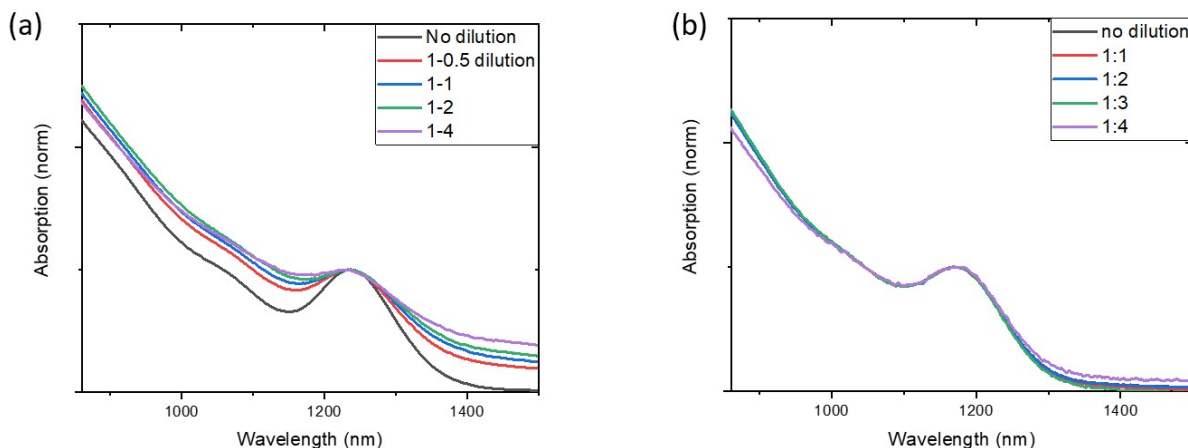
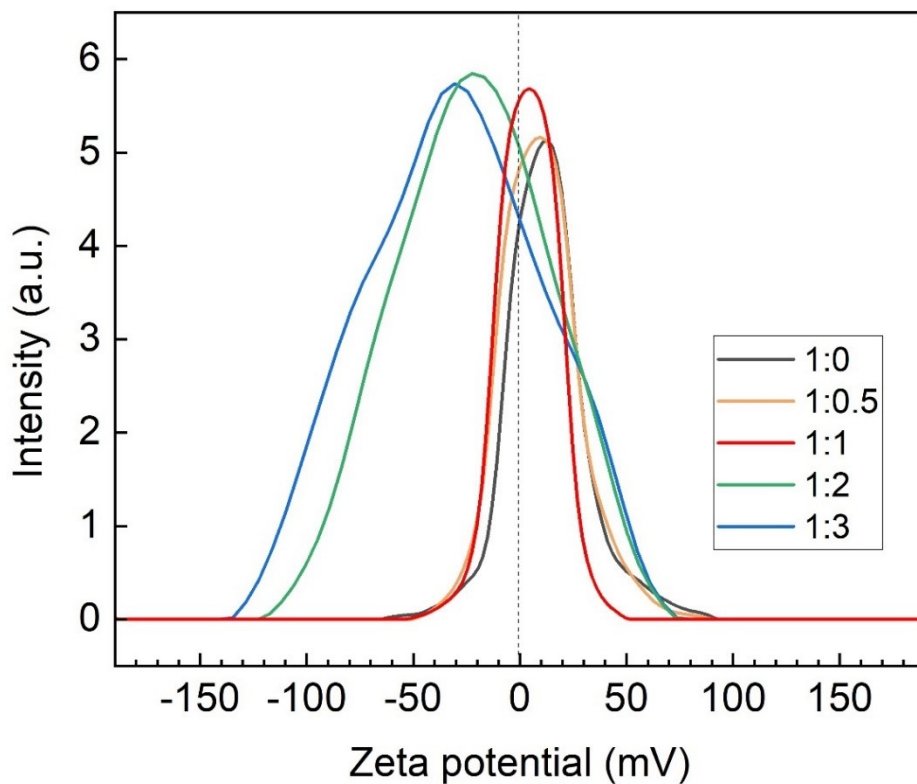


