Supplementary Information for

Deterministic printing of single quantum dots

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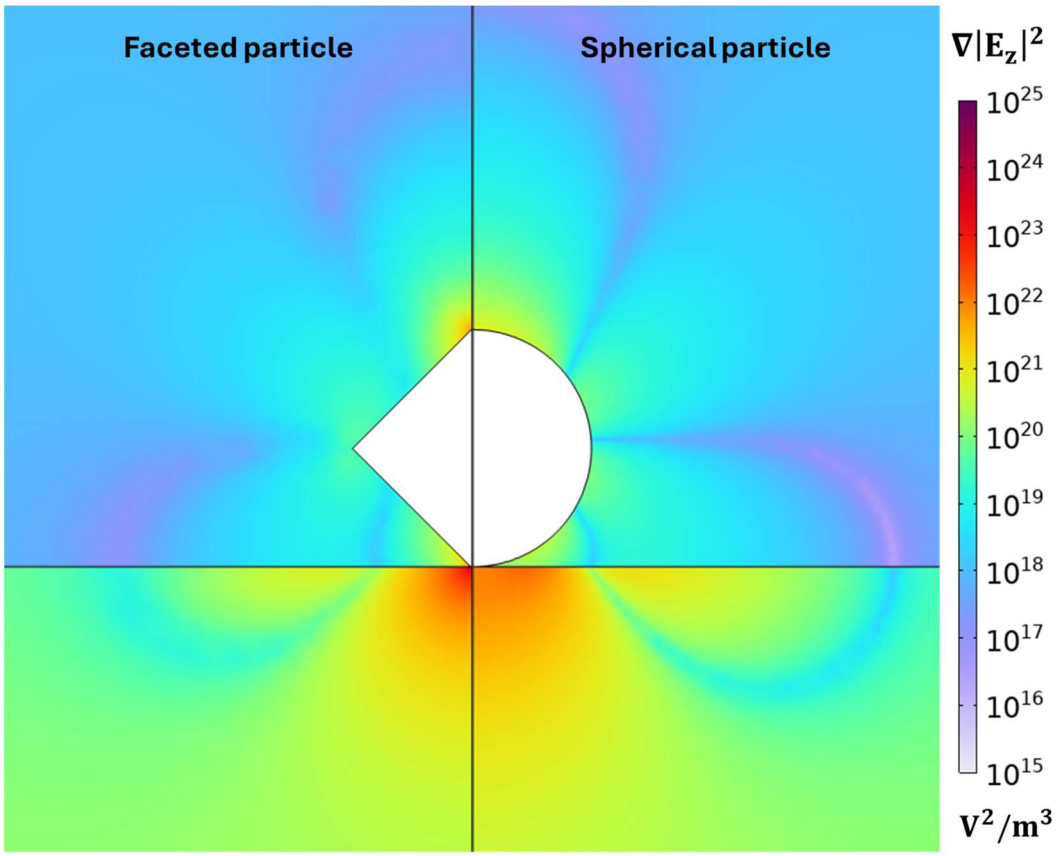
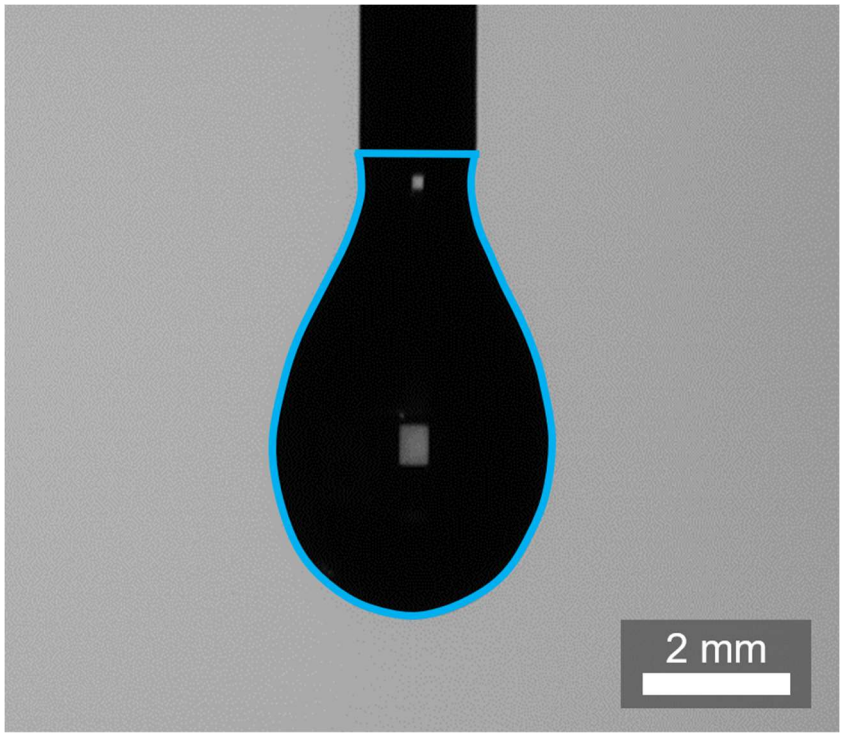
The PDF file includes:

