

Electronic Supplementary Information

Coiling ultrathin tellurium nanowires into nanorings by Pickering emulsion

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Experimental section

Materials. NaTeO₃ (99%), poly (vinylpyrrolidone) (PVP, M_w≈40000), ammonium hydroxide (25%~28%, wt%), hydrazine hydrate (85%, wt%), ethanol (95%), acetone (99.5%), hexamethylenetetramine (HMT, 98%), phenol (99%), *N,N*-dimethylformamide (DMF, 99.5%), 1,2-dichlorobenzene (DCB), Tween 20, Tween 40, Tween 60, Tween 80, Span 20, Span 40, Span 60, Span 80 were purchased from the Shanghai Reagent Company (P. R. China). All chemicals were used as received without further purification.

Synthesis of Te nanowires. The synthesis of well-defined hydrophilic ultrathin Te nanowires was described previously. Generally, 0.0922 g Na₂TeO₃ and 1.0000 g PVP were dissolved in 33 ml deionized water, the solution was stirred at room temperature for 10 min to form a homogeneous solution. Then 3.3 ml ammonium hydroxide and 1.67 ml hydrazine hydrate were added into previous solution and further stirred for 5min. After that, the final solution was transferred to a Teflon vessel with a total volume of 50 ml, the container was sealed and maintained at 180 °C for 3h. The autoclave was cooled at room temperature naturally. The fresh prepared Te nanowires solution (8 mM) was centrifuged after adding 110 ml acetone and washed several times, then dispersed in DMF.

Synthesis of Te nanorings in a water-in-oil emulsion. 3 μl of Ammonium hydroxide was added into 40 μl Te nanowires solution (0.8 mM, in DMF), the mixture was vibrated to form a homogenous solution. Then 1 ml 1, 2-dichlorobenzene was added and vortex. The product was separated by centrifugation and dispersed in ethanol.

Synthesis of Te@phenol formaldehyde resin (PFR) composite nanocables. Dissolved 0.28 g HMT in phenol aqueous solution (8 ml, 0.1M), then an aqueous Te solution (20 ml) was added into the mixed solution under magnetic stirring. After that, the final solution was

transferred to a Teflon vessel with a total volume of 50 ml, the container was sealed and maintained at 200 °C for 2h. The autoclave was cooled at room temperature naturally. The product was collected by centrifuging and washed by ethanol and deionized water for several times.

Characterization. The obtained sample was characterized on an (Philips X'Pert Pro Super) X-ray powder diffractometer with Cu Ka radiation. Transmission electron microscopy (TEM) was performed on H-7650 (Hitachi, Japan) operated at an acceleration voltage of 100 kV. Fieldemission scanning electron microscopy (FESEM) was carried out with a field emission scanning electron micro-analyzer (Zeiss Supra 40 scanning electron microscope at an acceleration voltage of 5 kV). Cryo-electronic microscopy (Cryo-EM) was performed on Tecnai G2 Spirit (FEI) operated at an acceleration voltage of 120 kV.

Supporting Figures

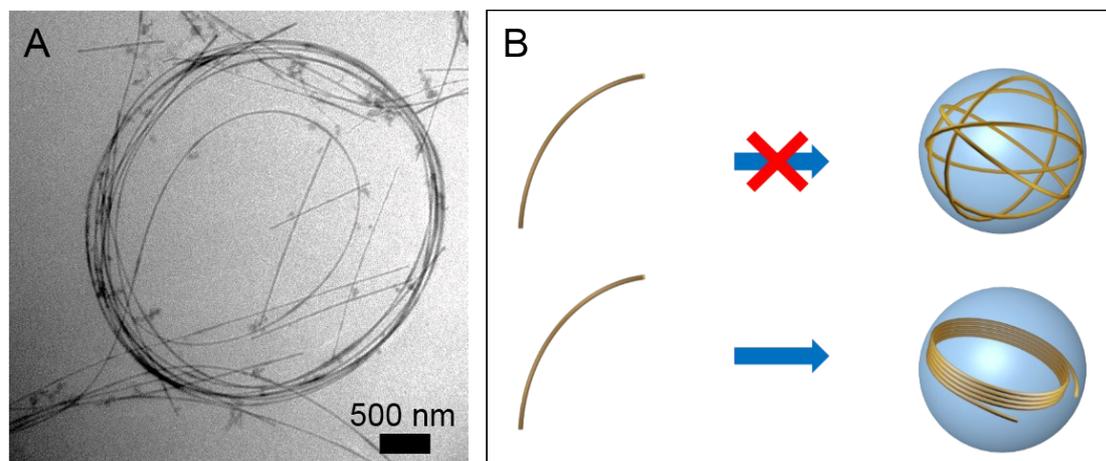


Fig. S1 (A) Cryo-EM image of Te nanorings. (B) Schematic of the formation of Te nanorings in droplets.

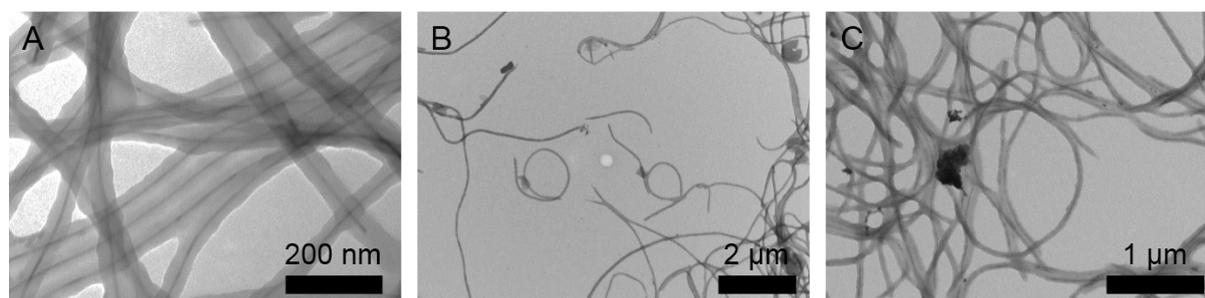


Fig. S2 TEM images of (A) Te nanowires coated with a PFR shell; (B and C) after treating Te@PFR composite in water-in-oil emulsion.

