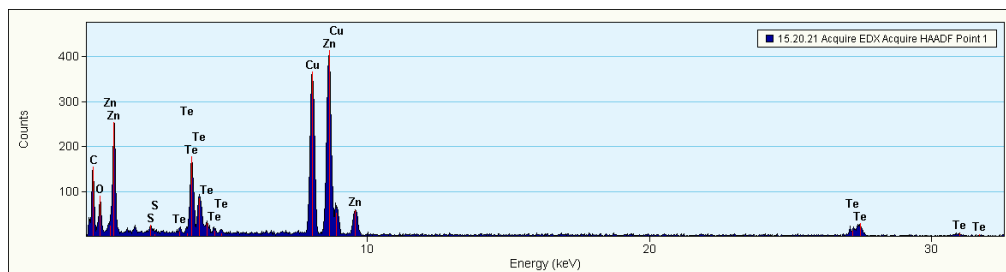


Fig. S2 TEM (a) and EDX results (b-d) of ZnTe nanoparticles after refluxing for 10 min. (b) and (d) respectively represented the chemical composition of 1D structures at O₁ and O₃ in TEM image, which showed major composition of Te. (c) was the chemical composition of aggregated spheres at O₂ in TEM image, which indicated the main composition of aggregated spheres of ZnTe.