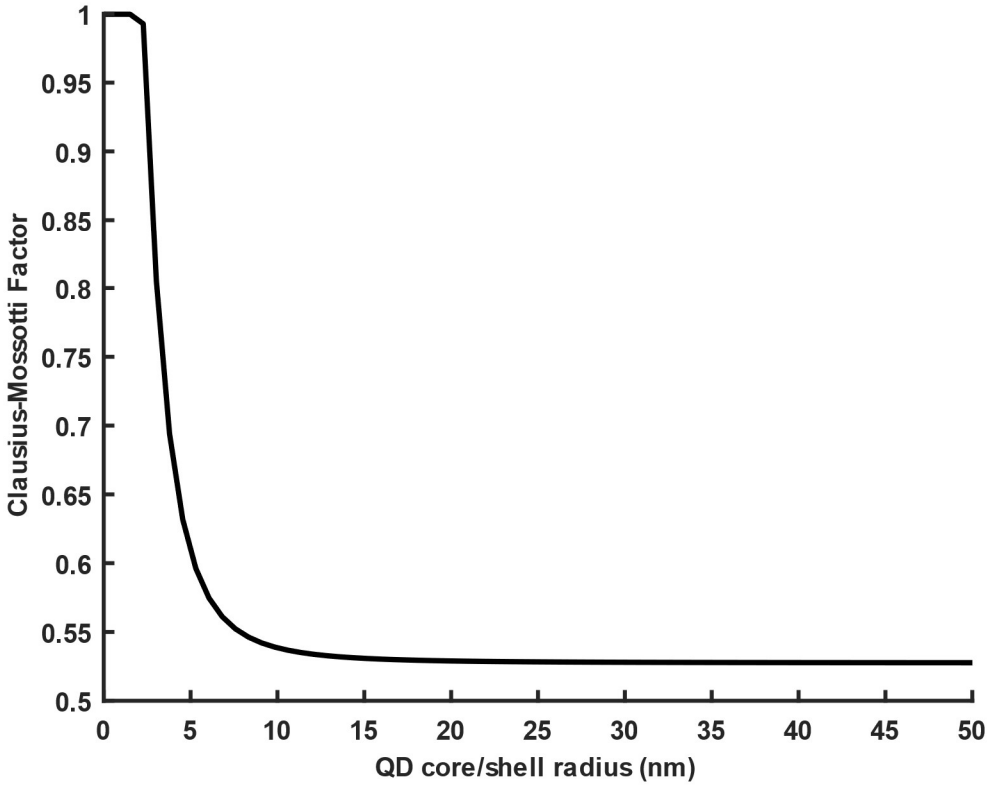
Supplementary Figs. 1 to 12



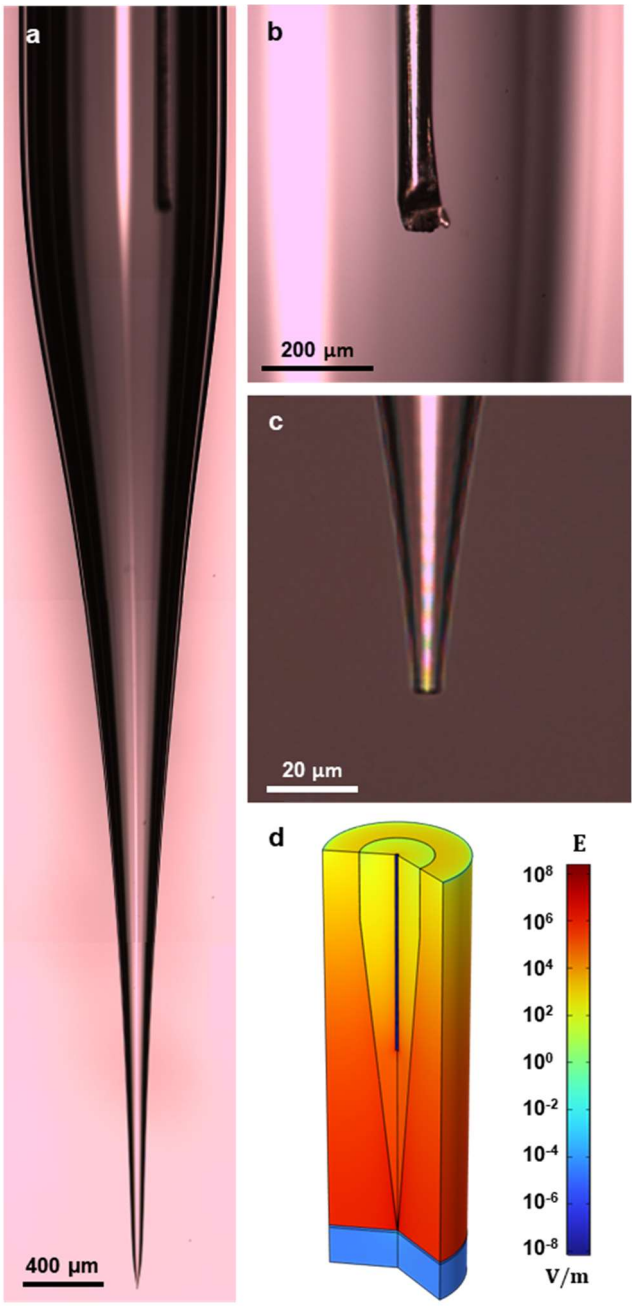
Supplementary Figure 1: COMSOL simulated particle geometries. Plotted gradient of the squared magnitude of the electric field, with respect to the vertical z-axis, of a faceted and spherical particle.