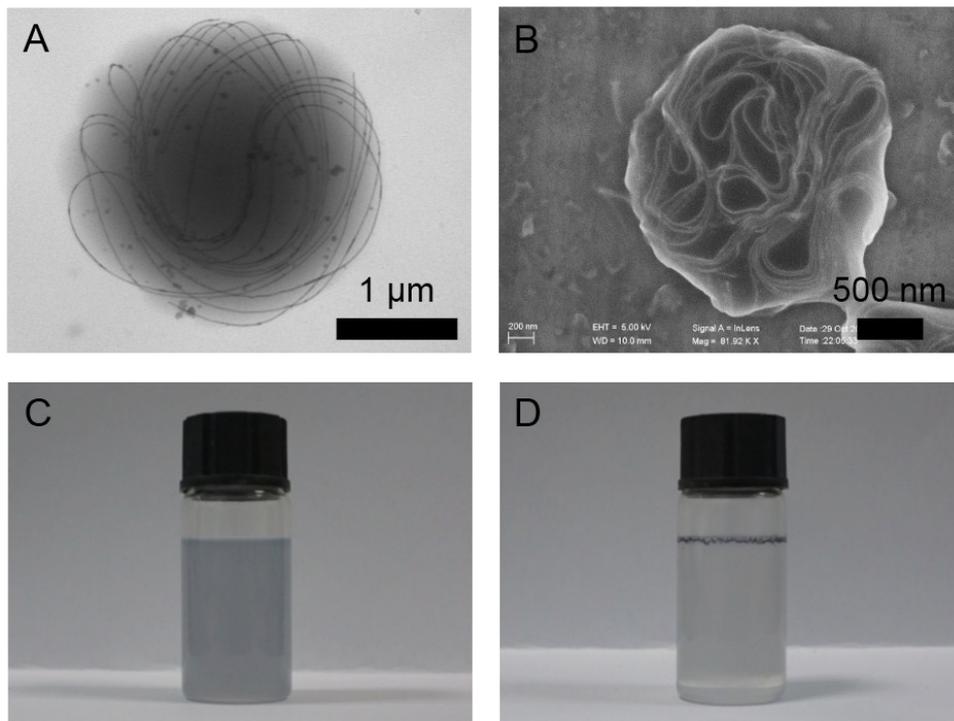


Fig. S3 TEM & SEM images of (A, B) Te nanowires aggregate randomly inside the droplets; photographs of (C) emulsion formed after mixed water phase and oil phase; (D) emulsion after a few minutes' standing.

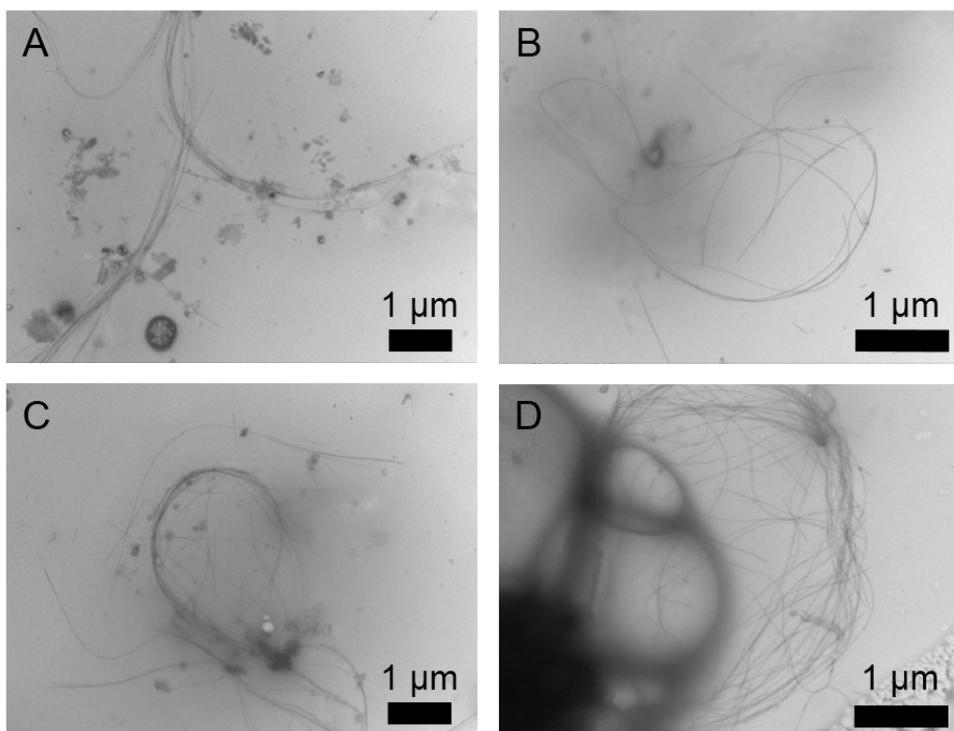


Fig. S4 EDS spectra of the kinked (a) Au/Ag₂S-ZnS and (b) Au/Ag₂S-ZnS/Au heteronanorods. The C and Cu elements are attributed to carbon film and copper grid, respectively.