Supporting information

Highly efficient Blue-Emitting CdSe-derived Core/Shell Gradient Alloy Quantum Dots with Improved Photoluminescent Quantum Yield and Enhanced Photostability

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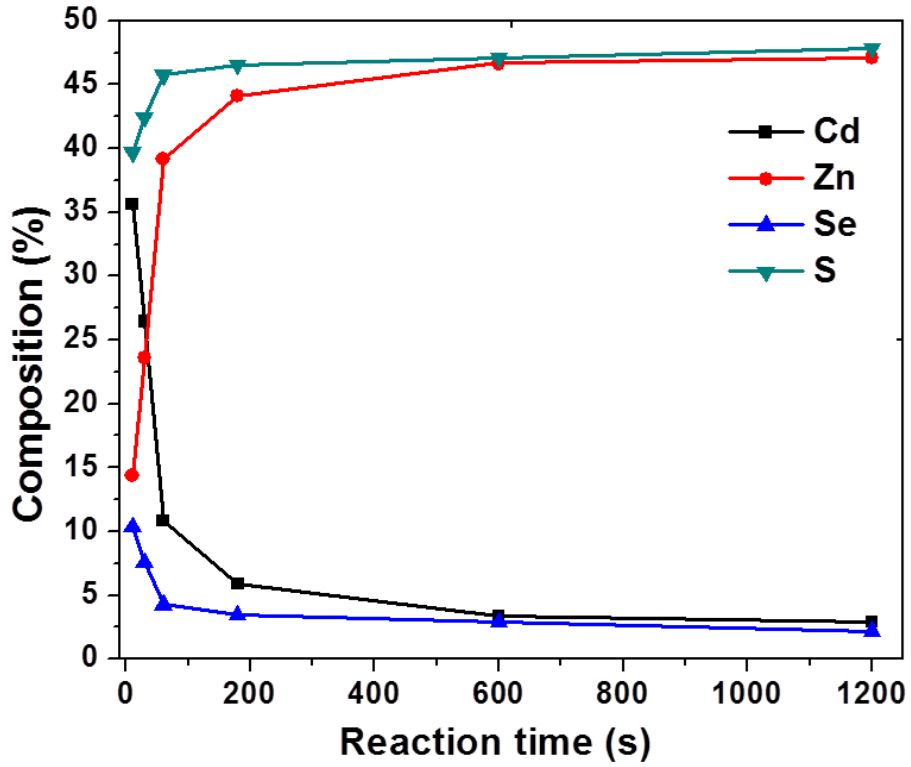

Figure S1. ICP-AES measurement of core/shell gradient alloy QDs collected at different reaction time (10, 30, 60, 180, 600, and 1200 s, respectively) for analyzing the element of Cd, Zn, Se, and S, respectively.

Table S1. Elemental composition of Cd, Zn, Se, and S for core/shell gradient alloy QDs at different reaction time (10, 30, 60, 180, 600, and 1200 s, respectively).

Time (s)	Cd	Zn	Se	S	Total (%)
10	35.6	14.4	10.3	39.7	100
30	26.4	23.6	7.6	42.4	100
60	10.8	39.2	4.2	45.8	100
180	5.9	44.1	3.5	46.5	100
600	3.3	46.7	2.9	47.1	100
1200	2.9	47.1	2.2	47.8	100

