Supporting information

Thermal Effect on the Efficiency and Stability of Luminescent Solar Concentrators based on Colloidal Quantum Dots

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Supporting tables and figures

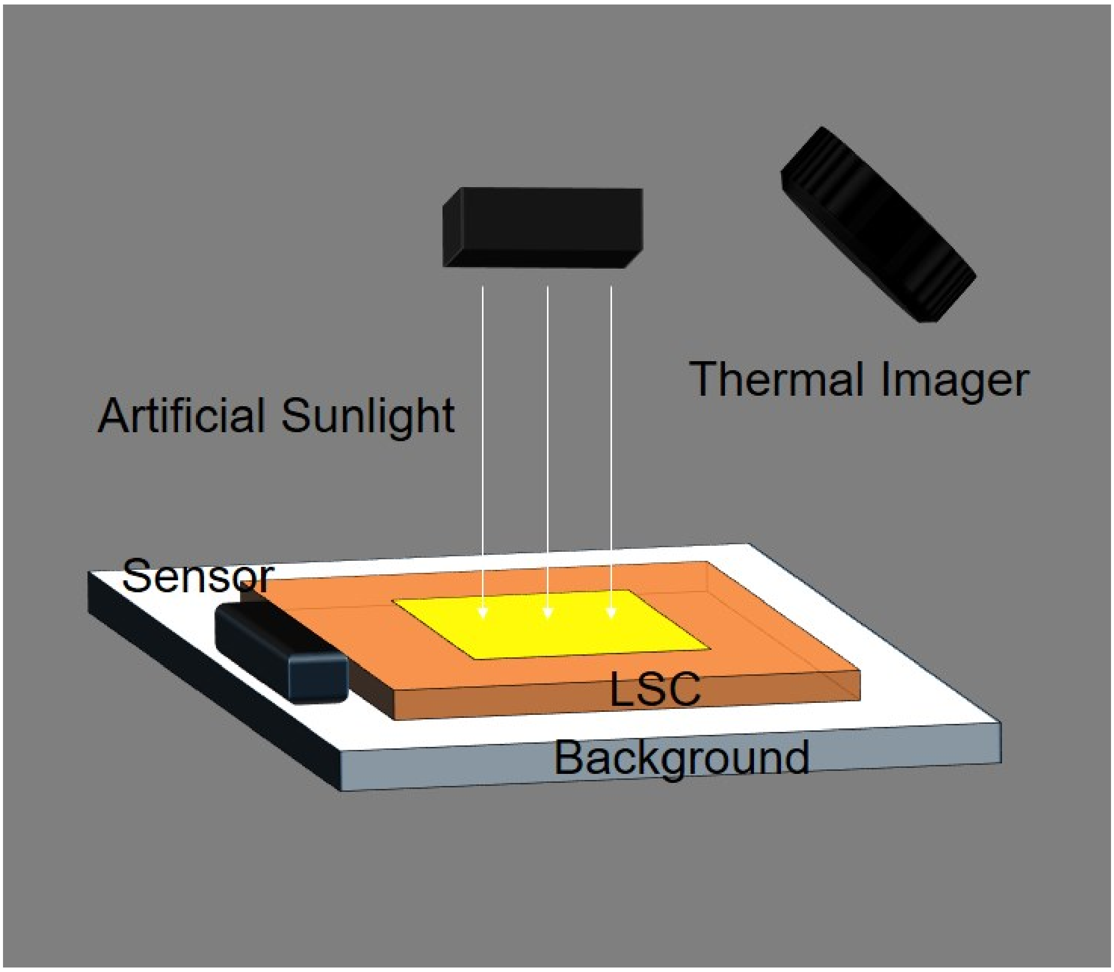

Figure S1. The setting-up scheme for the thermal imaging measurement.