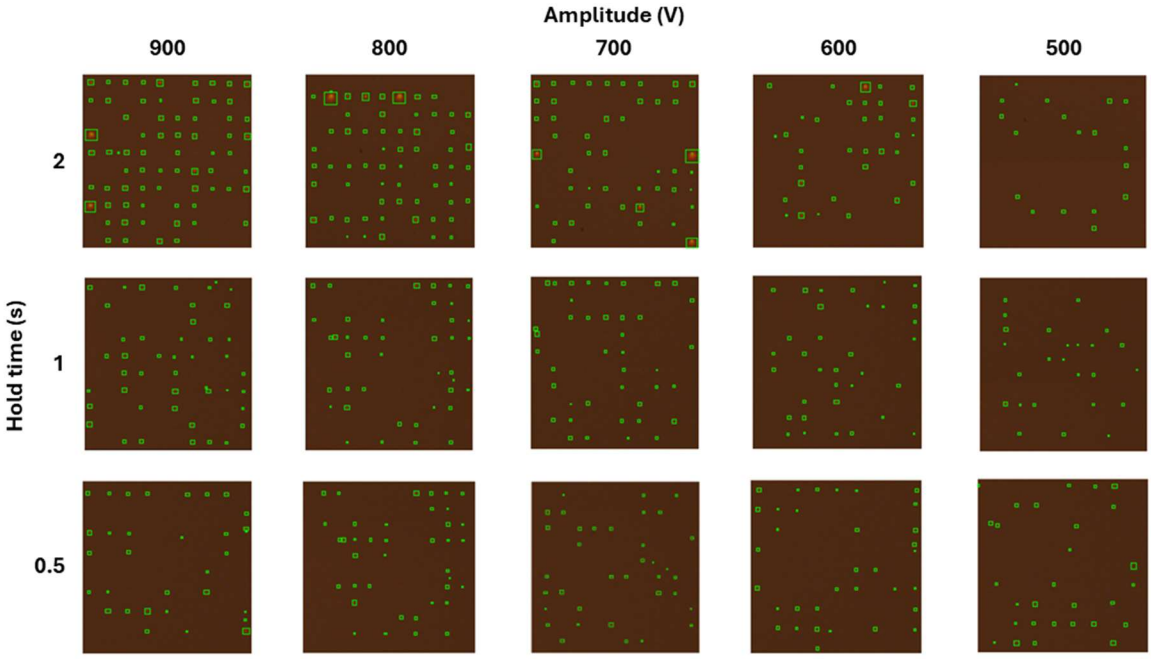
Supplementary Figure 2: Pendant drop test. Shadow image of octane:hexadecane pendant drop shape analysis. Pendant drop outline (blue) indicates shape profile used for surface tension measurement.



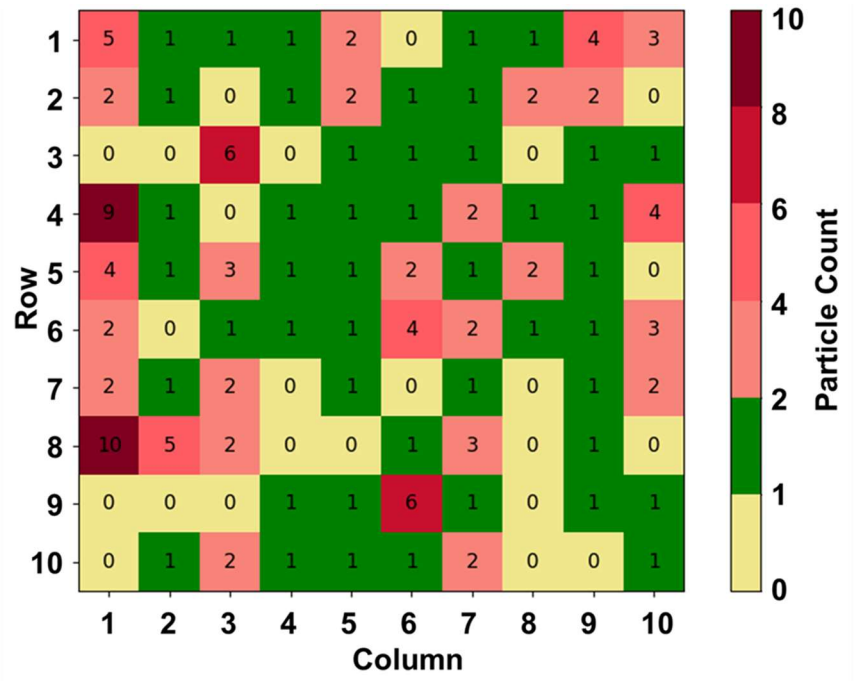
Supplementary Figure 3: Clausius-Mossotti factor for core/shell QD. Plotted approximation of Clausius-Mossotti factor of a core/shell QD based on the volumetric ratio between the CdSe core and CdS shell. The permittivity values (at 1 kHz) used for the CdSe core, CdS shell, and solvent medium used were: 20,000[23], 8.7[21], and 2.0[23,24], respectively.



