

Supporting Information

Solution-phase Synthesis and Photoelectrochemical Properties of Ag₈SnSe₆ Quantum Dots with Different Sizes

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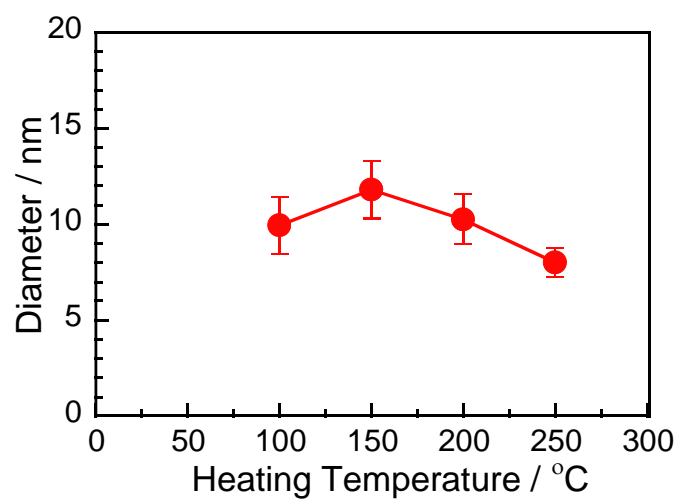


Figure S1. Dependence of the average size of Ag_8SnSe_6 QDs on the reaction temperature during synthesis. Error bars represent the standard deviation.

