Electronic Supplementary Material (ESI) for Nanoscale.

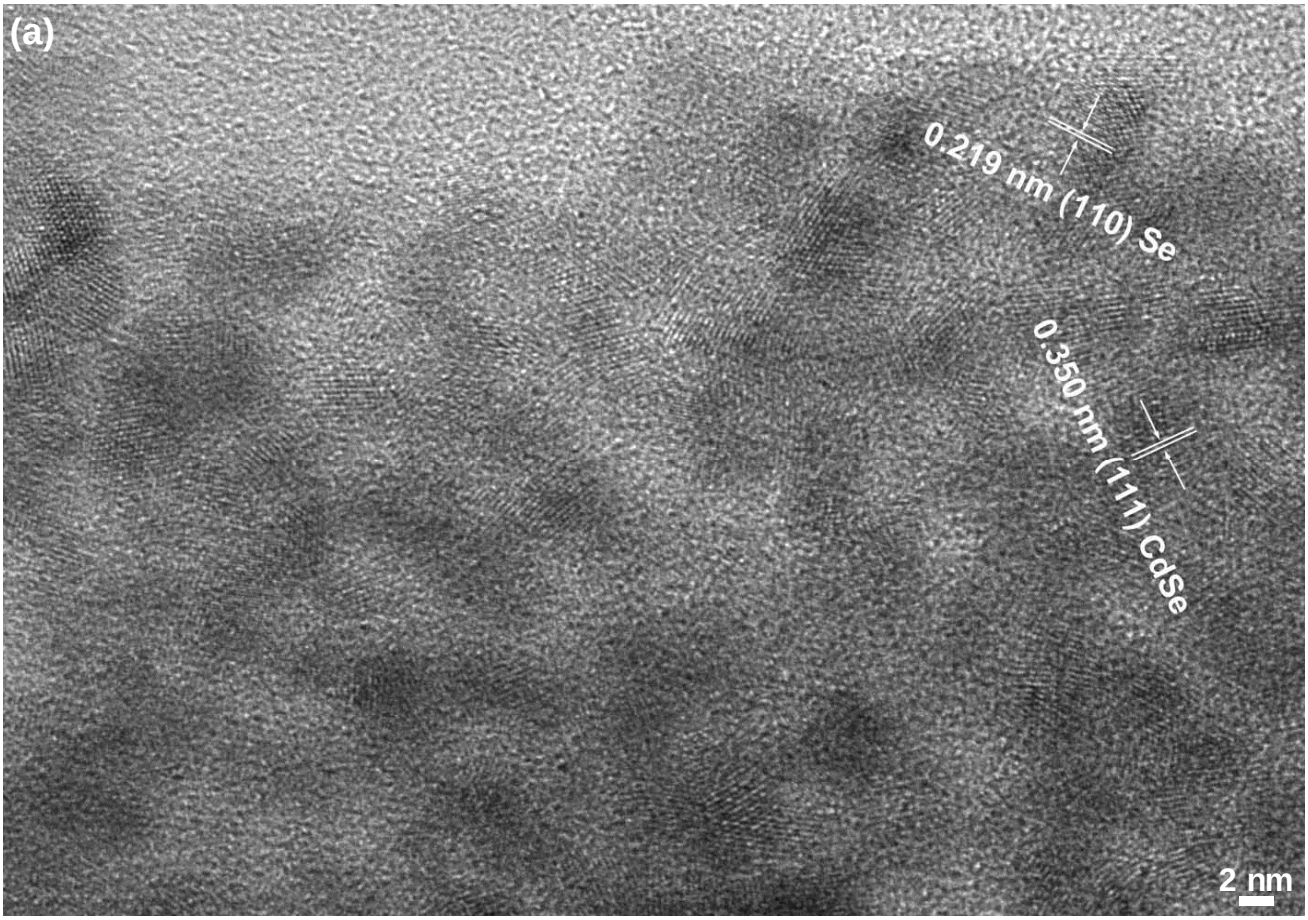
Supporting Information

Large-scale, solution-phase growth of semiconductor nanocrystals into ultralong onedimensional arrays and study of their electrical properties

