Electronic Supplementary Material (ESI) for CrystEngComm

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Growth of multi-step shaped CdTe nanowires and distinct photoelectric response in single nanowire

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Experimental details for CdTe nanodevice

Nanodevice construction. To evaluate the electrical and photoconductive properties of the CdTe nanowires, back-gate nano-FETs were constructed based on an individual CdTe nanowire, and the fabrication is followed a standard process. Briefly, the as-synthesized CdTe nanowires were dispersed uniformly onto SiO_2 (300 nm)/n^+-Si substrates at a desired density, followed by photolithography, electron beam evaporation and lift-off processes to define Cu (4 nm)/Au (50 nm) source and drain electrodes on the nanowires. The degenerately doped Si substrate then served as the global back gate.

Nanodevice characterization. The electrical transport characteristics of the CdTe nanowires were measured using a Keithley 4200 semiconductor characterization system. To study the photoconductive properties of the CdTe nanowires, a light system including a xenon lamp (500 W) and a monochromator (LEO LE-SP-MON150) was used to provide the monochromatic light, which was focused and guided perpendicularly onto the nano-photodetector by a quartz lens. During measurements, the light was turned ON and OFF manually to explore the time response of the CdTe nanowire photodetectors.

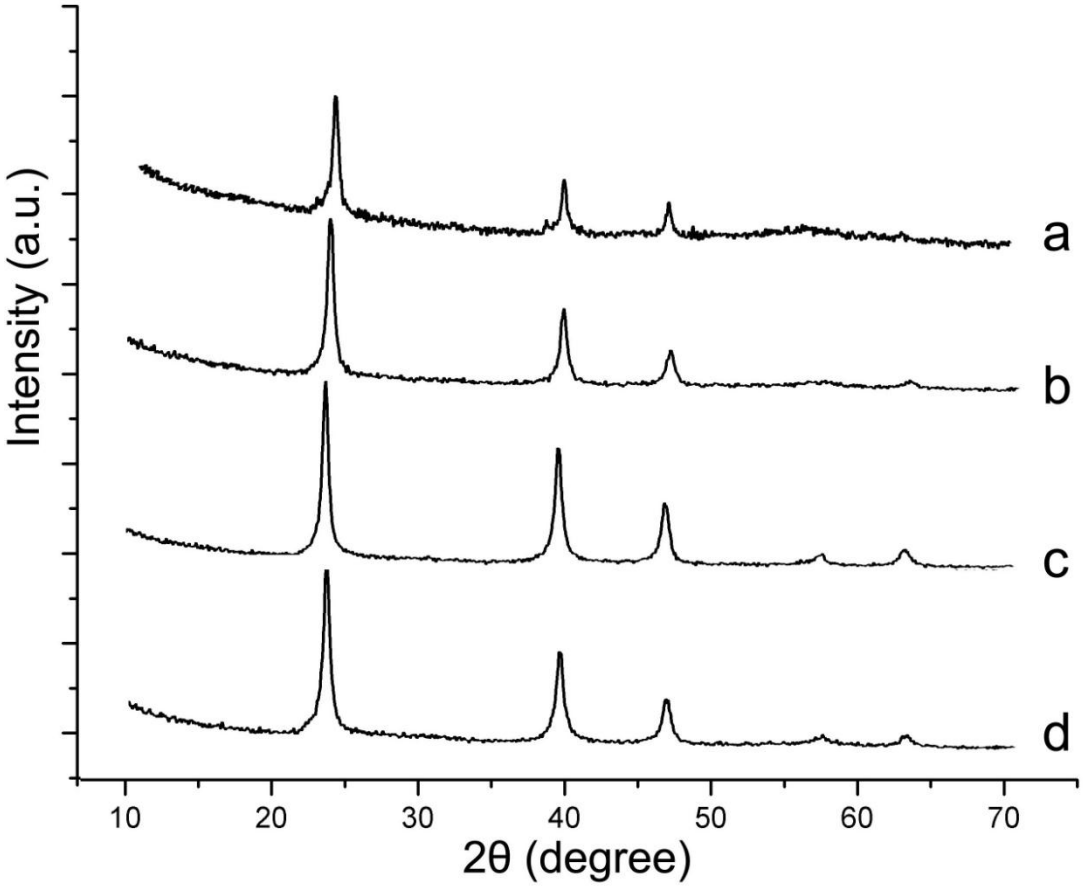

Figure S1. XRD patterns for the CdTe samples: (a) the nanoparticles obtained without use of tris(2-ethylhexyl) phosphate (TEHP) at 240 °C for 10 min, (b) the polyhedrons obtained without TEHP for 1 h, (c) the flying saucers-like nanostructures obtained using 0.5 mL TEHP in 5.0 mL oleylamine keeping other conditions constant, and (d) the pinecone-like nanostructures obtained with the use of 0.2 mL TEHP.