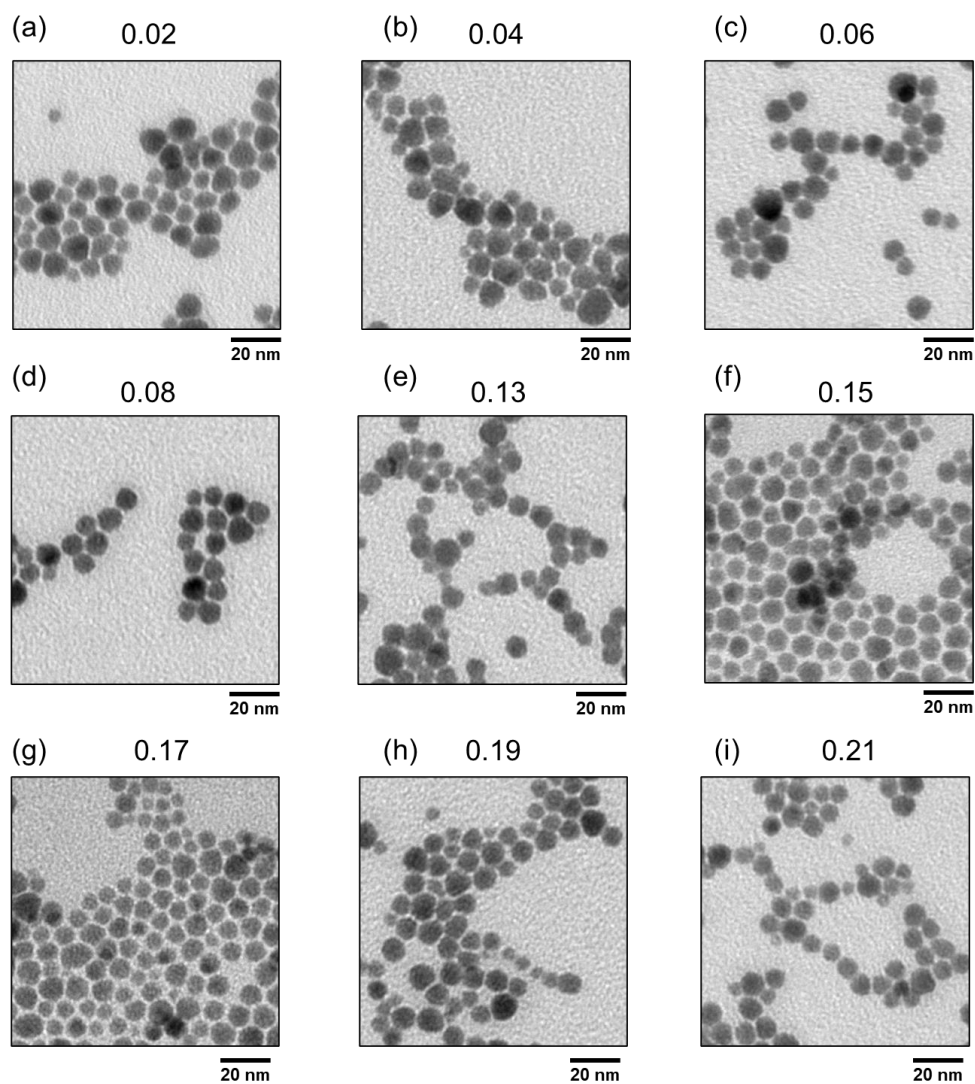


Figure S2. Representative TEM images of Ag_8SnSe_6 QDs prepared with different amounts of DDT. The numbers in the panels indicate the amounts of DDT added, in the unit of mmol.