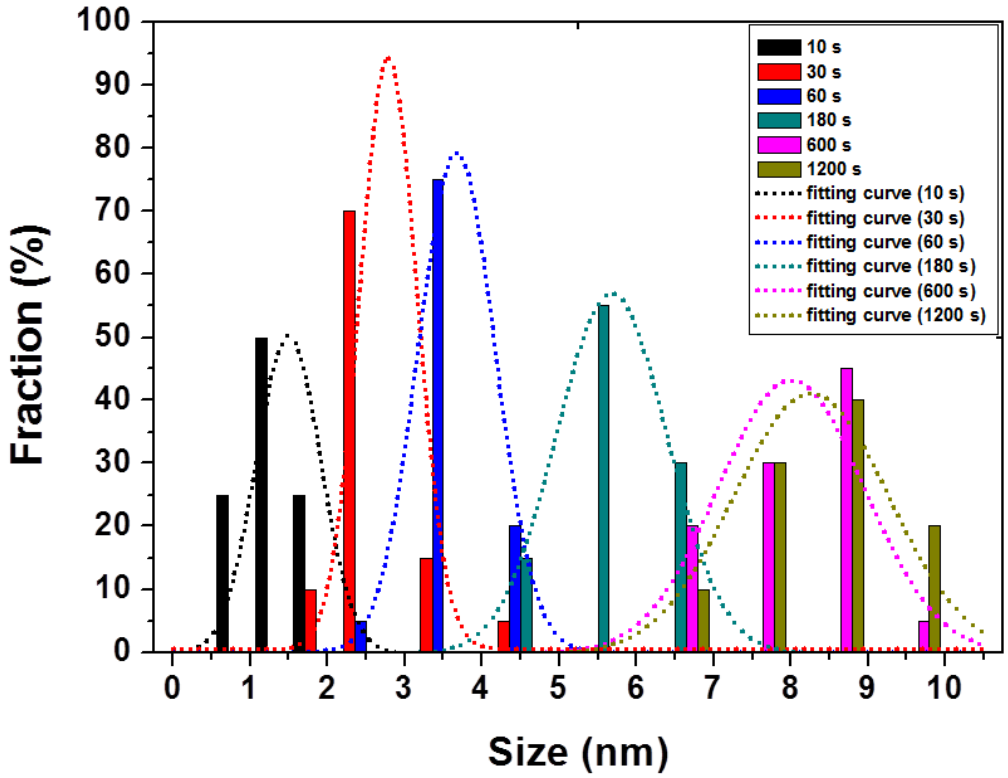

Figure S2. Size distribution and histogram curve of collected QDs at different reaction time (10, 30, 60, 180, 600, and 1200 s).

Table S2. Size change of QDs as a function of reaction time.

Time (s)	Average size ± standard deviation (nm)
10	1.5 ± 0.37
30	3.0 ± 0.36
60	3.8 ± 0.35
180	5.7 ± 0.54
600	7.6 ± 0.78
1200	8.3 ± 0.87

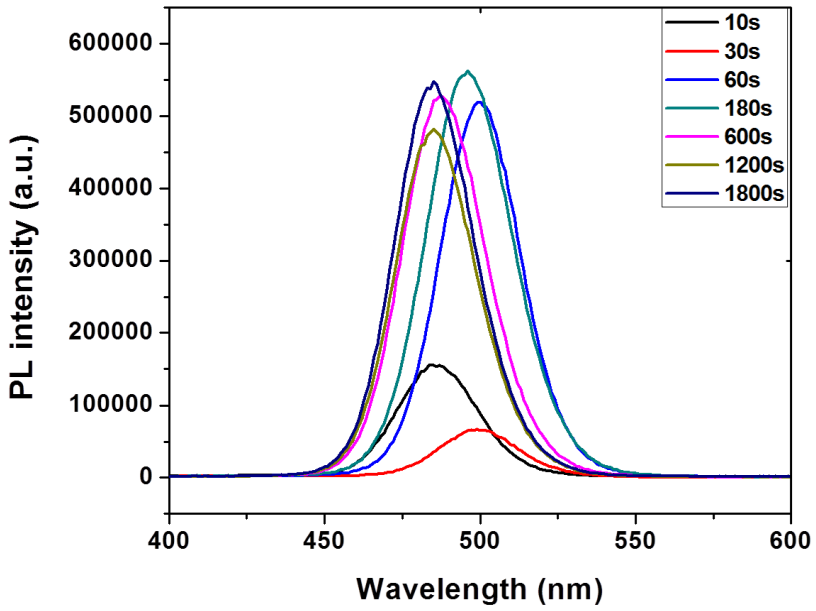

Figure S3. Unnormalized PL emission spectra of core/shell gradient alloy QDs at different reaction time (10, 30, 60, 180, 600, and 1200 s, respectively).