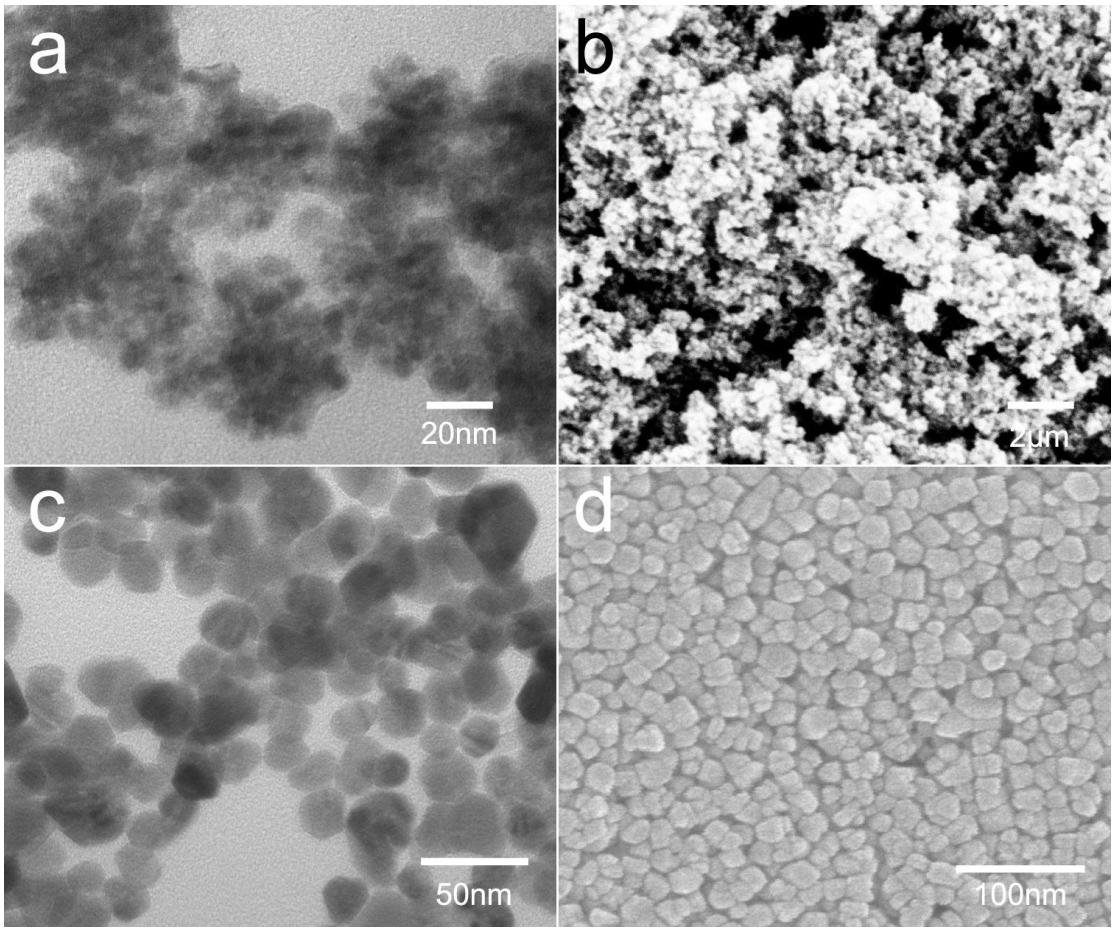

Figure S2. TEM and corresponding SEM images of the CdTe samples: (a,b) nanoparticles obtained without TEHP for 10 min, and (c,d) polyhedrons obtained without TEHP for 60 min.