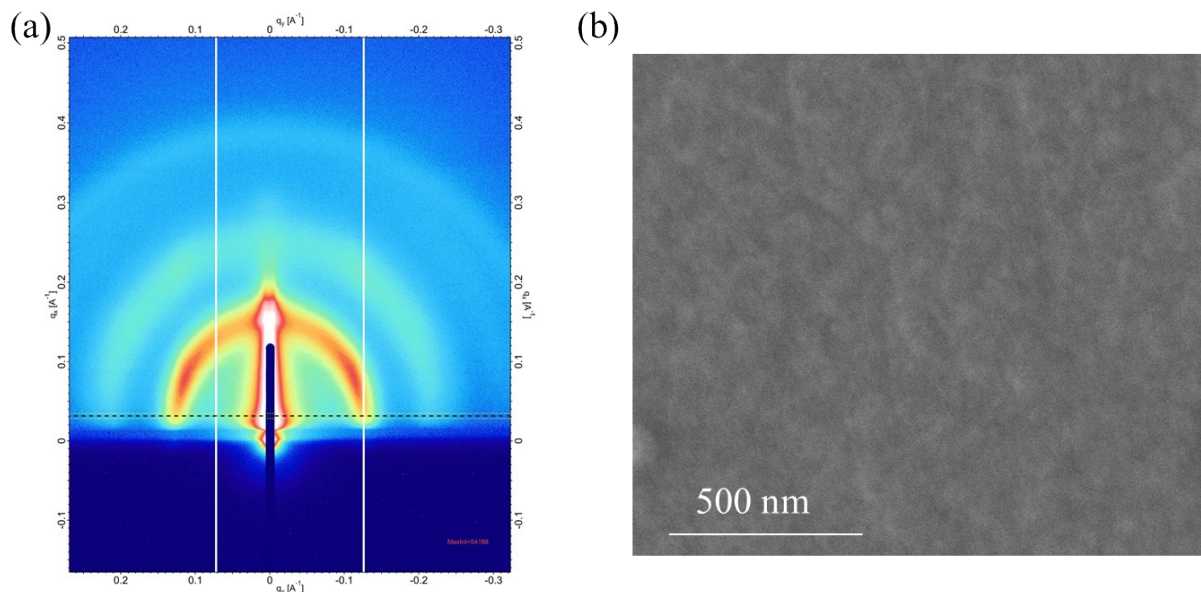
## Supporting Information



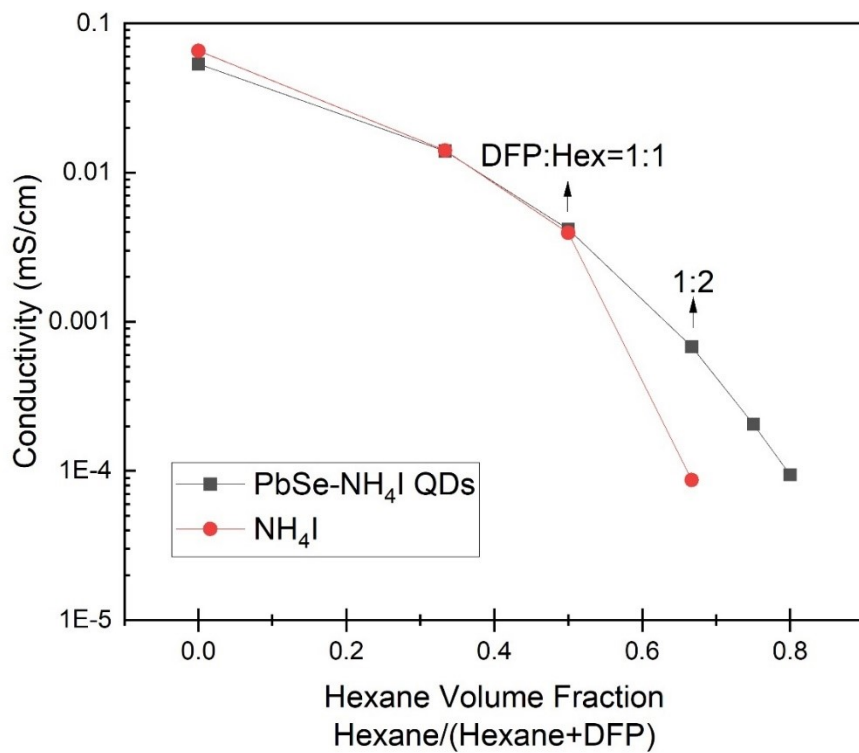
**Figure S1.** Absorption spectra of PbSe QDs in DFP diluted with (a) hexane and (b) DFP normalized to the peak position. Dilutions are given as volume ratios of the original solution to additional hexane or DFP solvent (no dilution concentration was 1.5mg/mL for each measurement, dilution reduced concentration, i.e. 1:1 ratio results in 0.75 mg/mL and so on). QDs diluted with hexane show higher scattering at longer wavelengths due aggregation of QDs as ratio of hexane to DFP increases. QDs diluted with more DFP show no change in peak shape and no increased scattering at longer wavelengths. The FWHM of the peaks diluted with hexane show minimal change, even narrowing slightly from 98nm (no dilution) to 90nm (1:4 dilution), while the FWHM of the peaks diluted with DFP does not change (94nm for all dilutions). \*Note the spectra for dilution with DFP only was taken with a different batch of QDs, made with the same method just slightly smaller in diameter.