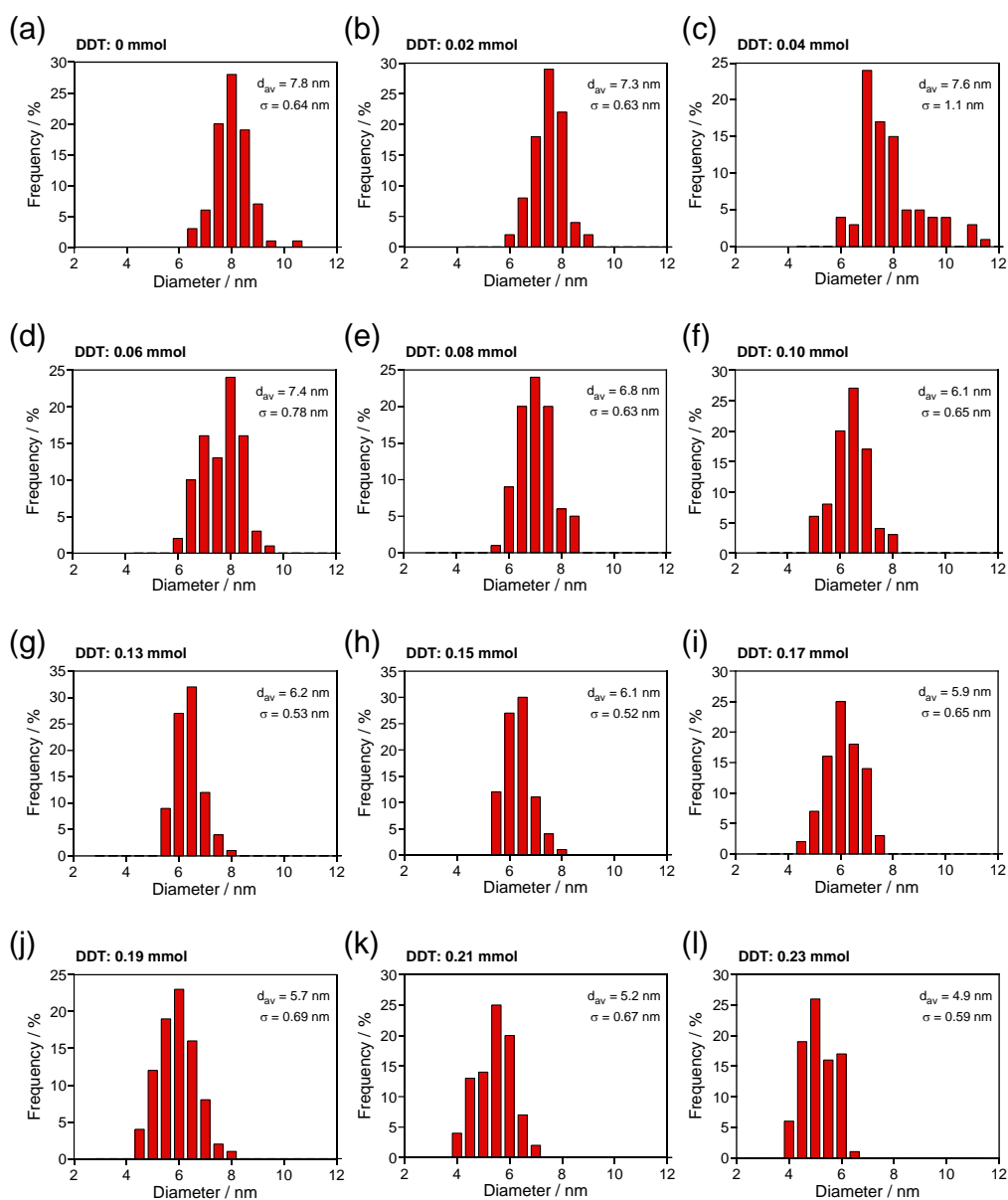


Figure S3. Size distributions of Ag_3SnSe_6 QDs prepared with different amounts of DDT. The amount of DDT added is represented in the unit of mmol in each panel.

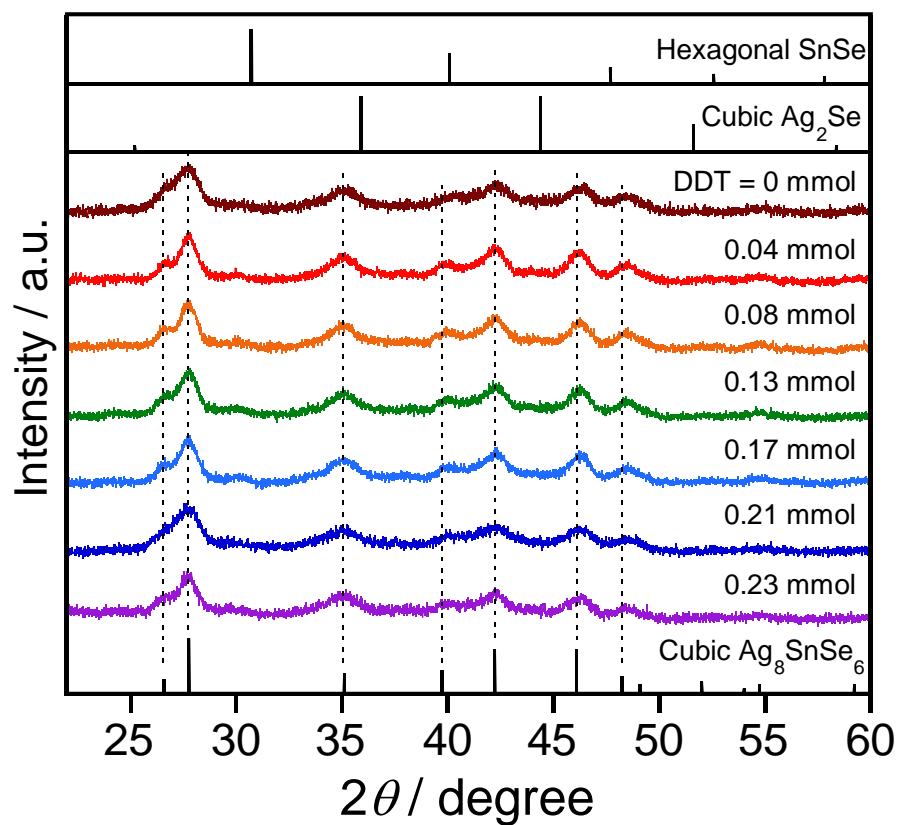


Figure S4. XRD patterns of Ag_8SnSe_6 QDs prepared with different amounts of DDT. The standard diffraction patterns of cubic Ag_8SnSe_6 (PDF card# 00-019-1133), cubic Ag_2Se (PDF card# 00-027-0619), and hexagonal SnSe (PDF card# 01-089-3197) are also shown as references.

Table S1. Chemical compositions of Ag₈SnSe₆ QDs prepared with different amounts of DDT.