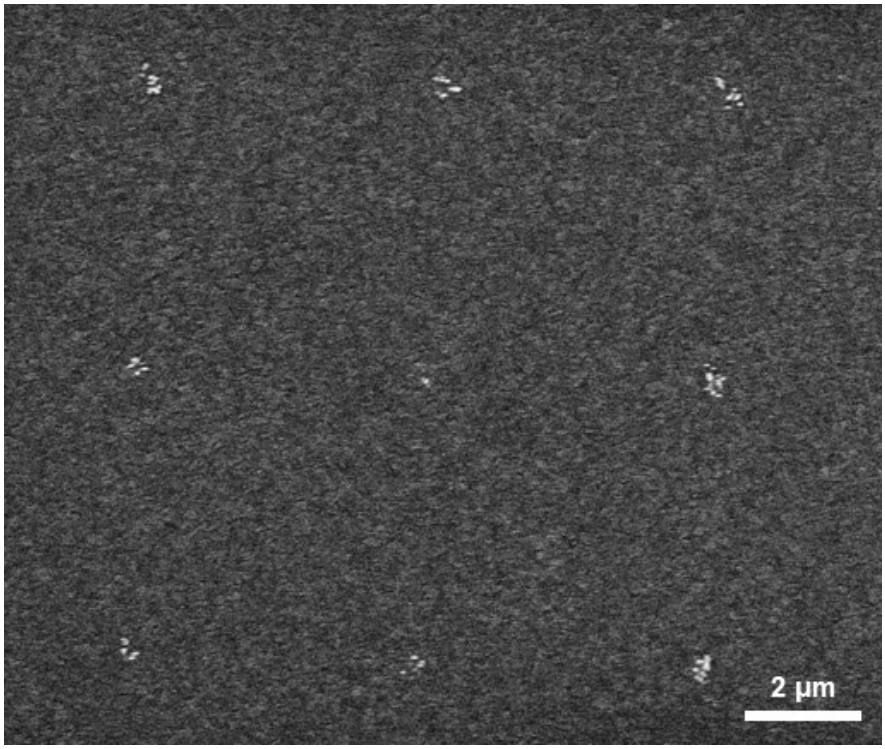
Supplementary Figure 4: Printhead analysis and simulation. a, b, and **c**, Brightfield microscopy images of (a) EHDIJ printhead, (b) interior electrode tip, and (c) printhead tip. (**d**) Finite element analysis simulating electric field in/around the printhead, substrate, and ground plane.



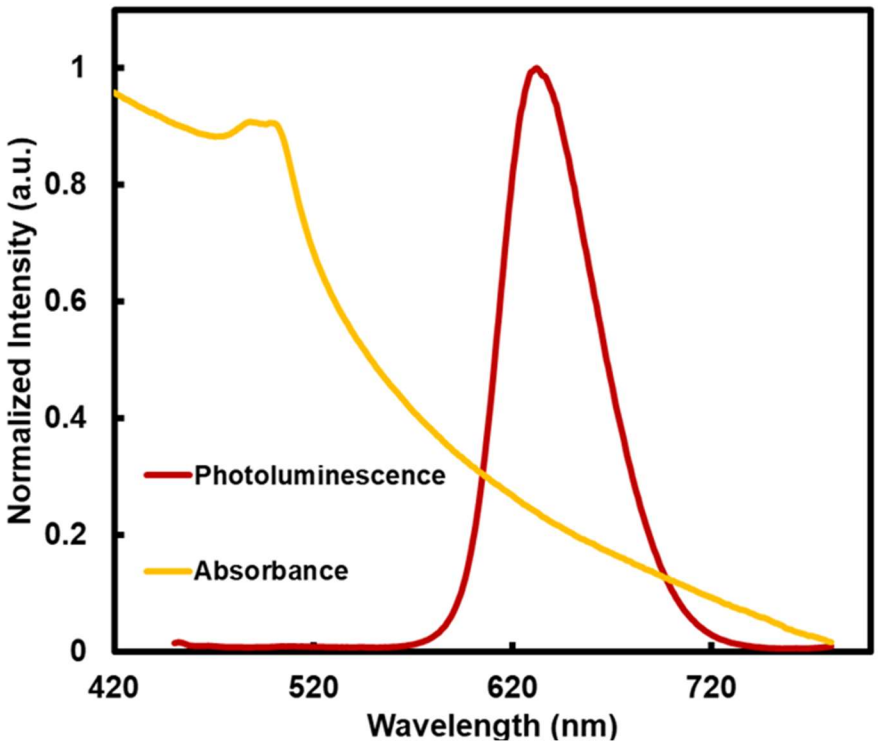
Supplementary Figure 5: MATLAB machine vision for print detection. Fluorescent microscopy images of EHDIJ prints in an array of amplitudes and hold times with 5 μm print spacing. Green boxes indicate discrete prints detected by MATLAB image processing toolbox.