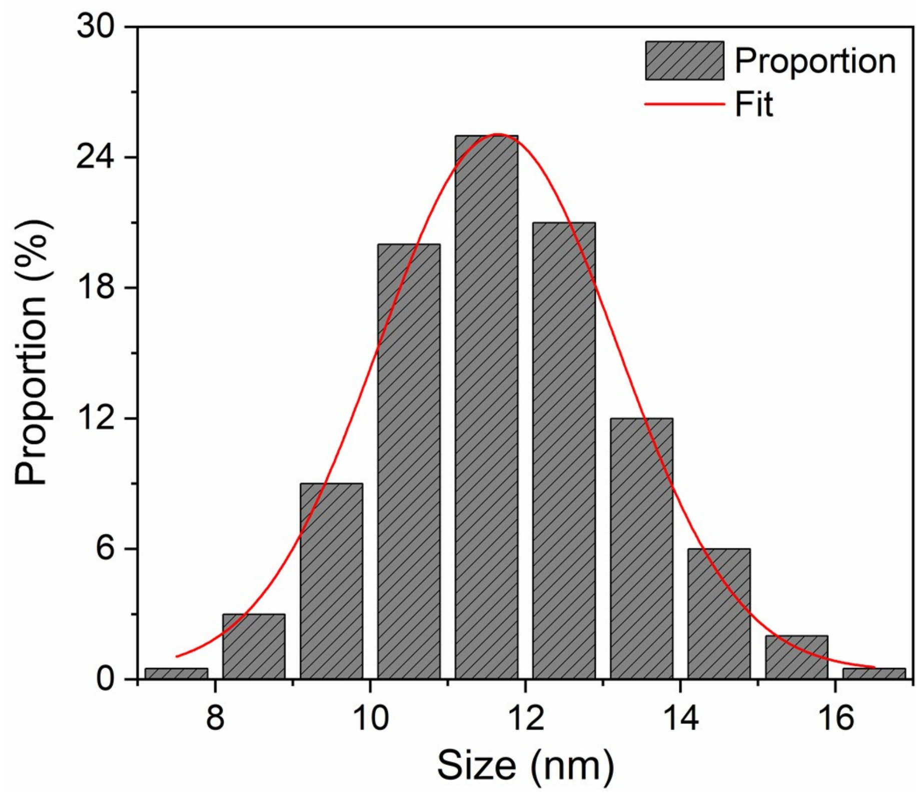

Figure S2. The size distribution of CdSe/CdS.

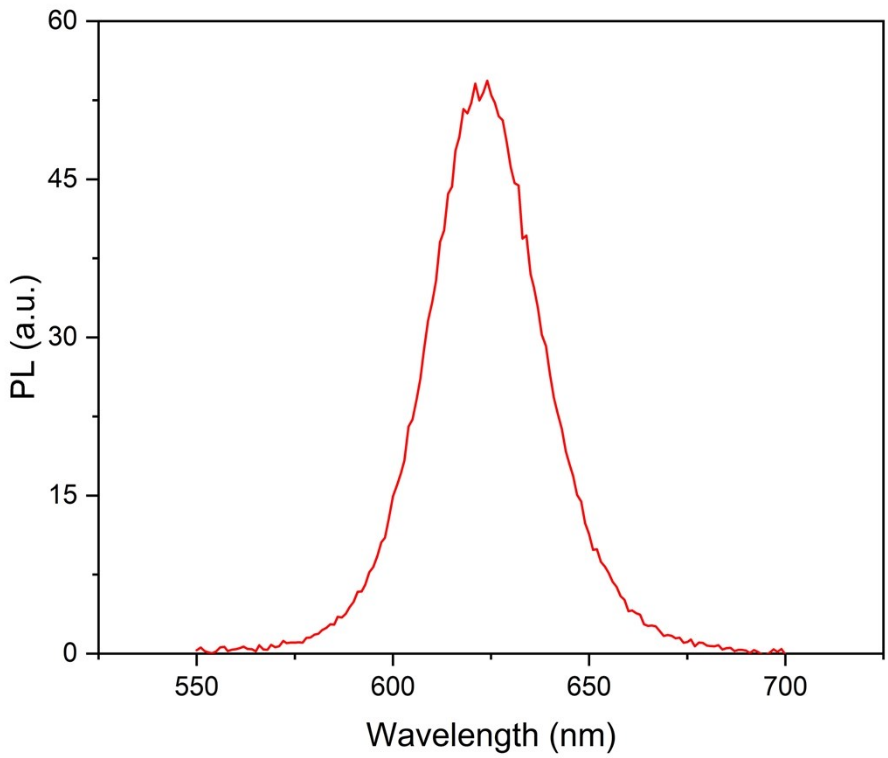

Figure S3. PL spectra recorded from the LSC based on CdSe/CdS QDs/PLMA polymer.

