

Supporting Information for

# Expanding the One-Dimensional CdS-CdSe Composition Landscape: Axially Anisotropic CdS<sub>1-x</sub>Se<sub>x</sub> Nanorods

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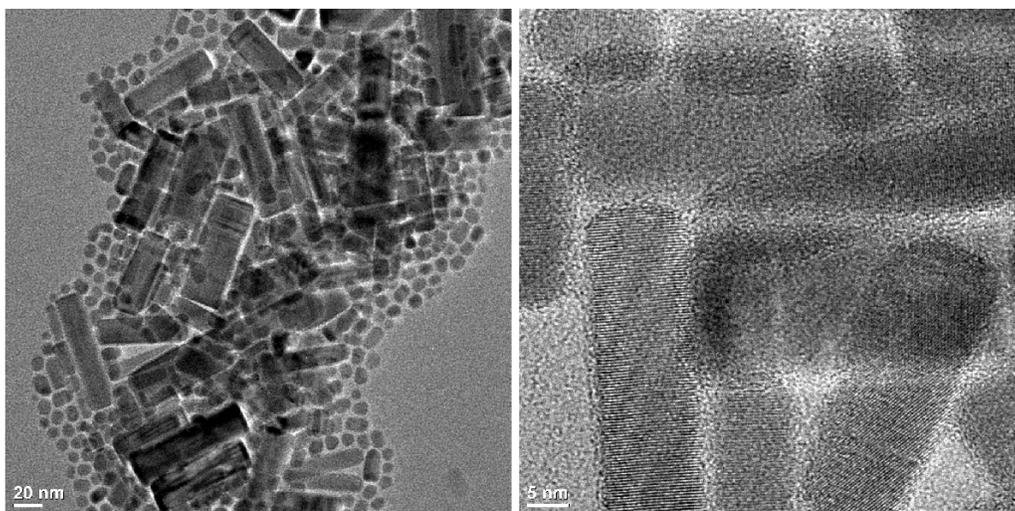
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**S1. Mechanistic experiment.** *Reaction of CdS nanorods with Cd-phosphonate and TOPSe.*

**S2. Energy Dispersive X-Ray Spectroscopy (EDS).** *Elemental analysis of CdS<sub>0.42</sub>Se<sub>0.58</sub>-Pd hybrid nanostructures.*

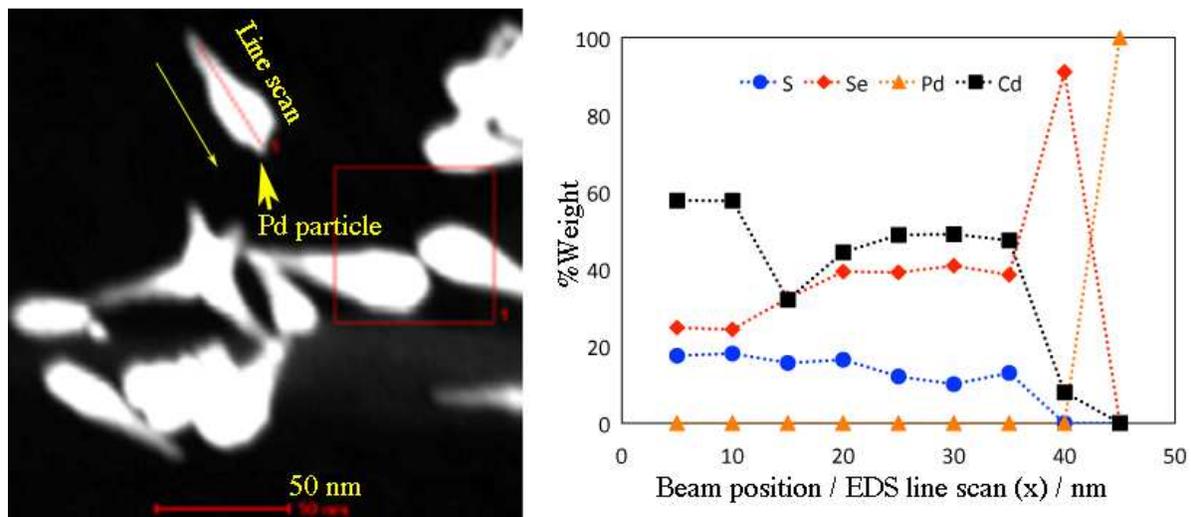
**S2. X-Ray Diffraction.** *Structural analysis of CdS-Pd hybrid heterostructures.*

**S1. Mechanistic experiment.** *Reaction of CdS nanorods with Cd-phosphonate and TOPSe.* We first prepared pure CdS nanorods by the general synthetic procedure starting from CdO (105.0 mg, 0.810 mmol), TOPO (1.375 g, 3.56 mmol), ODPa (535 mg, 0.937 mmol), TOP (1.20 ml, 2.69 mmol), and using TOPS (1.00 ml, 2.25 mmol). The reaction was stopped after 85 min and the final products were isolated as described in the general synthetic procedure (see Experimental). The isolated CdS nanorods were dissolved in toluene (3 mL), transferred to a new three-neck round bottom flask, and the solvent removed under vacuum. In a separate flask, CdO (105.0 mg, 0.810 mmol), TOPO (1.375 g, 3.56 mmol) and ODPa (535 mg, 0.937 mmol) were weighed, heated to 100 °C and evacuated under vacuum for 15 min, refilled with argon and heated to 320 °C to form a completely colorless solution. The solution was allowed to cool to 120 °C, evacuated under vacuum for 15 min, refilled with argon, and transferred to the flask containing the CdS nanorods via syringe. The mixture of Cd-phosphonate precursor and CdS nanorods was heated to 320 °C. When the temperature reached 300 °C, TOP (1.20 ml, 2.69 mmol) was injected into the flask. When the temperature reached 320 °C, a solution of TOPSe (1 mL, 2.25 mmol) was rapidly injected. Upon injection, the temperature was allowed to equilibrate at 315 °C and kept constant for a total reaction time of 85 minutes. The reaction products were isolated as described above (Figure S1).



**Figure S1.** TEM micrographs of the block-shaped nanocrystalline products ( $65.2 \text{ nm} \pm 8.8 \text{ nm} \times 18.7 \text{ nm} \pm 3.8 \text{ nm}$ ) obtained from the reaction of pure CdS nanorods with Cd-phosphonate and TOPSe. Some smaller (ca. 5-8 nm) slightly elongated nanocrystals are also observed.

S2. Energy Dispersive X-Ray Spectroscopy (EDS). *Elemental analysis of CdS<sub>0.42</sub>Se<sub>0.58</sub>-Pd hybrid nanostructures.*



**Figure S1.** Left: EDS Line scan (thin yellow arrow) along a CdS<sub>0.42</sub>Se<sub>0.58</sub> nanorod having a Pd particle on the tip of the head region (thick yellow arrow). Right: Composition (%Weight) profile along the EDS line scan.

S3. X-Ray Diffraction. Structural analysis of CdS-Pd hybrid heterostructures.