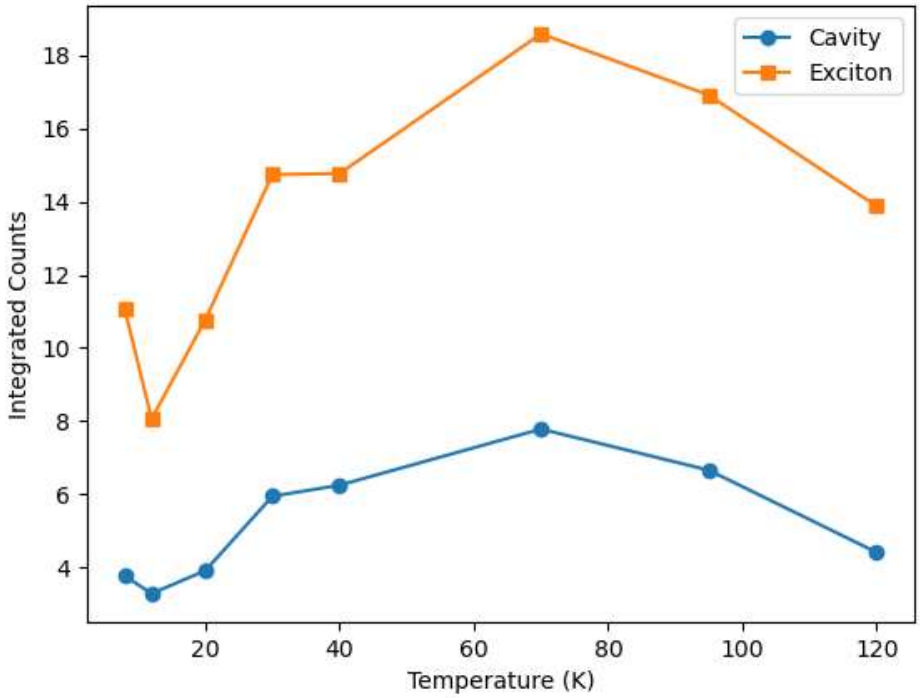
Supplementary Figure 6: Heatmap of SEM analysis. Plotted heatmap summary of the number of QDs counted per print attempt site, via SEM, for the 900 V and 2 s parameter configuration. Images from each print attempt site are included in Extended Data 1.