Yuchao Ma,[a] Mengmeng Xue,[a] Jiahua Shi[*b] and Yiwei Tan[*a]

[a] *State Key Laboratory of Materials-Oriented Chemical Engineering, School of Chemistry and Chemical Engineering, Nanjing University of Technology, Nanjing 210009, China, Email: ytan@njtech.edu.cn*

[b] *Key Laboratory of Natural Medicine and Immuno-Engineering of Henan Province, Henan University, Kaifeng 475004, China, Email: sjiahua@henu.edu.cn*



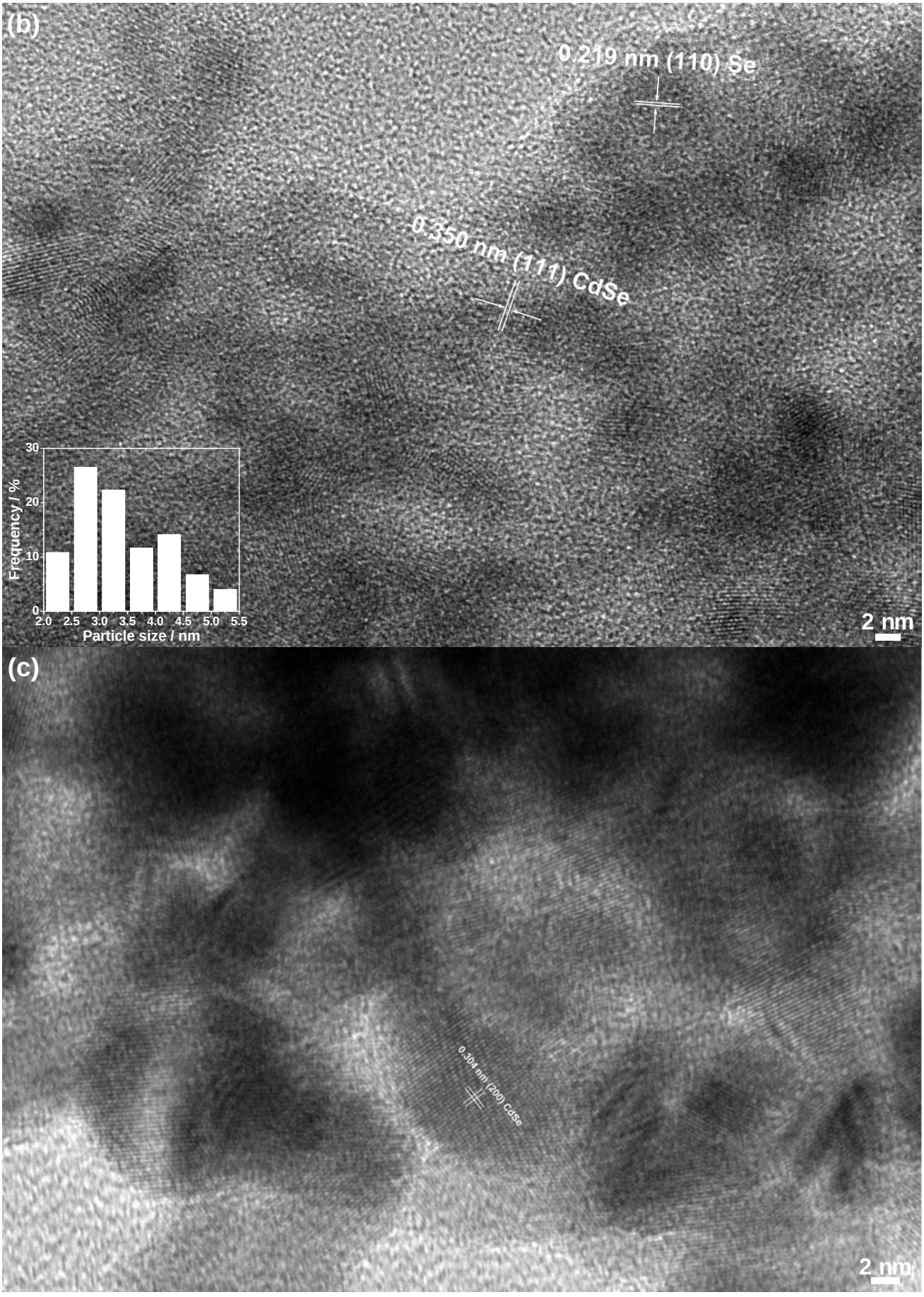
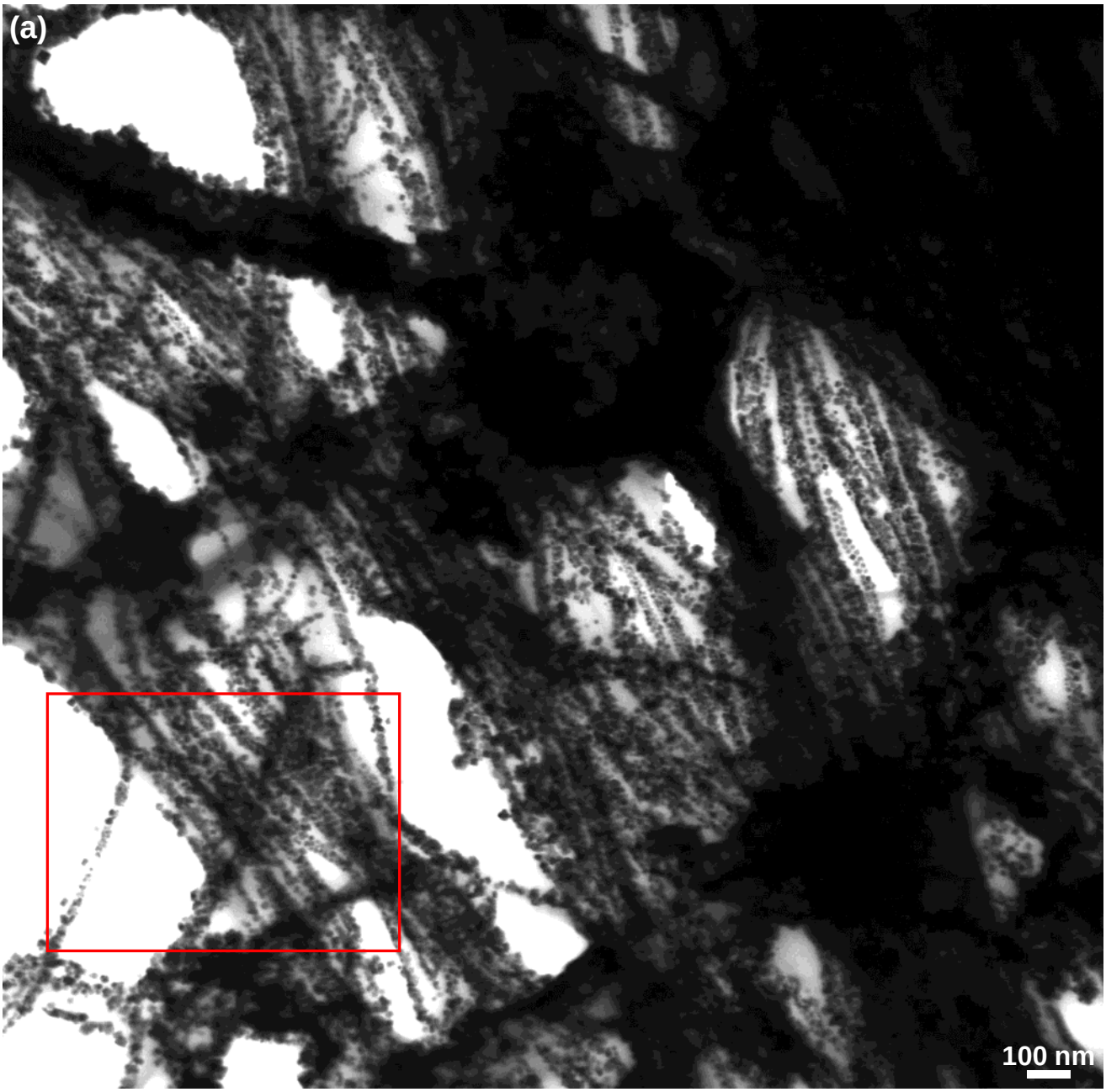
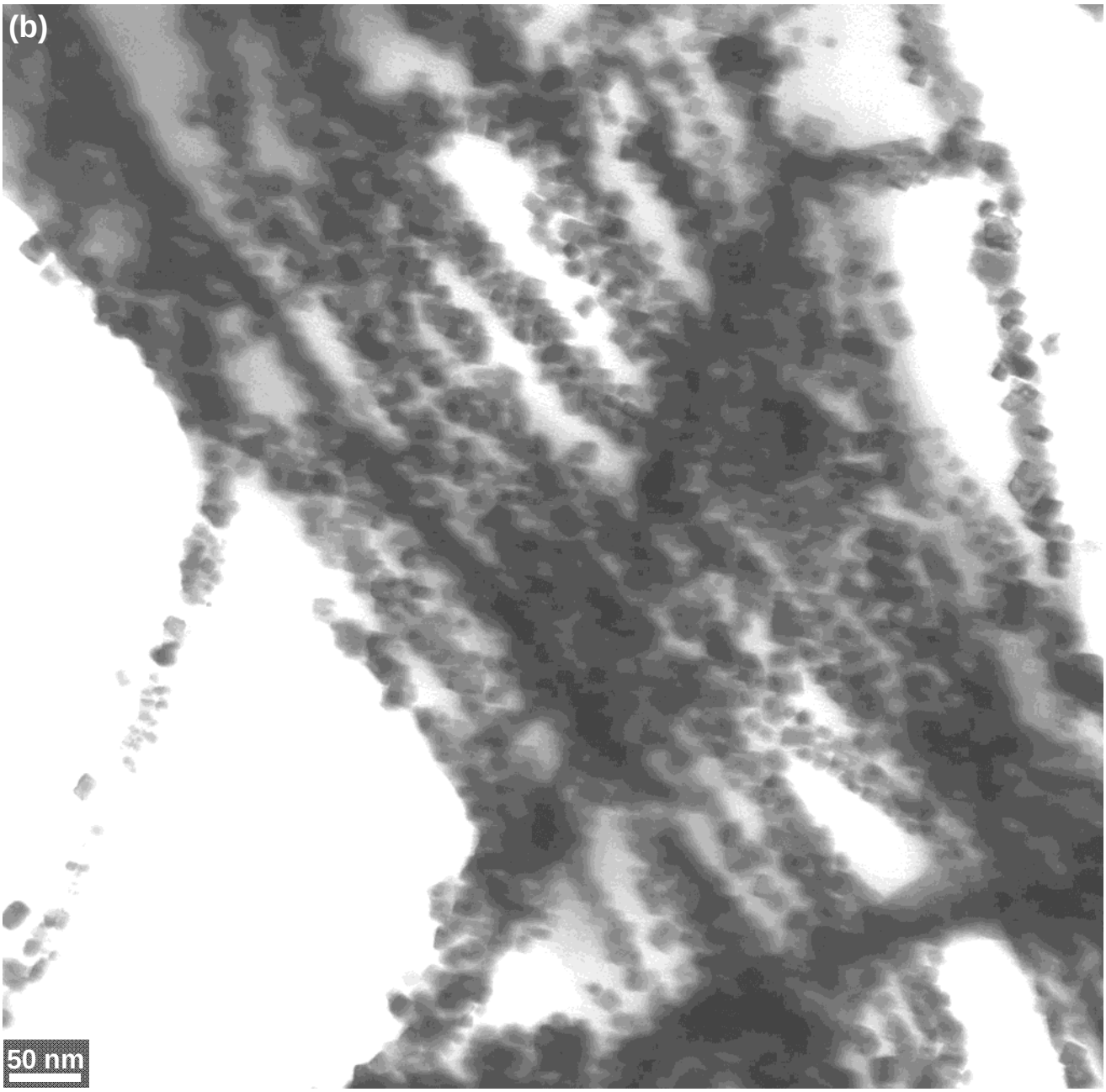