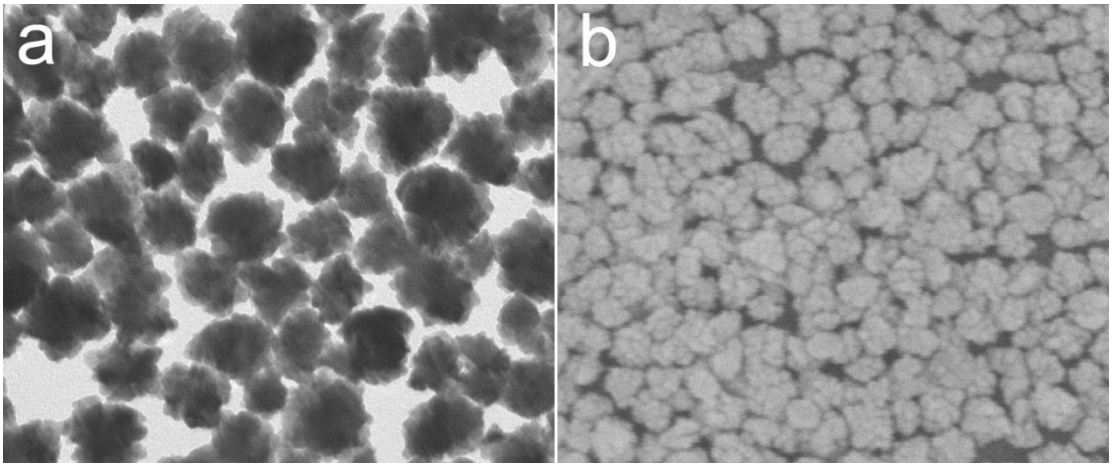

Figure S3. (a) TEM and (b) SEM images for the pinecone-like CdTe nanostructures obtained with the use of 0.2 mL TEHP in 5.0 mL oleylamine at 240 °C for 1 hour.

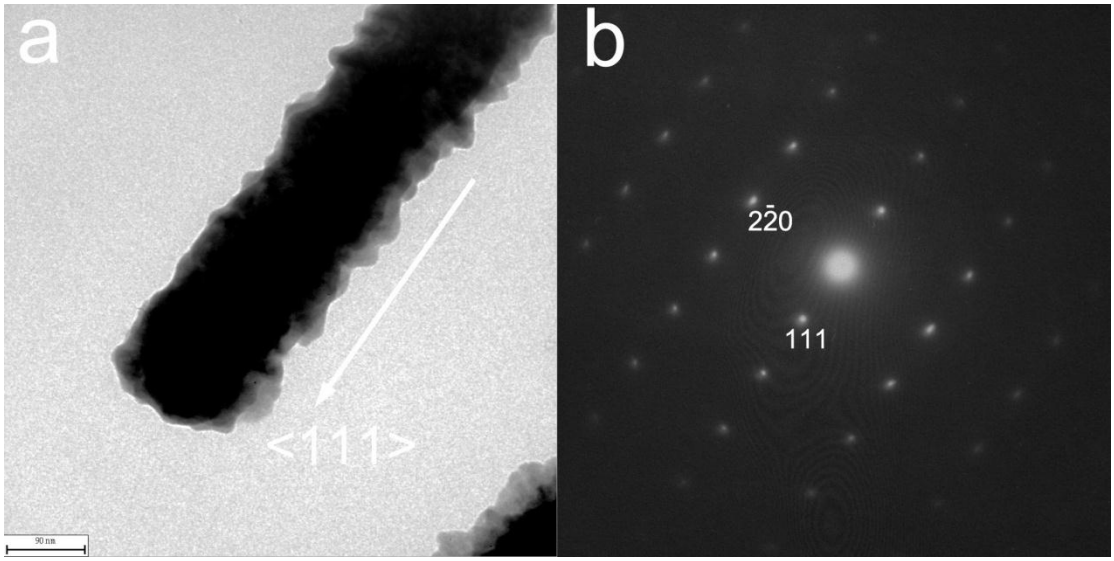

Figure S4. (a) TEM image and (b) corresponding ED pattern for the CdTe nanowires obtained with the use of 1.0 mL TEHP in 5.0 mL oleylamine at 240 °C for 1 hour.

