

Electronic Supplementary Information for

Nanometer Size Effects in Nucleation, Growth and Characterization of Tempered CdS Assemblies

Alexander Upcher^{1, 2}, Vladimir Ezersky², Amir Berman^{2, 3,} and Yuval Golan^{1, 2,*}*

¹Department of Materials Engineering, ²Ilse Katz Institute for Nanoscale Science and Technology, ³The Avram and Stella Goldstein-Goren Department of Biotechnology Engineering, Ben-Gurion University of the Negev, Beer-Sheva 84105, Israel

* Corresponding authors: aberman@bgu.ac.il, ygolan@bgu.ac.il.

Nucleation of CdS NCs on the blue phase PDA template

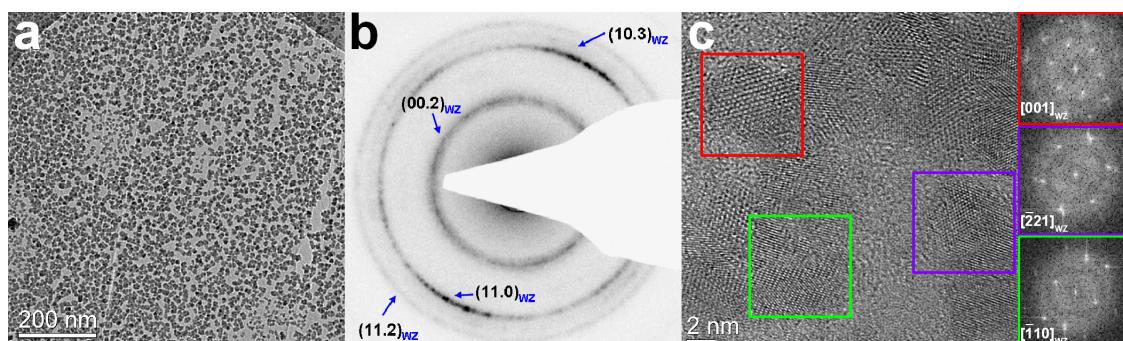


Figure ESI 1: CdS NCs on blue phase PDA LF template: (a) BF image, (b) SAED with reflection indexing, (c) HR-TEM image of CdS NCs and FFT analysis showing several different orientations within the CdS clusters.

Nucleation on blue phase PDA template resulted in nm-size CdS crystals along the organic polymer template (*Figure ESI 1a*). The average size of the NCs was about 12 nm. SAED micrographs showed ring patterns with some preferred orientation, which was induced by the linear direction of the polymer (*Figure ESI 1b*). The reflections were attributed to the WZ phase of CdS. In this SAED pattern the (10.0) and (10.1) reflections are not observed, either because they are smeared with the (00.2) ring, or because of preferred orientation that precludes them from the Bragg condition, as may be the case also for (10.2). These apparent absences and ring broadening are likely to be related to the nm-size of the crystals (*Figure ESI 1c*). HR-TEM images showed that the CdS clusters are composed from several NCs with different orientations as seen from the fast Fourier transform (FFT) analysis (*Figure ESI 1c*). The FFT analysis showed at least 3 different orientations: $[001]_{WZ}$, $[\bar{2}21]_{WZ}$ and $[\bar{1}10]_{WZ}$. The main influence of the PDA

template, in this case, is on the size confinement of the CdS NCs, and to some extent [110] in-plane preferred orientation of the crystallites with respect to the PDA direction.

Dark field imaging:

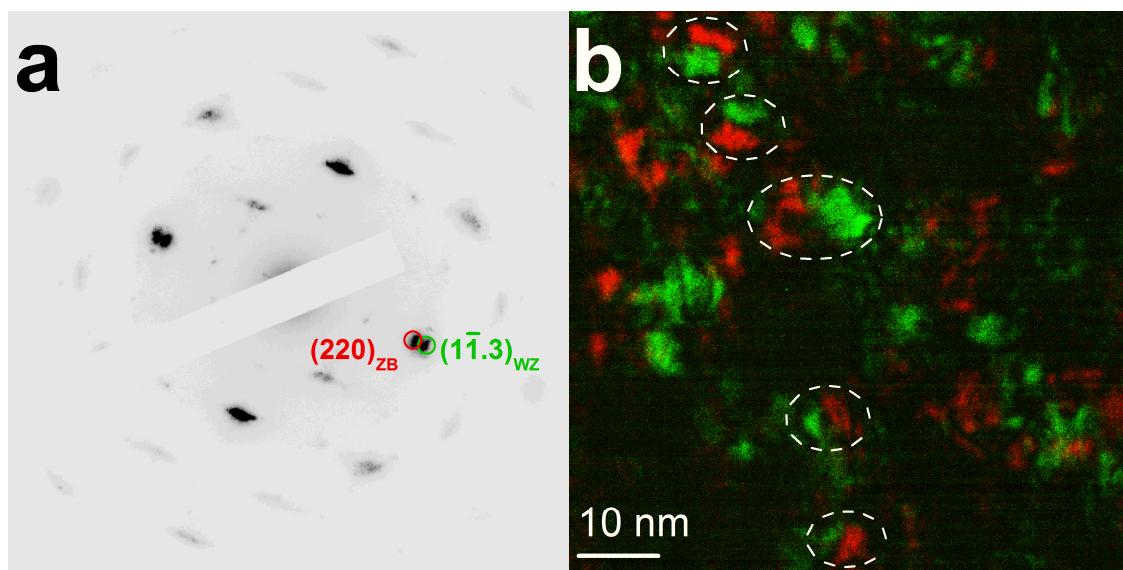


Figure ESI 2: (a) SAED pattern of CdS NCs and (b) superimposed DF images obtained from $(220)_{ZB}$ (red color) and $(1\bar{1}.3)_{WZ}$ (green color) reflections, respectively. Note the coexistence of nanoparticles of both the cubic and hexagonal phases.