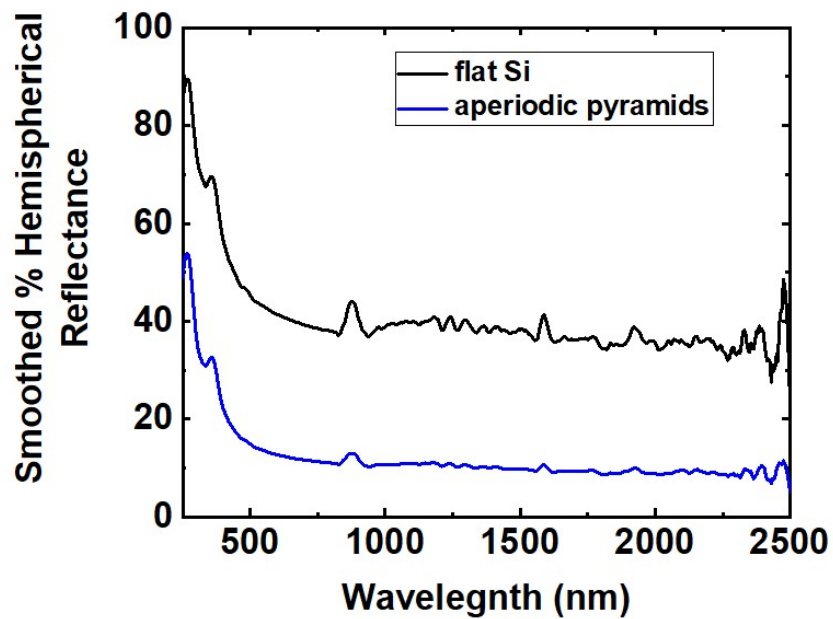
**Figure S2.** Zeta potential measurement of the PbSe-NH<sub>4</sub>I QDs in the solvent mixture of DFP and hexane with different volume



**Figure S3.** (a) Grazing-incidence small-angle scattering/GISAXS pattern and (b) the SEM image of a PbSe-NH4I QD film assembled on silicon at a DFP/hexane volume ratio of 1:1 under the electric field of 0.4V/mm for 5min.



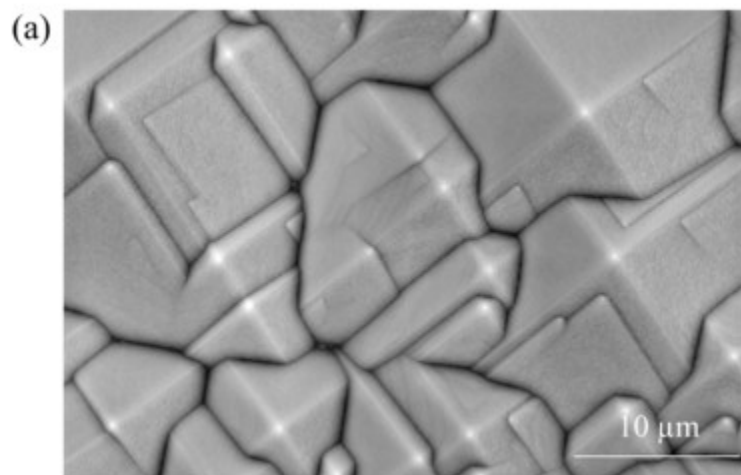
**Figure S4.** Measured electrical conductivity of suspensions of  $\text{NH}_4^+\text{I}^-$  -ligated PbSe QDs in DFP and 0.4mM  $\text{NH}_4\text{I}$  as a function of hexane volume fraction. The  $\text{NH}_4\text{I}$  concentration was chosen by assuming that the initial measure current of the QD solution is dominated by free  $\text{NH}_4^+$  ions.



