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Supporting Information

Facilely Controlling the Förster Energy Transfer Efficiency of Dendrimer Encapsulated Conjugated Organic Molecular Wires/CdSe quantum dot Nanostructures

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The fluorescence quantum yields (ϕ_f) of CdSe QDs and the Den-OPEs solutions were measured and reported using quinine sulfate as a standard [16]. The quantum yields were obtained with the following equation (F denotes fluorescence intensity at each wavelength, $\sum[F]$ was calculated by summation of fluorescence intensity). Therefractive indices of $CHCl_3$ (n_{CHCl3}= 1.445) and H_2O (n_{H2O} = 1.33) were used in the calculation to take into account the effect of different refractive indices of the reference and sample solution [18]:

$$\phi_f^{sample} = \frac{\phi_f^{sample} \times n_{CHCl_3}^2 \times Abs^{standard} \times \Sigma(F^{sample})}{n_{H_2O}^2 \times \Sigma(F^{standard}) \times Abs^{sample}}$$

Table S1 the quantum yield of all samples were measured. (A) simple samples; (B) composite samples ; (C) the comparative quantum yield of composite samples and simple samples.

(A)

Molecular name	Wavelength(nm)	Absorption	$\Sigma[F]$	F_U/A_U	ϕ_1(%)
Den0-OPE	370	1.210	206524	170681	93
Den1-OPE	370	1.380	126038	173933	94.8
Den2-OPE	370	1.500	265486	176991	96.4
CdSe	515	0.732	4714	6739	3.6

(B)

Molecular name	Wavelength(nm)	Absorption	$\Sigma[F]$	F_U/A_U	ϕ_2(%)
Den0-OPE/CdSe	515	0.200	2924	14623	7.8
Den1-OPE/CdSe	515	0.342	6960	20351	10.9
Den2-OPE/CdSe	515	0.253	9070	35851	19
Den0-OPE/CdSe	370	1.271	54532	78290	23.38
Den1-OPE/CdSe	370	0.570	4463	42904	18.32
Den2-OPE/CdSe	370	0.496	15937	32131	17.5

(C)

molecular name	Den0-OPE	Den1-OPE	Den2-OPE	CdSe	CdSe	CdSe
simple molecule(ϕ_1)(%)	93.0	94.8	96.4	3.6	3.6	3.6
Composite molecule(ϕ_2)(%)	23.38	18.32	17.50	7.8	10.9	19.0
ϕ_2/ϕ_1	0.25	0.19	0.18	2.17	3.03	5.28

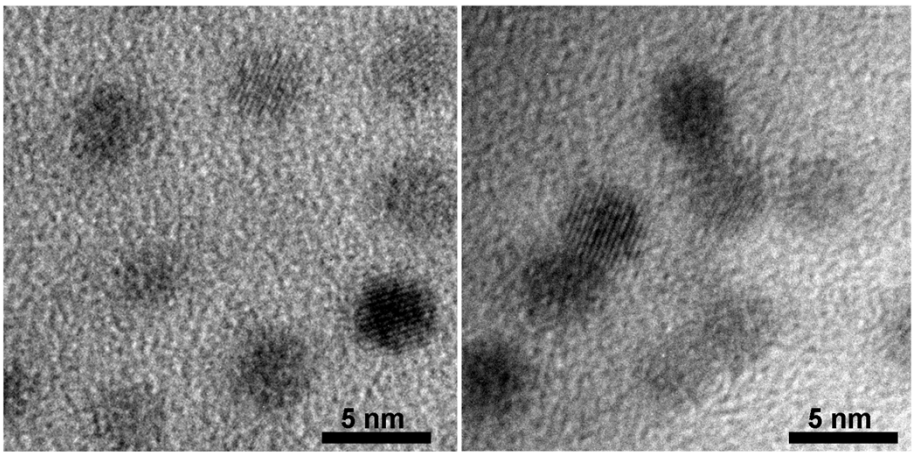

Fig. S1 HRTEM images of (A) TOPO-CdSe and (B) Den0-OPE/CdSe drop-cast onto carbon-coated TEM grid.

HRTEM images of the TOPO-CdSe QDs and Den-OPEs/CdSe composites are shown in Fig. S1. As can be seen, mainly single QDs were present before TOPO exchange with the Den-OPEs (Fig. S1A). The size of QDs was around 4.0 nm in diameter. However, after Den-OPEs modified QDs, aggregates with same size and shape of the QDs were visible in Fig. S1B. These results confirm the controllable cross-linkage of QDs by Den-OPEs.

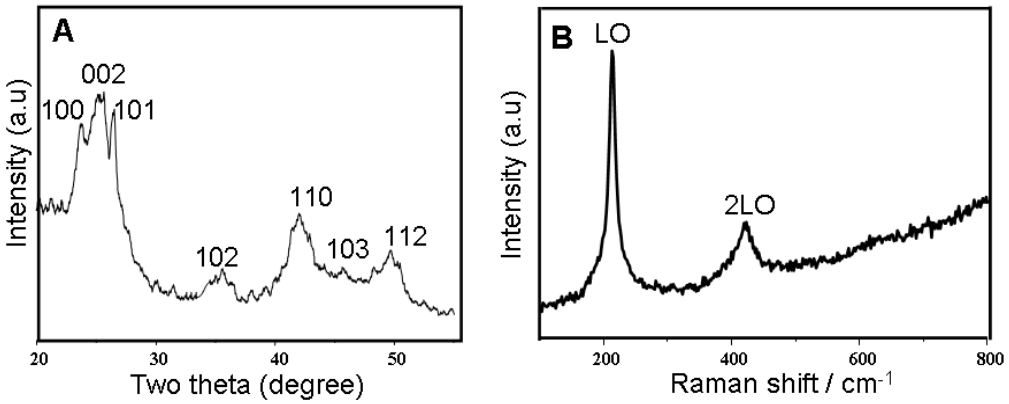

Fig. S2 (A) The powder X-ray diffraction pattern of CdSe QDs; (B) Raman spectra of CdSe QDs in chloroform at the 480 nm excitation wavelengths.

The X-ray diffraction patterns (Fig. S2A) of CdSe QDs exhibited diffraction patterns similar to those of almost perfect wurtzite CdSe QDs [3]. Fig. S2B showed representative polarized Raman spectra of CdSe QDs in chloroform at 480 nm excitation wavelengths. The dominant CdSe feature was the “LO phonon” centered

near 210 cm^{-1} and the overtone of the LO phonon, centered near 415 cm^{-1}, which were in accordance with the wurtzite CdSe QDs [4].

References:

[1] W.H. Melhuish, J. Phys. Chem. 65 (1961) 229.

[2] D.F. Eaton, Pure Appl. Chem. 60 (1988) 1107.

[3] L. Qu, Z. A. Peng, X. Peng, Nano Lett. 1(2001), 333.

[4] J. A. Baker, D. F. Kelley, A. M. Kelley, J. Chem. Phys. 139(2013), 024702.