

Supporting Information for

A Facile Synthesis of Te Nanoparticles with Binary Size Distribution by Green Chemistry

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Experimental Section

Synthesis of Te Nanoparticles. All synthetic steps were carried out in nitrogen filled, moisture free glove box at room temperature. In a typical synthesis, 3.5 mL oleic acid (OA) was dissolved in a mixture solution of 15.0 mL ethylene glycol (EG) and 4.0 mL triethanolamine (TEA) under vigorous stirring. 2.0 mL of 0.1 M solution of Na₂Te in EG was added drop-wise into the vigorously stirred OA solution. The resulting black-colored Te nanoparticles were separated by centrifugation, were washed with methanol, and were stored in methanol for further electrophoretic depositions and measurements. This procedure produced the two size distributions described in the main text: 1.5 nm and 27.5 nm Te nanoparticles. To achieve other binary size distributions, one can modify the concentration of Te precursor, or change synthetic temperatures.

Characterization. A Bruker Tensor 27 Fourier Transform Infrared Spectroscopy (FT-IR) was employed to measure the liganding of Te nanoparticles after cleaning. Atomic force microscope (AFM) images were collected using a Nanoscope III Atomic Force Microscope.

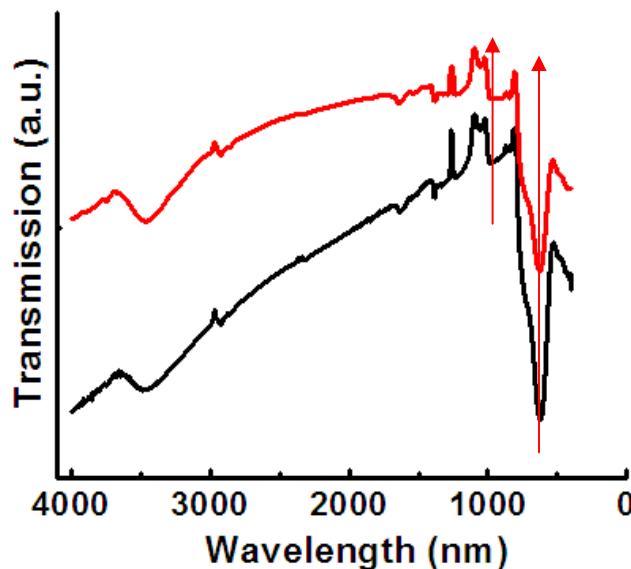


Figure S1. FTIR spectrum of Te nanoparticles cleaned once (black, bottom) and twice (red, top). The primary peaks correspond to triethanolamine. Peaks identification: O–H vibration, $3500\text{--}3000\text{ cm}^{-1}$; C–H stretching band, $3000\text{--}2800\text{ cm}^{-1}$; C–C and C–H bending, $1460\text{--}1130\text{ cm}^{-1}$; C–O and C–N stretching, $1100\text{--}890\text{ cm}^{-1}$; C–C–O vibrations, $880\text{--}690\text{ cm}^{-1}$. Physisorbed and chemisorbed water, 3500 to 3000 cm^{-1} and $1800\text{--}1500\text{ cm}^{-1}$. Red arrows demarcate the decreases in FTIR peaks.

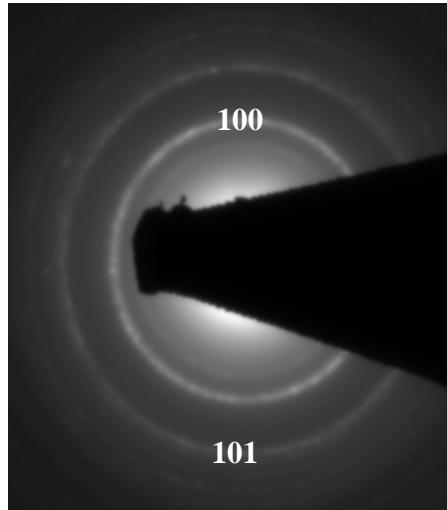


Figure S2. Electron diffraction pattern of as-synthesized 27.5 nm Te nanoparticles.

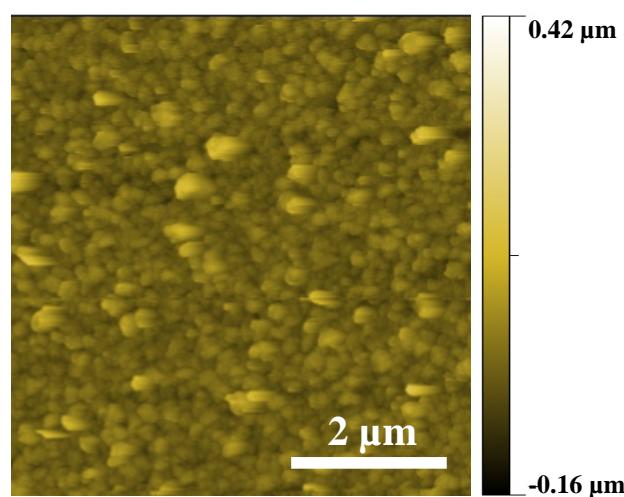


Figure S3. (a) 2D AFM image of 27.5 nm Te NP EPD films deposited for 20 min.

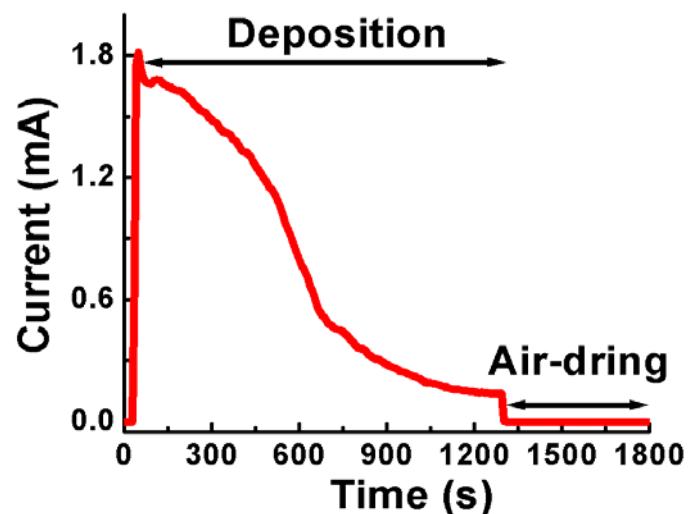


Figure S4. Electrophoretic deposition current versus time graph for our 27.5 nm Te nanoparticles. After approximately 22 minutes, the electrodes were extracted from the suspension and were dried in air with the applied voltage maintained.