Figure S1. Large-area HRTEM images of 1D arrays of CdSe nanocrystals with a different average size coated on Se NWs, which are synthesized under different conditions: (a) $T_{reaction}$ = 165 ºC, V_{OA} = 10.0 mL; (b) $T_{reaction}$ = 150 ºC, V_{OA} = 10.0 mL; (c) $T_{reaction}$ = 150 ºC, V_{OA} = 8.0 mL. The inset in panel b shows the corresponding size-distribution histogram.


(a)
100 nm


(b)
50 nm

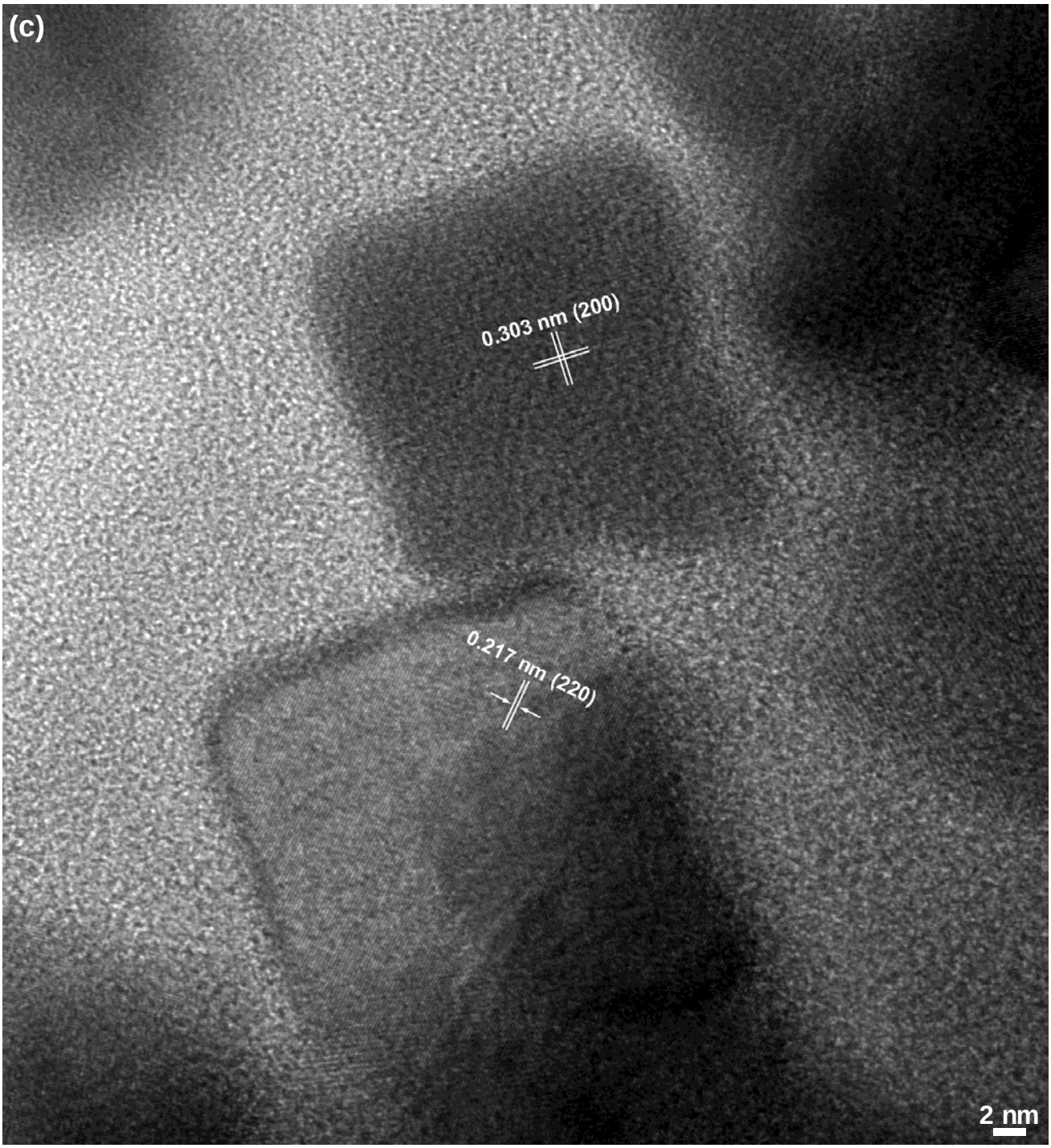


Figure S2. (a) Low-magnification TEM image of the bundles of the one dimensionally arrayed PbSe nanocubes. (b) Enlargement of the marked area of panel a shows the well-aligned 1D architectures composed of closely packed PbSe nanocubes. (c) Large-area HRTEM image of PbSe nanocubes in the 1D arrays.