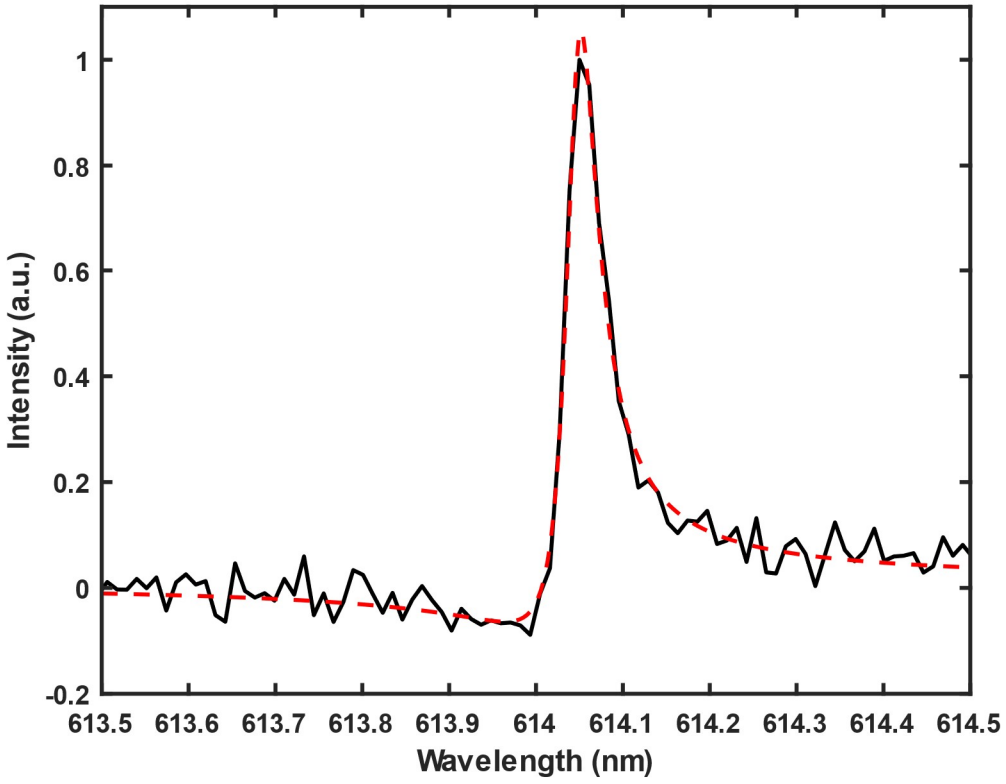
Supplementary Figure 7: Smaller colossal CdSe/CdS printing results. Scanning electron microscopy of 3x3 array of printed CdSe/CdS QD ensembles. Synthesized with 30 CdS monolayers, with an average diameter of $\mathbf{26.3 \pm 2.2}$ nm.



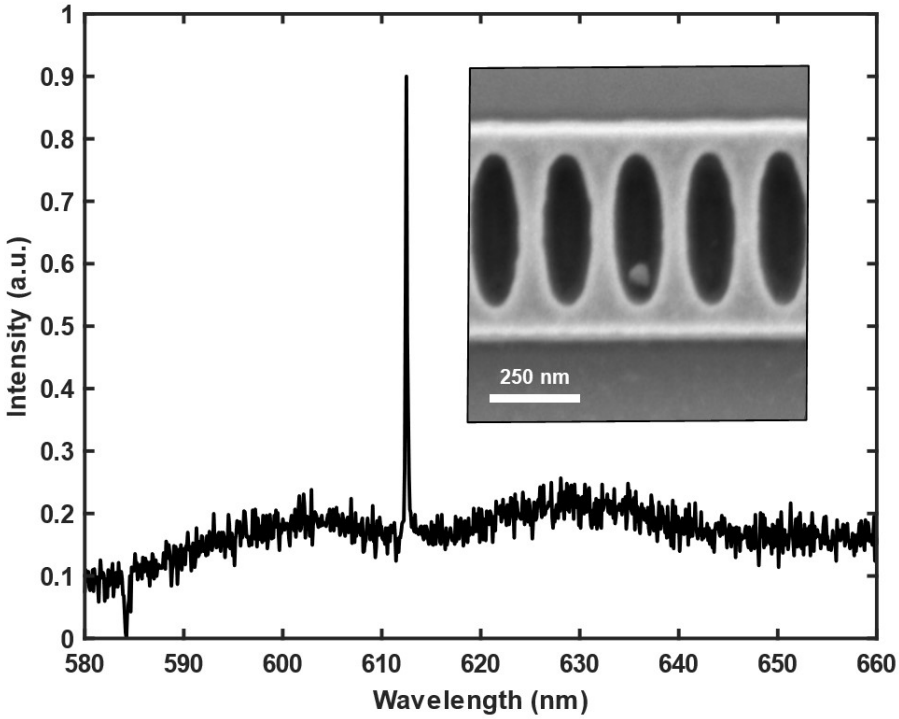
Supplementary Figure 8: Colloidal QD spectral characterization. Plotted spectrum of the Photoluminescence and absorbance of 80 ML CdSe/CdS QDs, as measured in hexane.