Amount of DDT added / mmol	Compositions of QDs (atom %)			
	Ag	Sn	Se	S
0.00	51.0	8.4	40.6	0.0
0.02	51.7	7.9	40.3	0.2
0.04	50.7	7.4	41.4	0.5
0.06	50.1	8.3	41.3	0.3
0.08	51.0	6.9	42.0	0.1
0.10	50.6	8.6	40.6	0.2
0.13	50.6	8.1	41.1	0.3
0.15	51.5	7.6	40.8	0.1
0.17	50.1	7.8	41.5	0.7
0.19	55.2	8.5	35.6	0.7
0.21	51.4	7.7	40.7	0.2
0.23	50.6	7.7	41.5	0.2

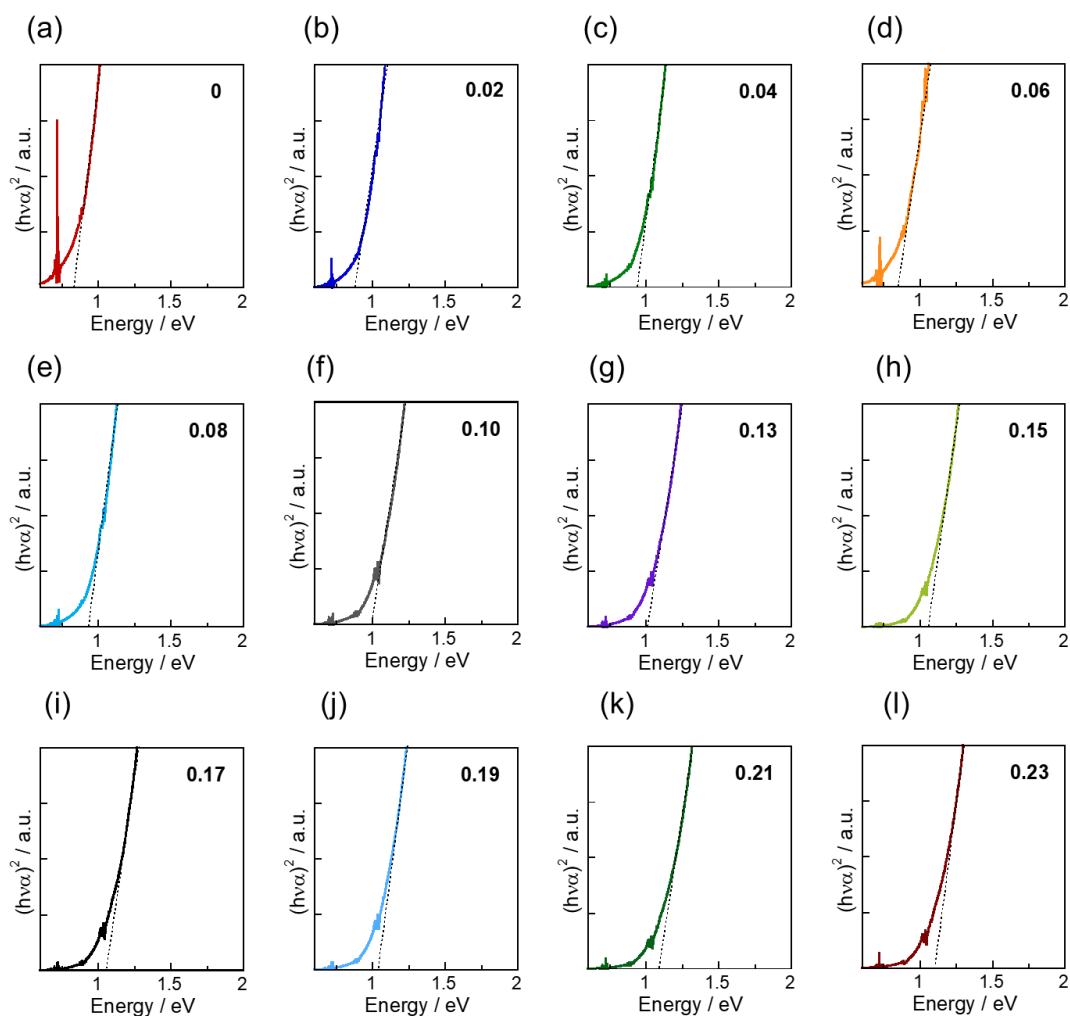


Figure S5. Plots of $(\alpha h\nu)^2$ as a function of photon energy ($h\nu$) for absorption spectra (Fig. 3f) of Ag_8SnSe_6 QDs (Tauc plots). The amounts of DDT added in the preparation were 0 (a), 0.02 (b), 0.04 (c), 0.06 (d), 0.08 (e), 0.10 (f), 0.13 (g), 0.15 (h), 0.17 (i), 0.19 (j), 0.21 (k), and 0.23 mmol (l). By extrapolating the linear portion (dotted line) of each plot to the abscissa, the E_g of the QDs was obtained from the intercept.