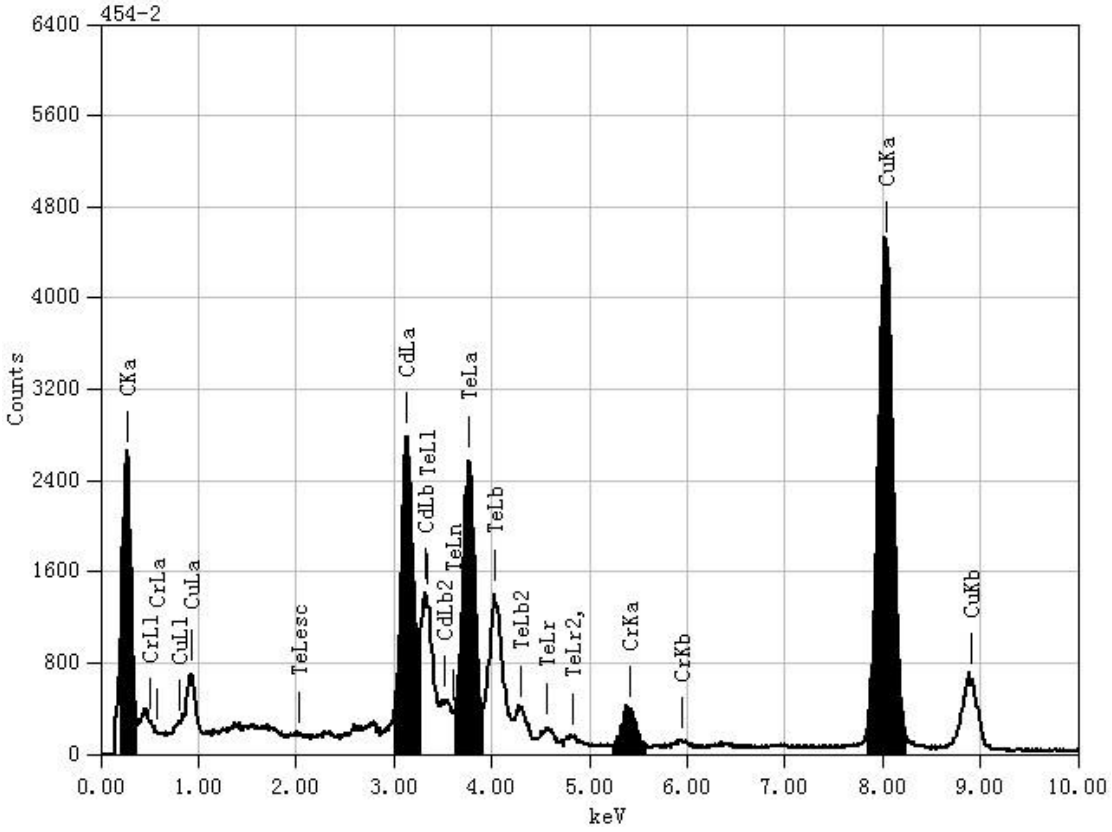

Figure S5. EDX spectrum of the CdTe nanowires, showing the atom ratio of Cd : Te is 50.94 : 49.06.

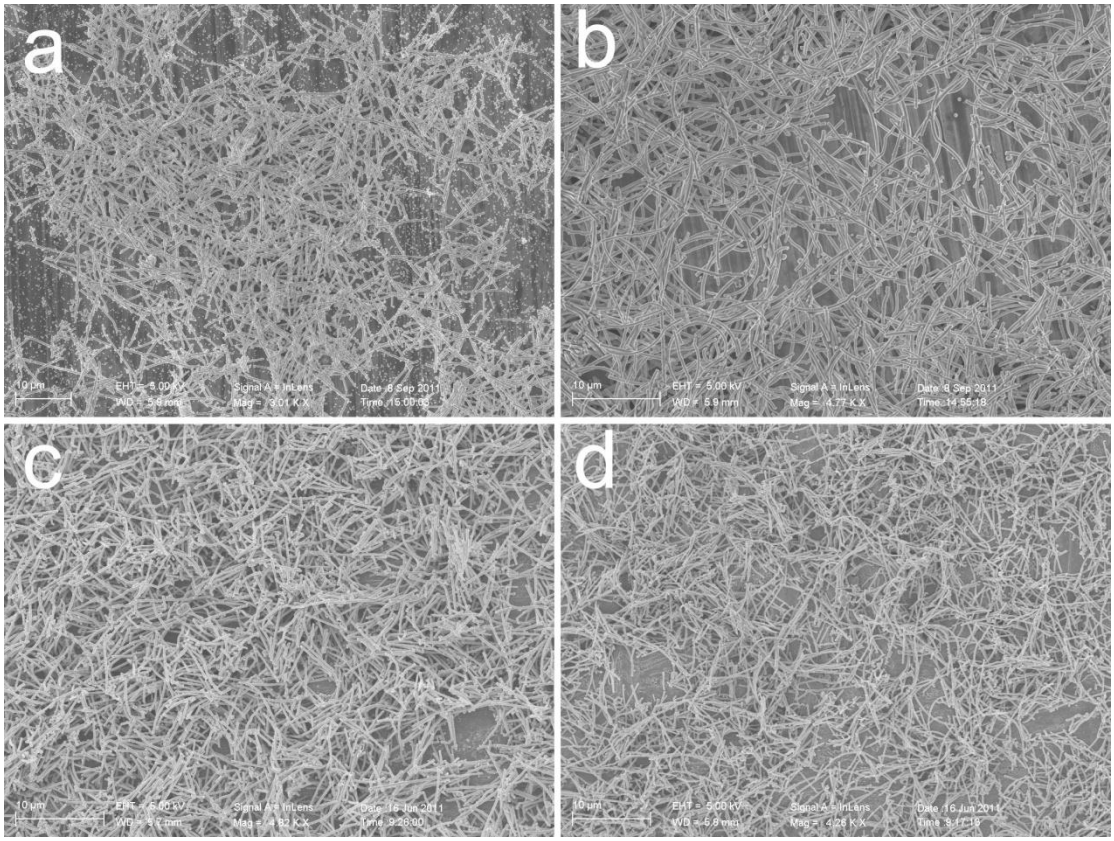

Figure S6. SEM images of the CdTe nanowires prepared at different temperature and time: (a) 220 °C for 0.5h, (b) 220 °C for 2h, (c) 260 °C for 0.5h, and (d) 260 °C for 2h.