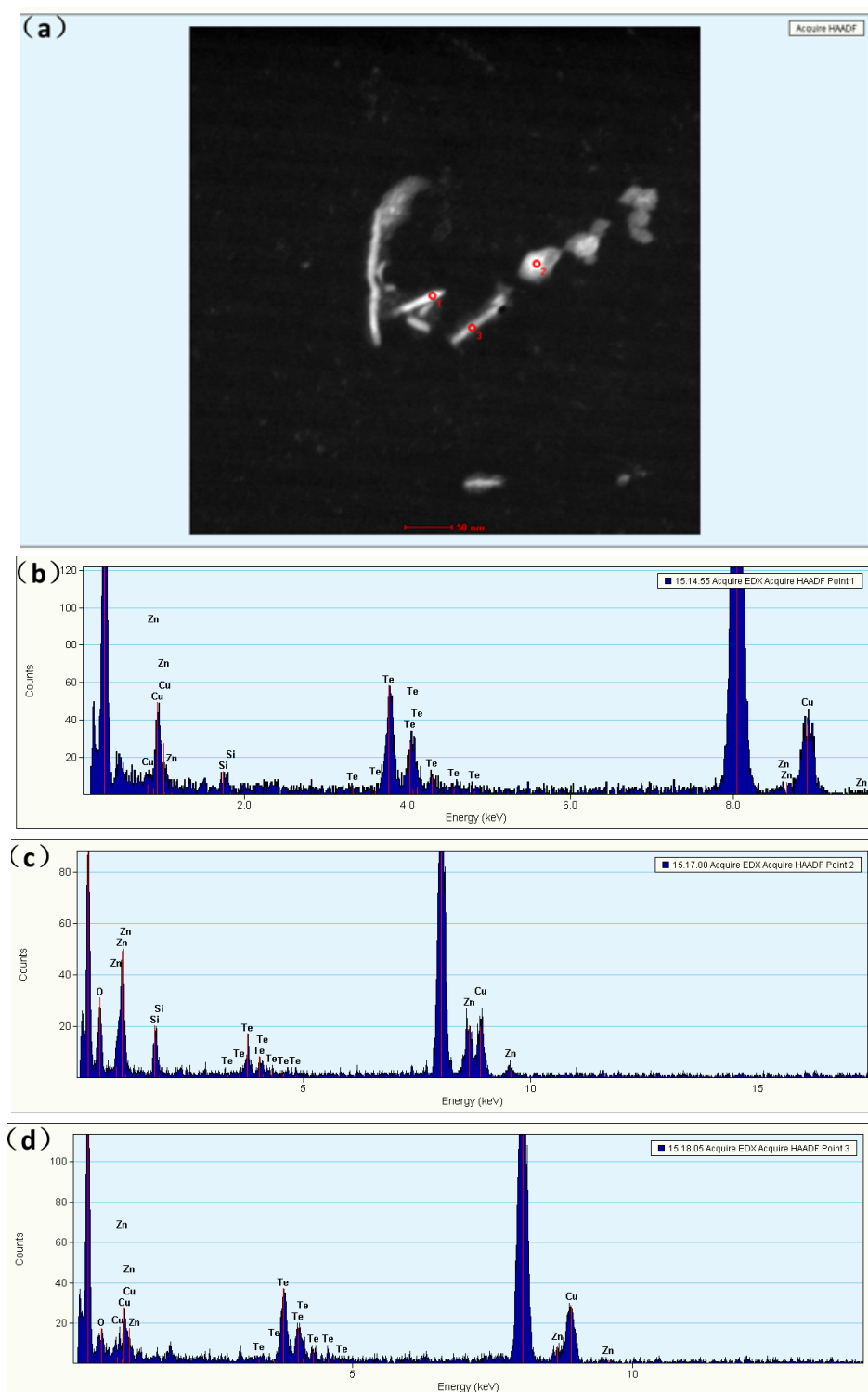
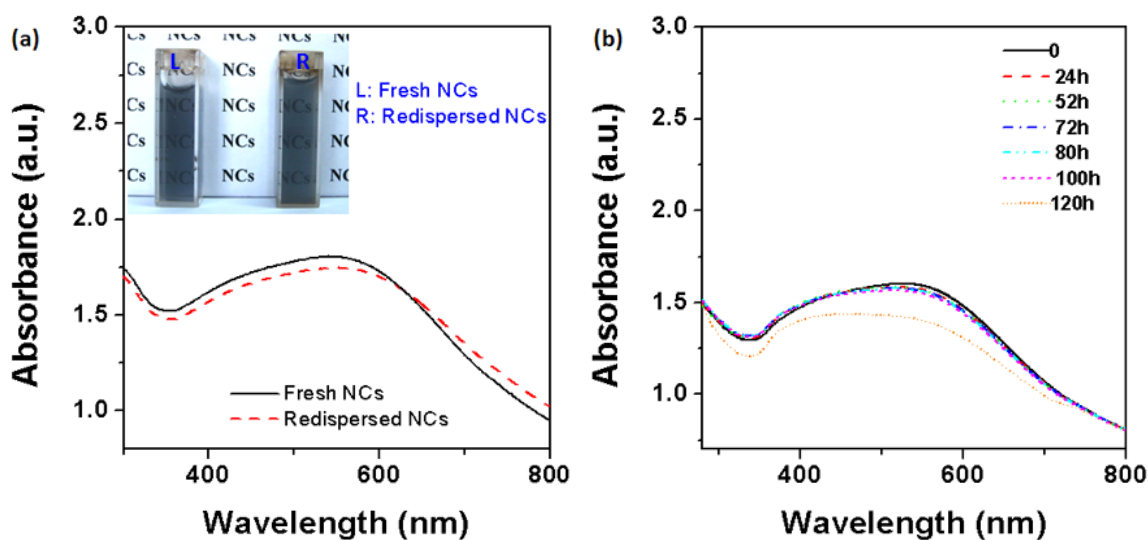


Fig. S3 (a) Uv-vis spectra and photo images for freshly prepared (solid spectral line and left image) and re-dispersed (dash spectral line and right image) 1D Te@ZnTe core-shell nanoparticles. (b) Uv-vis spectra of freshly prepared 1D Te@ZnTe core-shell nanoparticles after different storage time in the open air at room temperature.



As can be seen from the photo image in (a), 1D Te@ZnTe core-shell nanoparticles could be well dispersed in water. Moreover, there was no obvious spectral difference between freshly prepared nanoparticles and the re-dispersed nanoparticles (prepared by dispersing the powder of 1D Te@ZnTe core-shell nanoparticles into water). This also confirmed the good dispersibility of as-prepared nanoparticles in water. The stability of as-prepared nanoparticles was characterized by (b). As can be seen, there was no obvious alteration in the absorption spectra of as-prepared nanoparticles after 100h's storage in the open air. This implied the good stability of as-prepared nanoparticles.