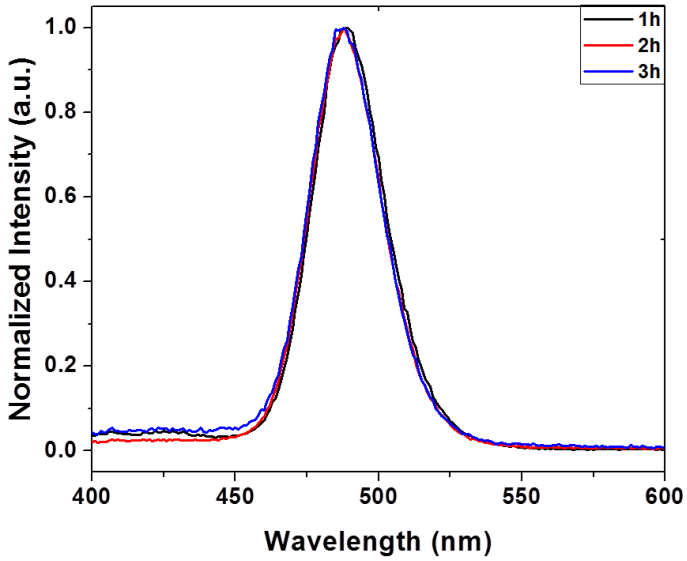

Figure S4. PL emission spectra of core/shell gradient alloy QDs at elongated reaction time for 1, 2, and 3 hours, respectively.

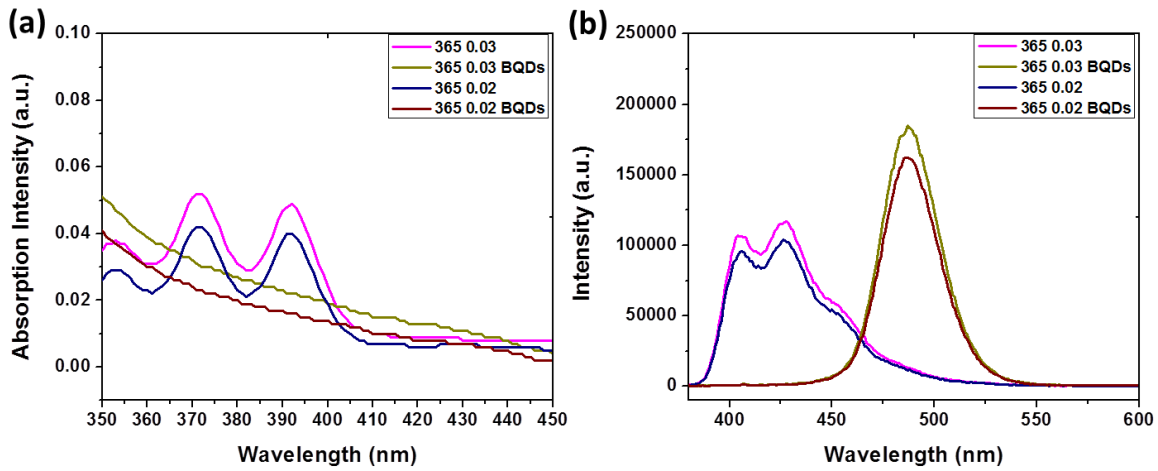

Figure S5. (a) UV-vis absorption, (b) PL emission spectra of core/shell gradient alloy QDs and known organic dye (9,10-diphenylanthrancene in ethanol) at fixed absorption optical cross section of 0.03.

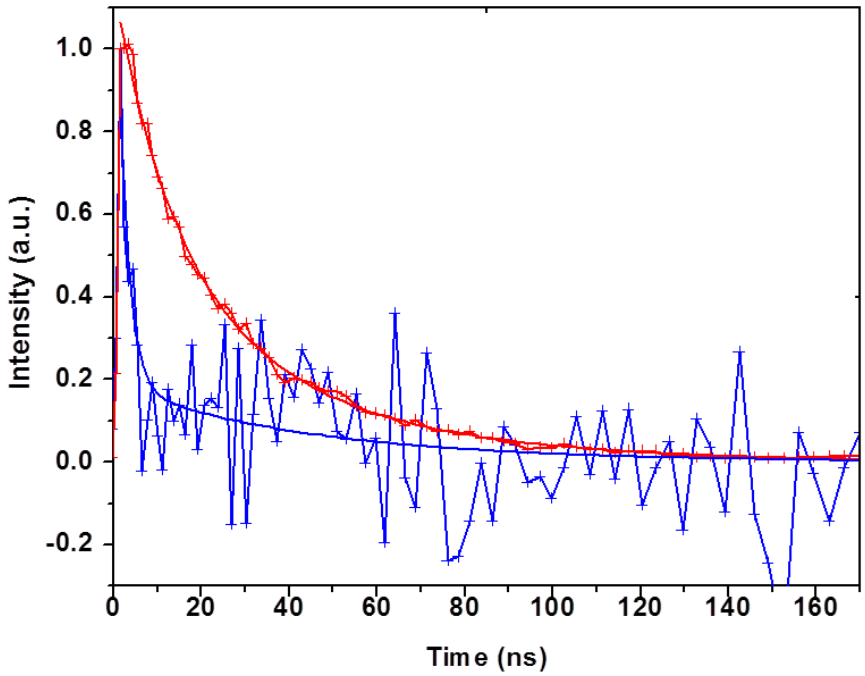

Figure S6. PL lifetime decay trace and fitting of core/shell gradient alloy QDs: QDs obtained 10 s (blue line) and QDs obtained at 600 s (red line).