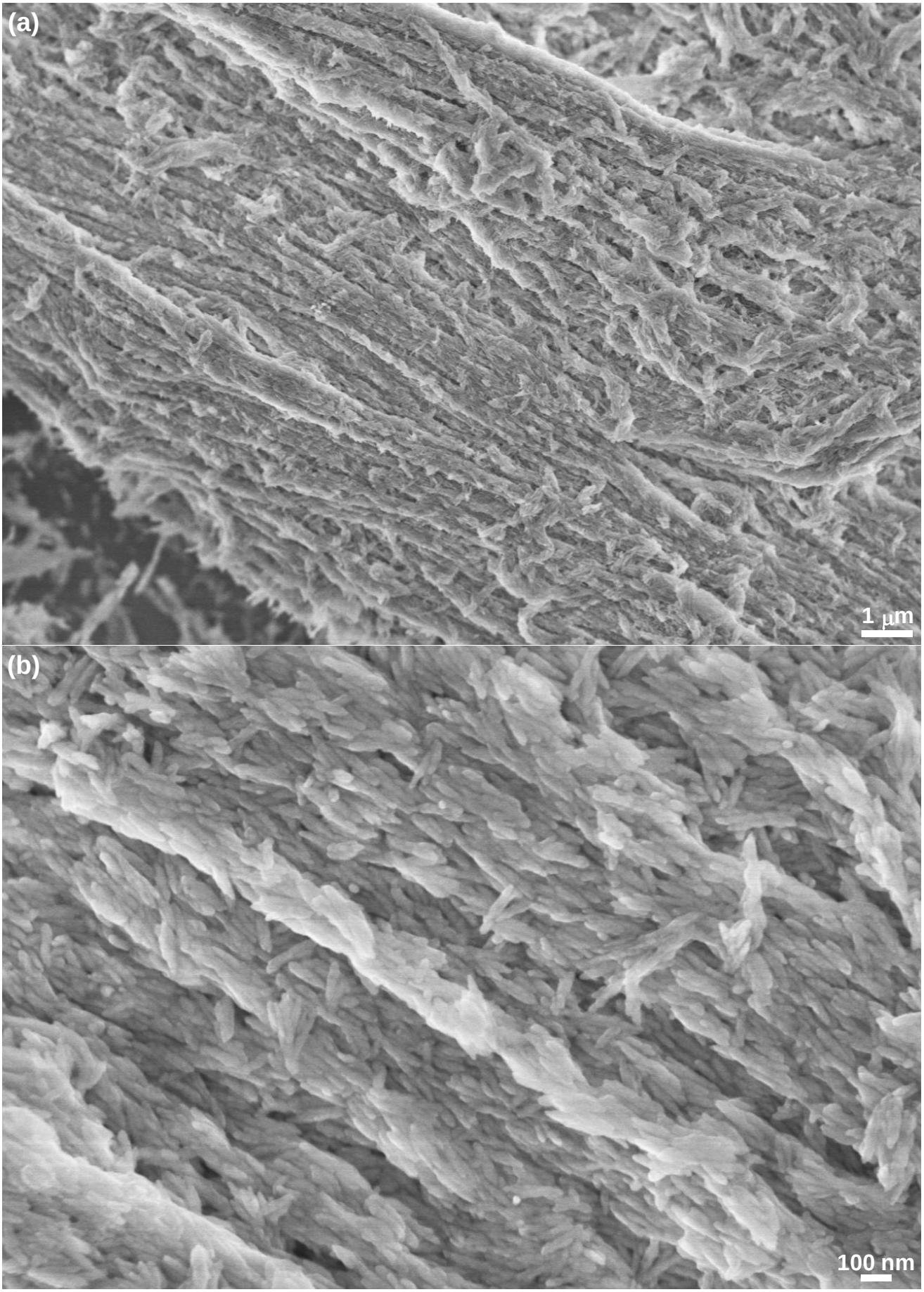


Figure S3. (a) Low- and (b) high-magnification SEM images of the bundles of the one dimensionally arrayed PbSe nanorods.