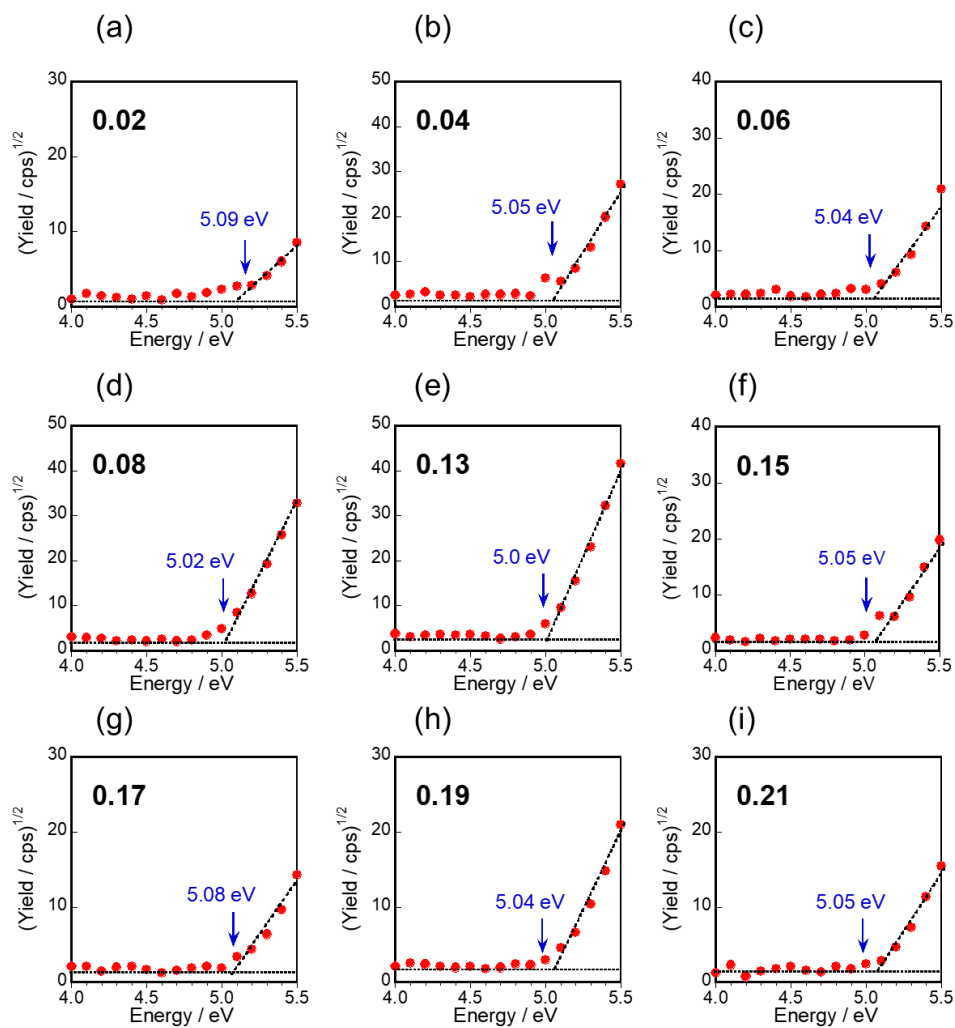


Figure S6. Representative PYSA spectra of Ag_8SnSe_6 QDs prepared with different amounts of DDT: (a) 0.02, (b) 0.04, (c) 0.06, (d) 0.08, (e) 0.13, (f) 0.15, (g) 0.17, (h) 0.19, and (i) 0.21 mmol.