Table S2. PL lifetime parameters for core/shell gradient alloy QDs collected at 10s and 600 s, respectively. PL lifetime was calculated as per below equation.

	A_1	τ_1 (ns)	A_2	τ_2 (ns)	Chi^2	τ_{ave} (ns)
QDs (10s)	**0.647**	**1.519**	**0.330**	**6.410**	**2.136**	**3.150**
QDs (600 s)	**0.427**	**11.67**	**0.160**	**30.40**	**0.002**	**16.80**

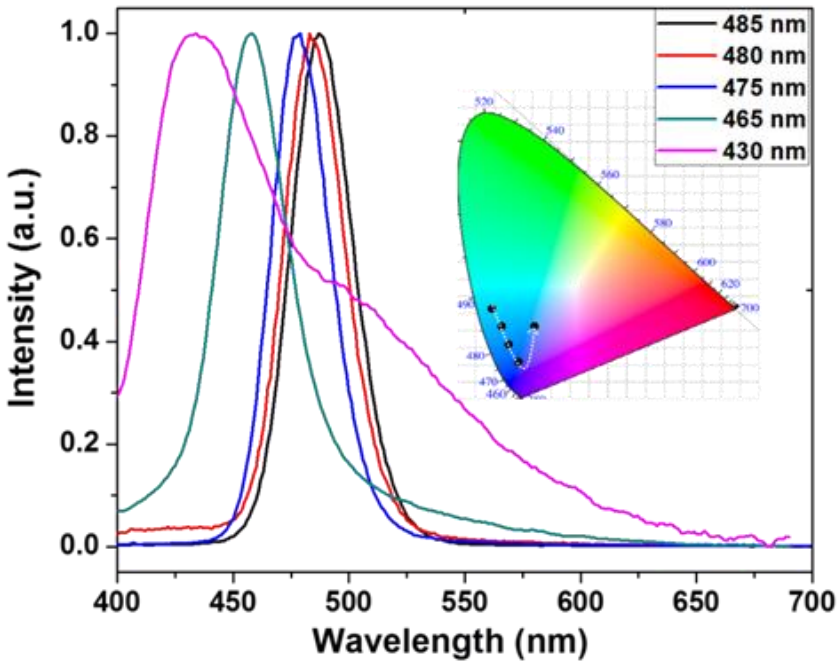

Figure S7. PL emission spectra of CSGA QDs tunable in various emission wavelengths (Inset shows the corresponding CIE chromaticity diagram).