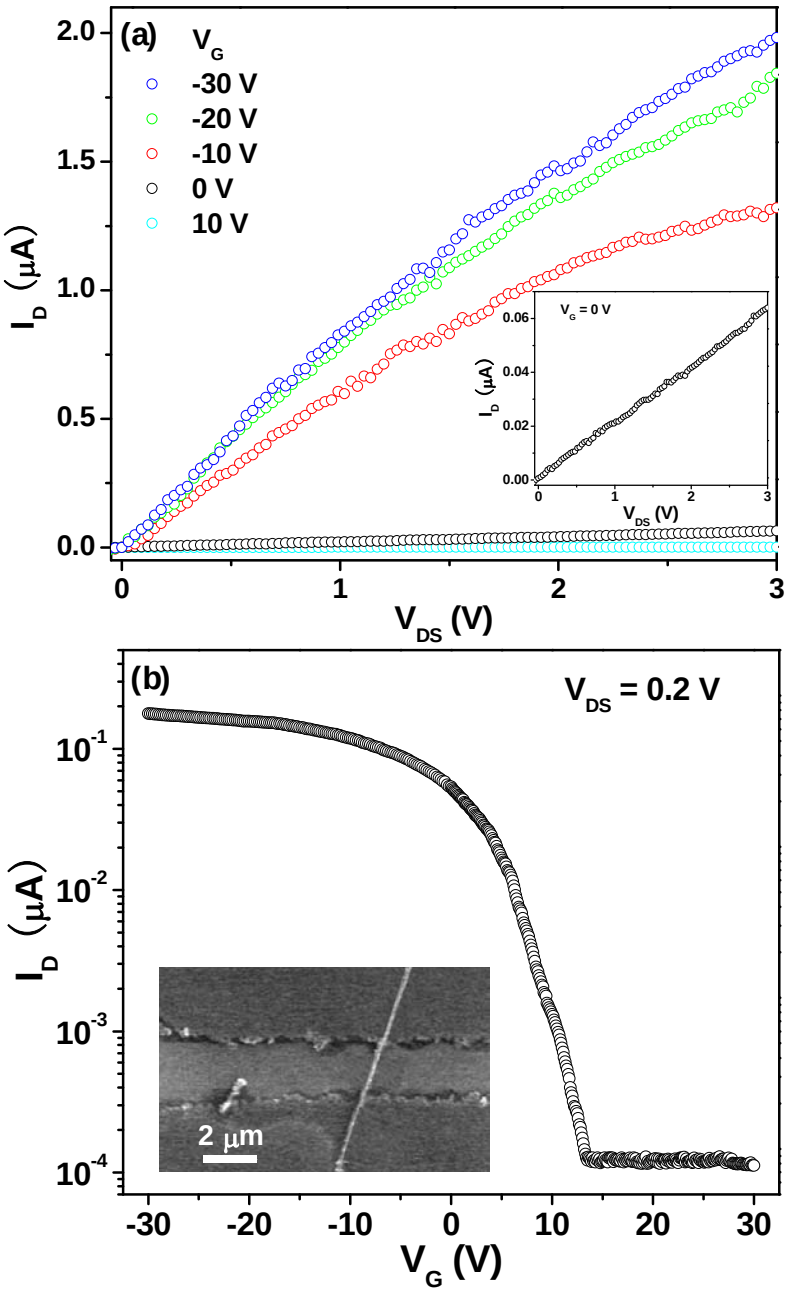


Figure S4. (a) Output curves of drain current I_D versus drain-source voltage V_{DS} obtained with gate voltage increasing from –30 to 10 V in steps of 10 V for the single Se NW (110 nm in diameter) FET device. (b) The transfer characteristic of the Se NW device obtained with I_D versus different V_G at constant V_{DS} of 0.2 V. The insets in panels a and b show the output curve of drain current I_D versus drain-source voltage V_{DS} obtained at a gate voltage of 0 V on small scale and the SEM image of the device, respectively.

