Supplementary material (ESI) for Journal of Materials Chemistry

Supplementary Information:

Notes on characterization of quantum dots.

Quantum dot size and concentration were routinely determined by the method of Peng and coworkers,[1] with subsequent confirmation by TEM studies. Briefly, this involves use of spectral data to calculate QD diameter and extinction coefficient. For CdSe diameter is determined using the wavelength of the first excitonic absorption peak, according to

$$D = (1.6122\times10^{-9})\lambda^4 - (2.6575\times10^{-6})\lambda^3 + (1.6242\times10^{-3})\lambda^2 - (0.4277)\lambda + 41.57,$$

and extinction coefficient is then calculated from the diameter according to

$$\varepsilon = 5857D^{2.65}.$$

Concentration may then be calculated from the extinction coefficient and the absorbance of the first excitonic absorption peak, though a method for using calibrated absorbance is required if the full width half max of the excitonic absorption peak varies within some undertainty from 14 nm.[1]

Samples were collected from both organic and aqueous phases for TEM imaging. At different times, TEM, HRTEM, and EFTEM were used to perform confirmatory studies on synthesized QDs. EFTEM confirms that the imaged dots are CdSe, and with HRTEM we observed lattice fringes with separation of 0.35 nm. This distance is characteristic to both crystalline polymorphs of CdSe ({111} of *fcc* and {002} of *hcp*), so the dots imaged by TEM were unambiguously recognized as CdSe crystalline QDs. Also, from TEM images dot sizes were collected, and we routinely found that both the size and distribution were as suggested from results based on calculation using the method of Peng and coworkers, or at least to within experimental error. Fig. SI 1A shows a representative low magnification TEM image of CdSe QDs, and Fig. SI 1B-C shows TEM size distributions for two different sized dots, each labeled with both the TEM average size and the average size as determined by calculation based on spectral data.

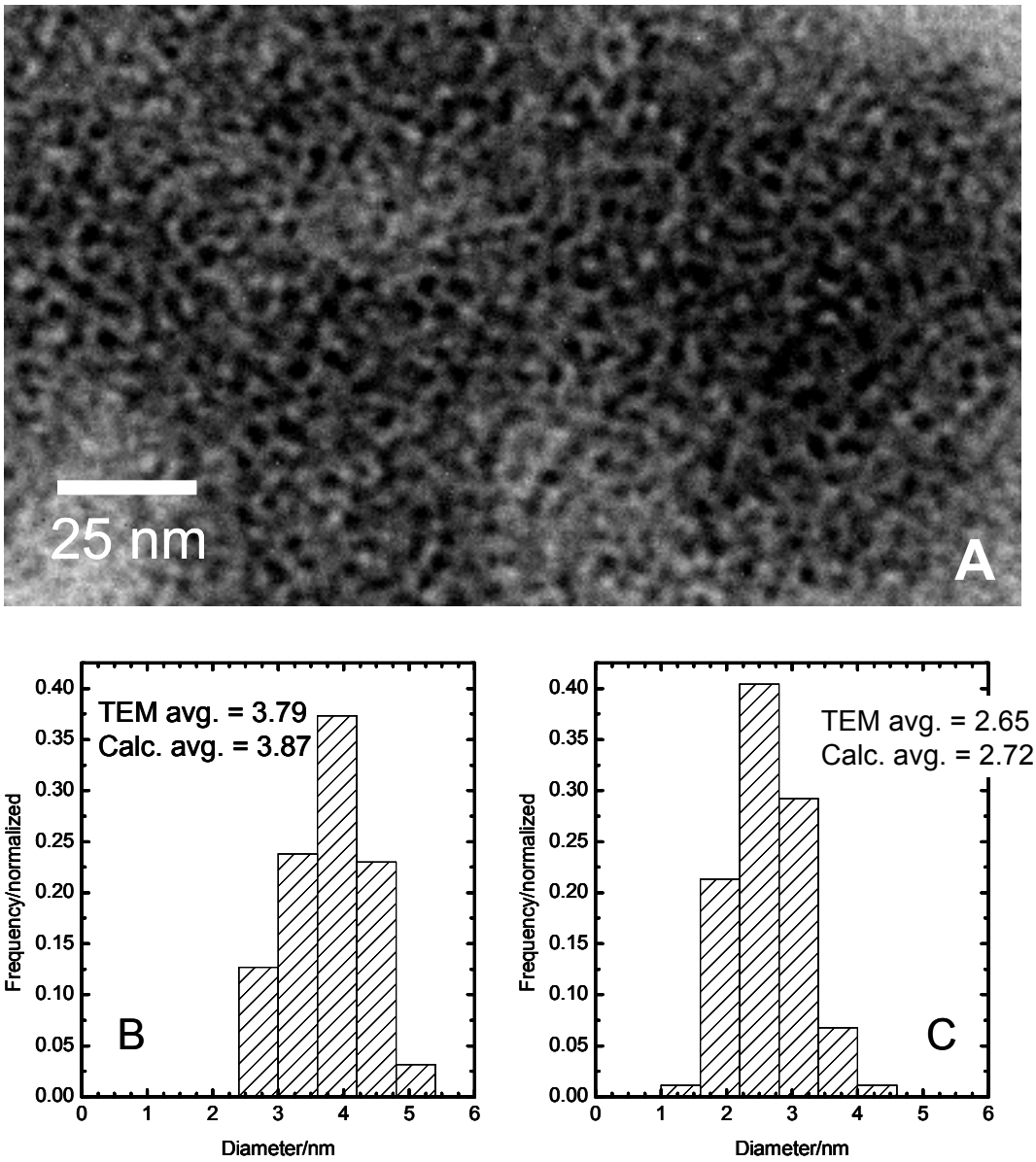

Fig. SI 1. A. Representative low magnification TEM image of CdSe QDs; B and C –TEM size distributions for two different sized dots. TEM average size and the average size as determined by calculation based on spectral data are as labeled.

1. W. W. Yu, L. Qu, W. Guo and X. Peng, *Chem. Mater.*, 2003, **15**, 2854-2860.