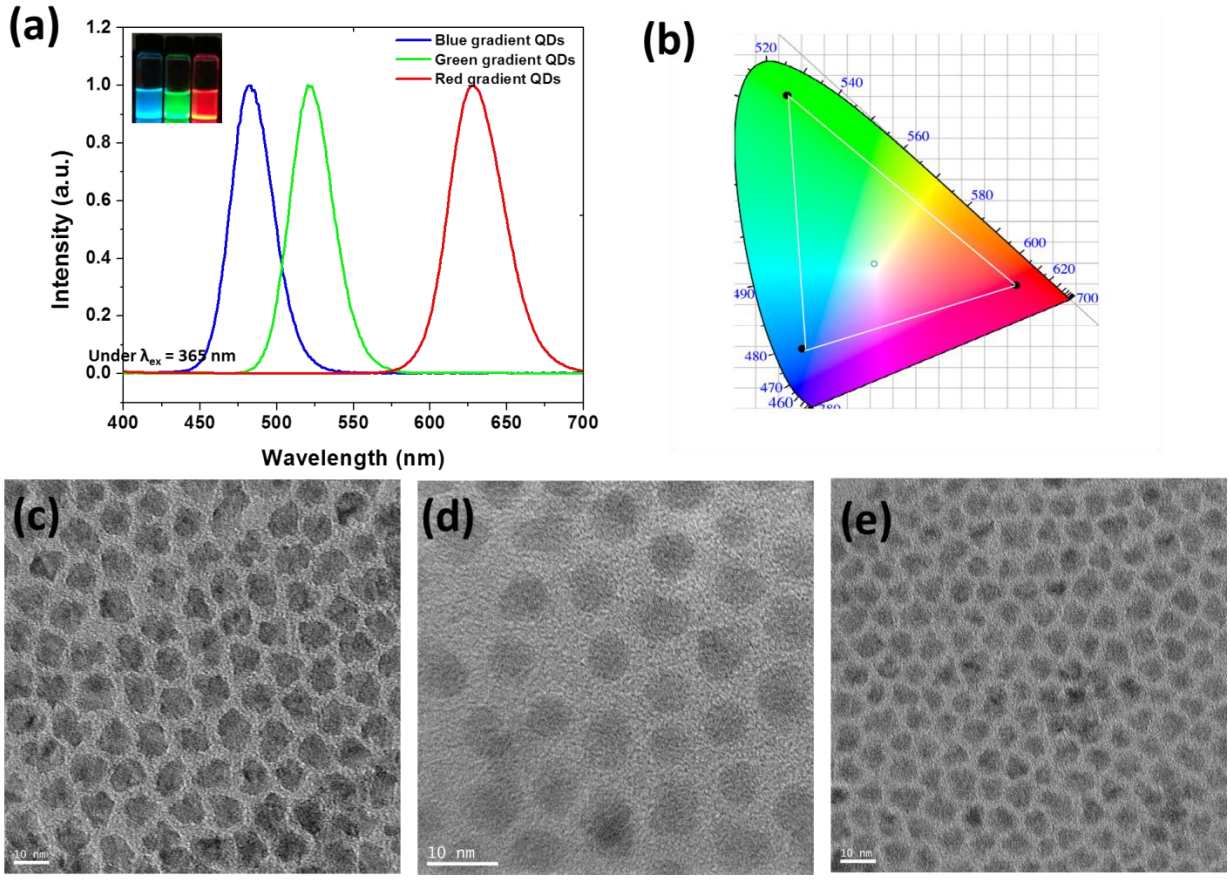

Figure S8. (a) PL emission spectra, (b) CIE color diagram, and (c-e) TEM images for blue-, green-, and red-emitting core/shell gradient alloy QDs, respectively.

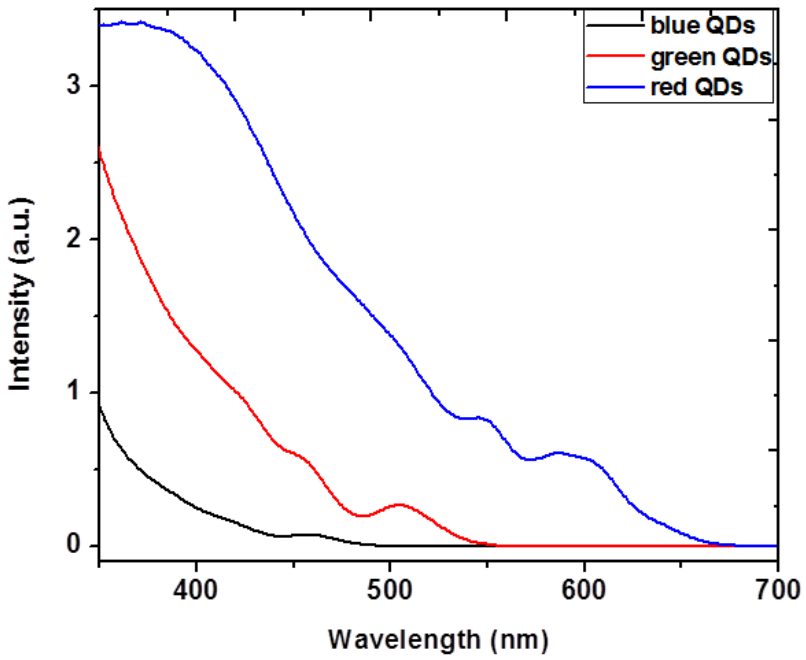

Figure S9. UV-vis absorption spectra of blue-, green, and red-emitting CSGA QDs with identical mass of QDs dispersed in hexane.