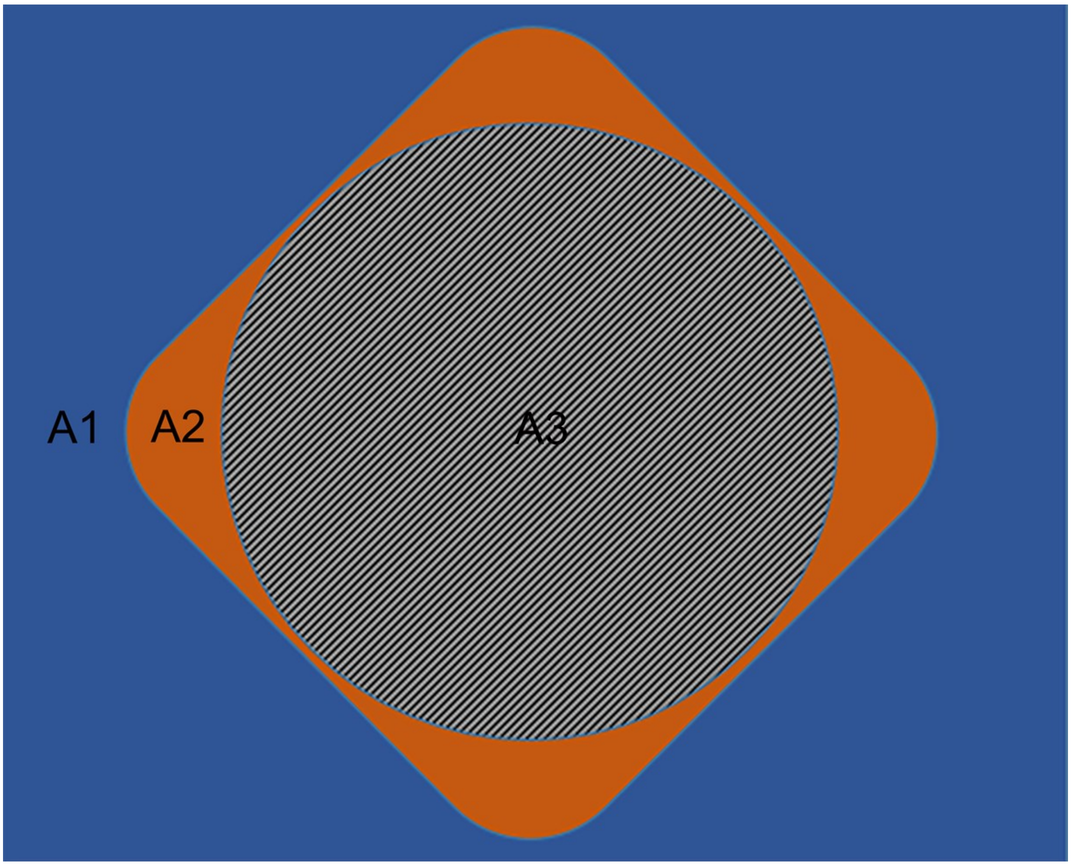

Figure S4. A3 is the selected area of the LSC for the temperature monitoring. A1 and A2 are the LSC exposed without and with sunlight (100 mW/cm^2), respectively.

Table S1. The dimension and mass of the LSCs.

Type	Mass (g)	Long (cm)	Width (cm)	Thin (mm)
QDs/PLMA	13.43	6.5	7	3
QDs/PLMA-PMMA	73.7	10	10	7
QDs/PMMA-Glass	122.24	10	10	5

Table S2. Measured Refractive Index and calculated Total internal reflection efficiency and Reflectance.

Ambient Temperature	Refractive index	Total internal reflection efficiency	Reflectance
Glass	1.50	0.745	4%
PLMA	1.49	0.741	3.9%
PMMA	1.49	0.741	3.9%

Total internal reflection efficiency, P_{TIR} is defined by the escape cone identified by the critical angle θ of the air/glass interface:[1]

$$P_{TIR} = \sqrt{1 - \left(\frac{n_{air}}{n}\right)^2}$$

R can be calculated as follows:[1]

$$R = \frac{(n - n_{air})^2}{(n_{air} + n)^2}$$

Table S3. The saturation temperature of LSCs during the thermal measurement.

Ambient Temperature	QDs/PLMA (℃)	QDs/PLMA-PMMA (℃)	QDs/PMMA-Glass (℃)
10 ℃	25.6	22	15.5
20 ℃	32.25	28.64	26.08
30 ℃	40.35	39.42	33.94
40 ℃	49.16	46.87	41.88

Table S4. The saturation time of LSCs during the thermal measurement.

Ambient Temperature	QDs/PLMA (s)	QDs/PLMA-PMMA (s)	QDs/PMMA-Glass (s)
10 ℃	337	410	226
20 ℃	272	367	308
30 ℃	313	487	312

40 ℃	254	387	201

Table S5. The temperature variation rate of LSCs.

Ambient Temperature	QDs/PLMA (℃/min)	QDs/PLMA-PMMA (℃/min)	QDs/PMMA-Glass (℃/min)
10 ℃	2.46	1.49	0.98
20 ℃	2.34	1.26	1
30 ℃	2.29	1.28	0.99
40 ℃	2.34	1.45	1.09

Table S6. The temperature variation of the measured LSCs before and after temperature saturation.

Ambient Temperature	QDs/PLMA (℃)	QDs/PLMA-PMMA (℃)	QDs/PMMA-Glass (℃)
10 ℃	13.8	10.2	3.7
20 ℃	10.59	7.71	5.15
30 ℃	11.93	10.39	5.16
40 ℃	9.9	8.64	3.65

Table S7. The current output per unit area (mA/cm^2) of the solar cells. The arrow bar for all the measured is less than ±0.01 mA/cm^2

Cycles	QDs/PMMA-Glass	QDs/PMMA-PLMA	QDs/PLMA
1	1.697	2.176	3.715
2	1.694	2.189	3.729
3	1.701	2.182	3.751
4	1.722	2.189	3.753
5	1.716	2.199	3.783
6	1.723	2.205	3.774
7	1.730	2.214	3.792

Reference:

[1] V. I. Klimov, T. A. Baker, J. Lim, K. A. Velizhanin, H. McDaniel, *ACS Photonics*, 2016, 3, 1138-1148.