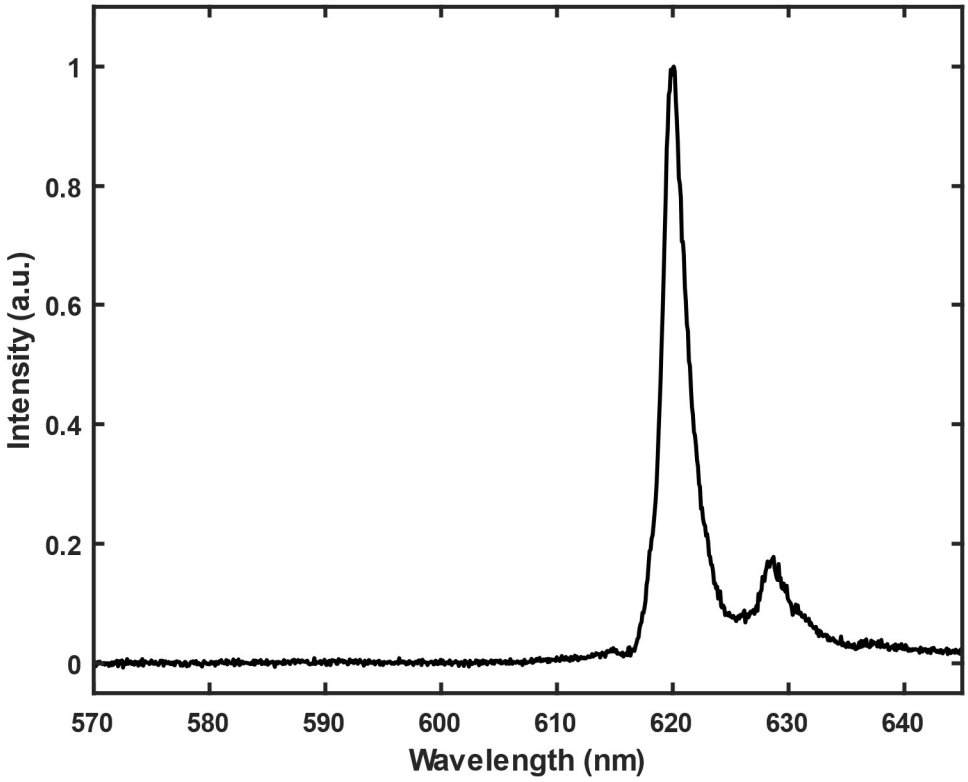
Supplementary Figure 9: QD-cavity temperature sweep. Plotted integrated counts of cavity mode and excitonic emission across a range of temperatures. Highest intensity of emission measured at 70 K.



Supplementary Figure 10: Spectrum of cavity mode. Plotted spectrum of QD-integrated cavity mode (black) with Fano fit (red). Measured at room temperature with 10 μW excitation.



Supplementary Figure 11: Photobleached heterointegrated QD-cavity. Plotted spectrum of heterointegrated QD that photobleached during spectral analysis, leaving only the SiN background and cavity mode emission. Inset: SEM image of EHD-printed QD in cavity.



Supplementary Figure 12: Spectrum of colossal CdSe/CdS QD at 8 K. Plotted spectrum of colossal CdSe/CdS QD (80 CdS monolayers) measured at 8 K and 1 μW excitation. Measured on SiO_2 substrate.