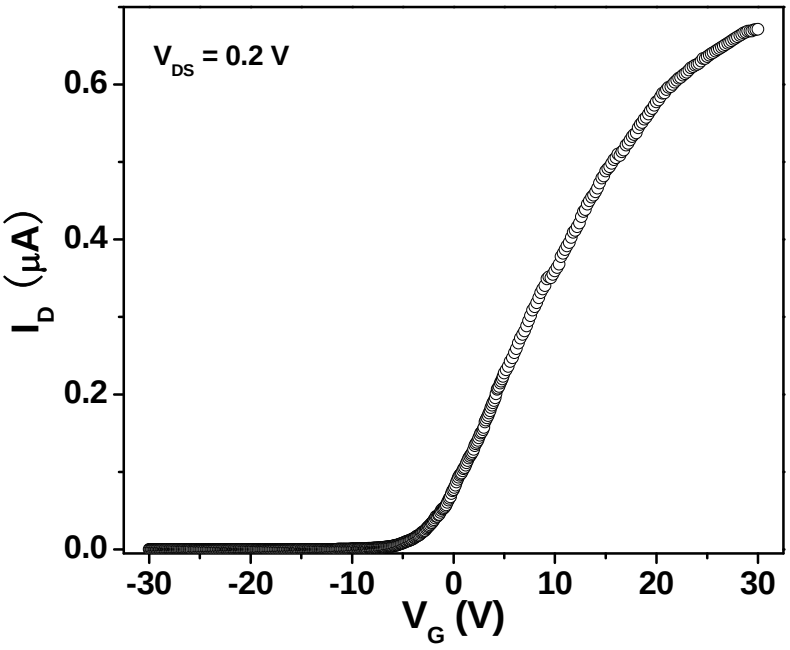


Figure S5. Transfer curve of the single Se NW (110 nm in diameter) FET device obtained by sweeping the gate voltage between –30 and 30 V in steps of 0.1 V under light illumination (for the light source, light intensity I = 40 W m^{-2} and λ = 400 nm).

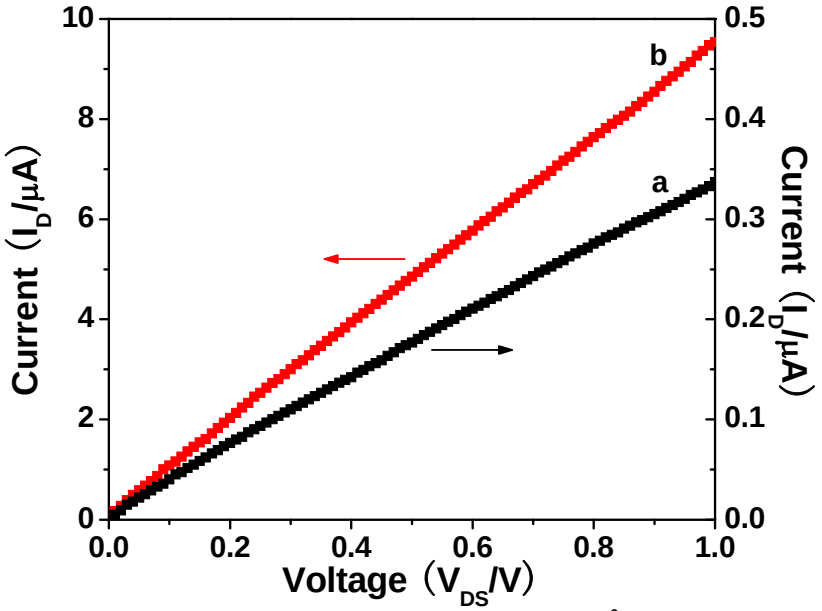


Figure S6. *I–V* curves measured under the light intensity of 40 W m^{-2}. (a) Se NW and (b) 1D Se/CdSe heterostructure devices.