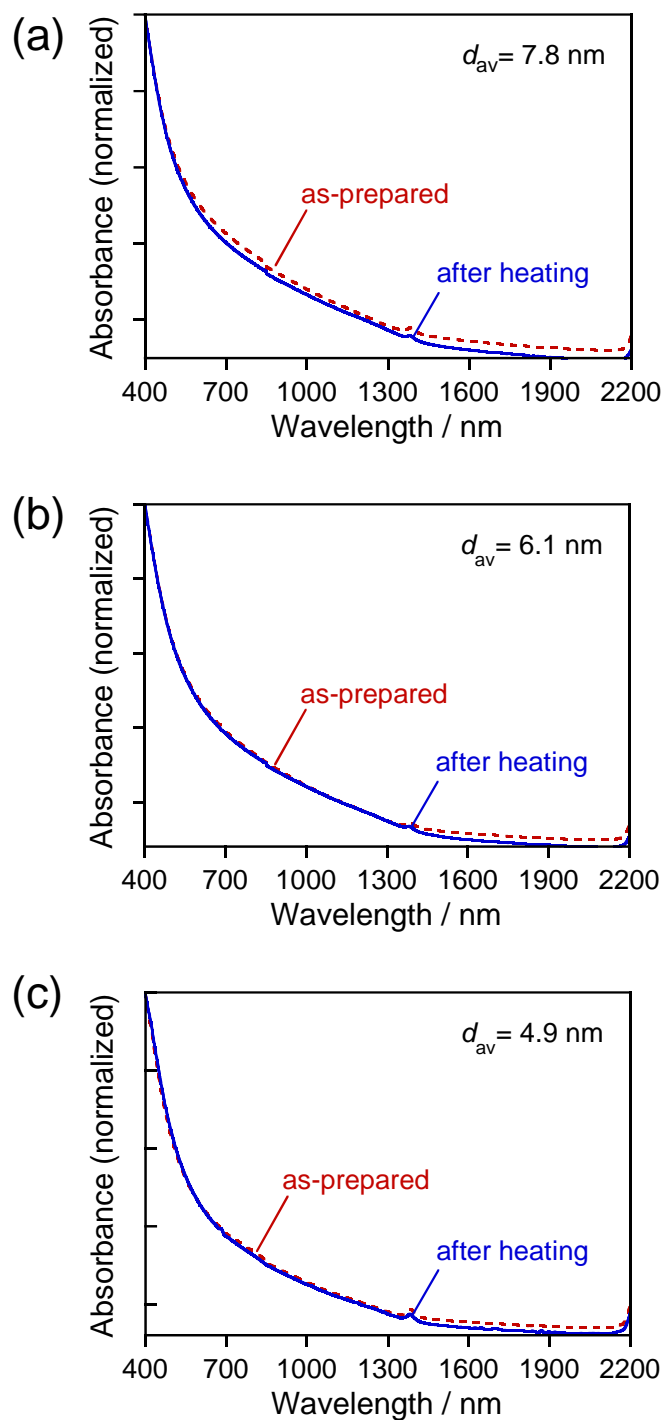


Figure S7. Absorption spectra of the Ag_8SnSe_6 QD-immobilized quartz plates before and after the heat treatment at 150 °C under vacuum. The average sizes of QDs used were 7.8 (a), 6.1 (b), and 4.9 nm (c).

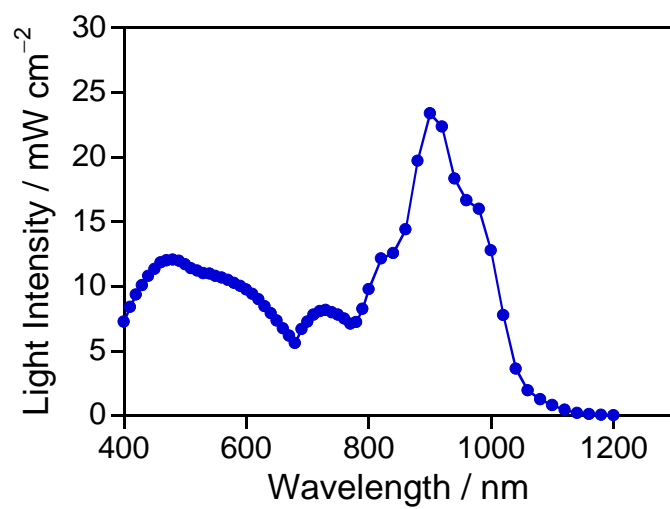


Figure S8. Light intensities of monochromatic lights with various wavelengths for measurements of the incident photon-to-current efficiencies (IPCEs).