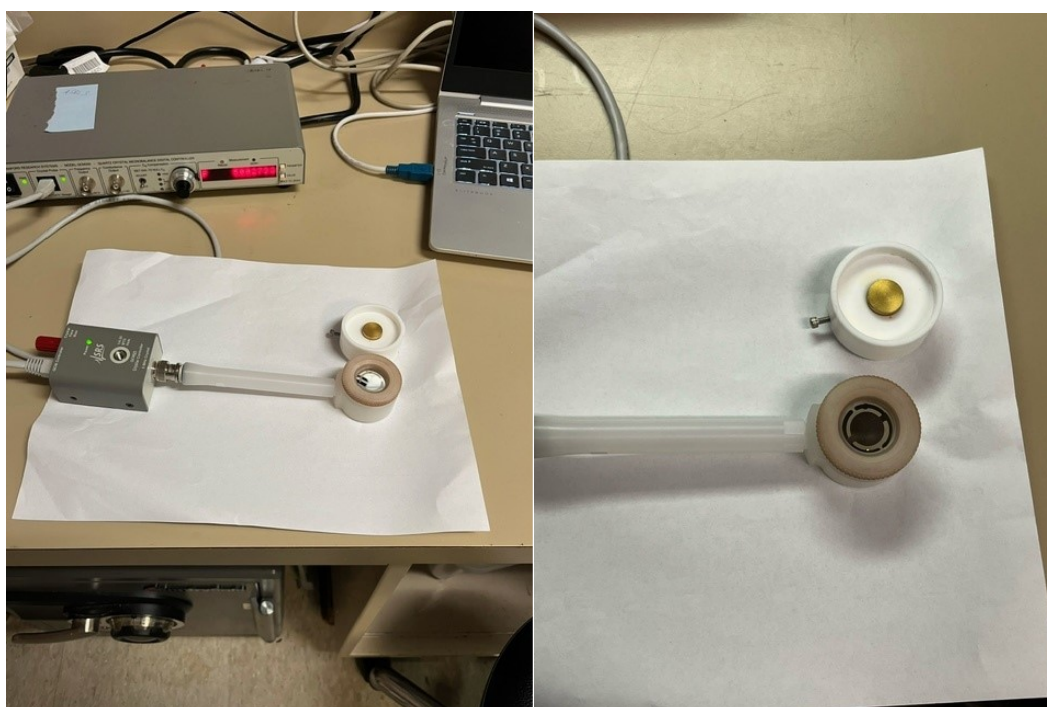
*Figure S5. Reflectance of textured and flat Si wafers*



*Figure S6. Photograph of selective deposition of PbSe QDs onto conductive gold traces on Si/SiO<sub>2</sub>. Gold traces have a linewidth of 100 $\mu$ m and a circle at the bottom of the traces of 1mm in diameter. Small amount of PbSe on non conductive area is from dip-coating effect.*



*Figure S7. SEM image of the plain textured surface of the silicon substrate.*



*Figure S8. Photos of homemade QCM cell*

**Table S1.** Film thickness of the PbSe QDs films prepared under a variety of EPD conditions

<b>Film No</b>	<b>DFP:Hexane volume ratio</b>	<b>Electric field (V/mm)</b>	<b>Deposition Time (min)</b>	<b>Film thickness (nm)</b>
1	1:1	0.6	2	~ 350
2	1:2	0.4	2	~4600
3	1:2	0.6	2	~7700

**Table S2.** Calculated parameters as a function of hexane titration using ion concentration from NH4I solutions.

<b>DFP:Hexane</b>	<b>Hexane Volume Fraction</b>	<b>Relative Dielectric (<math>\epsilon_r</math>)</b>	<b>Ion Concentration (M)</b>	<b>Bjerrum Length (nm)</b>	<b>Debye Length (nm)</b>
1:0	0.00	108	4.2E-04	0.5	25
1:0.2	0.17	90	2.4E-04	0.6	30
1:0.5	0.33	72	8.9E-05	0.8	44
1:1	0.50	55	2.5E-05	1.0	73
1:2	0.67	37	5.5E-07	1.5	403