Electronic Supplementary Information for "Direct Surface Modification of Semiconductor Quantum Dots by Metal–Organic Frameworks"

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1. Experimental

Synthesis of Cadmium Stearate ($Cd(St)_2$): Briefly, HSt (20 mmol) was neutralized with equal-mole of tetramethylammonium hydroxide in 200 mL methanol. $Cd(Ac)_2{\cdot}2H_2O$ (10 mmol) dissolved in 50 mL of methanol was added dropwise to the solution under vigorous stirring. The reaction solution immediately became turbid, and the mixture was stirred for another 30 min. The precipitate in the solution was recovered by filtration, washed with methanol, and dried under reduced pressure overnight.

Synthesis of Cadmium Diethyldithiocarbamate ($Cd(DDTC)_2$: In a 400 mL beaker, $Cd(Ac)_2{\cdot}2H_2O$ (10 mmol) was dissolved with 100 mL of distilled water. $NaDDTC{\cdot}3H_2O$ (20 mmol) dissolved in 60 mL of distilled water was added dropwise to the solution under vigorous stirring. The reaction solution immediately became turbid, and the mixture was stirred for another 30 min. The precipitate was recovered by filtration, washed with distilled water, and dried under reduced pressure overnight.

Purification of CdSe core QDs: Tributylphosphine (TBP) (0.2 mL), octylamine (0.2 mL), hexane (3 mL), and methanol (6 mL) were added to the reaction solution at 50 °C and stirred for 5 min. After stirring was stopped, the colorless methanol underlayer was removed from the mixture. This extraction procedure was repeated four times, but TBP was only added for the first and third runs. Then, an excess amount of acetone was added to the solution to precipitate the QDs. The suspension was centrifuged and the QDs in solid were redispersed in chloroform.

Preparation of 0.1 M solution of $Cd(DDTC)_2$: For each CdS shell growth reaction, a 5 mL of $Cd(DDTC)_2$-amine-octane solution (0.1 M) was prepared by dissolving of $Cd(DDTC)_2$ (0.122 g, 0.3 mmol) in a mixture of octane (1.5 mL), oleylamine (0.45 mL), and octylamine (1.05 mL).

2. Supplementary figures

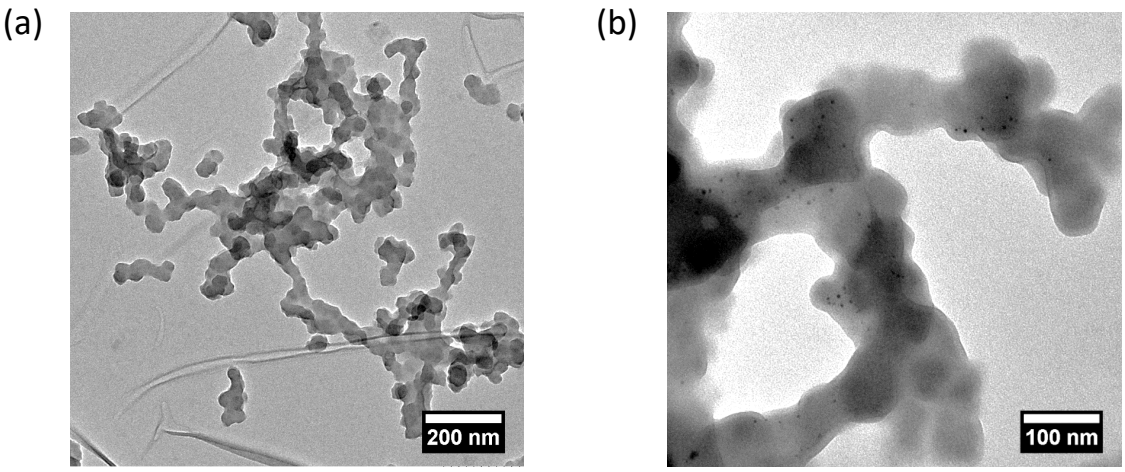

Fig. S1 TEM images of QD@ZIF-8 composites; overall (a) and magnified (b) images. Samples were synthesized by immediately mixing ZIF-8 precursors with pyridine-capped CdSe/CdS QDs solution.

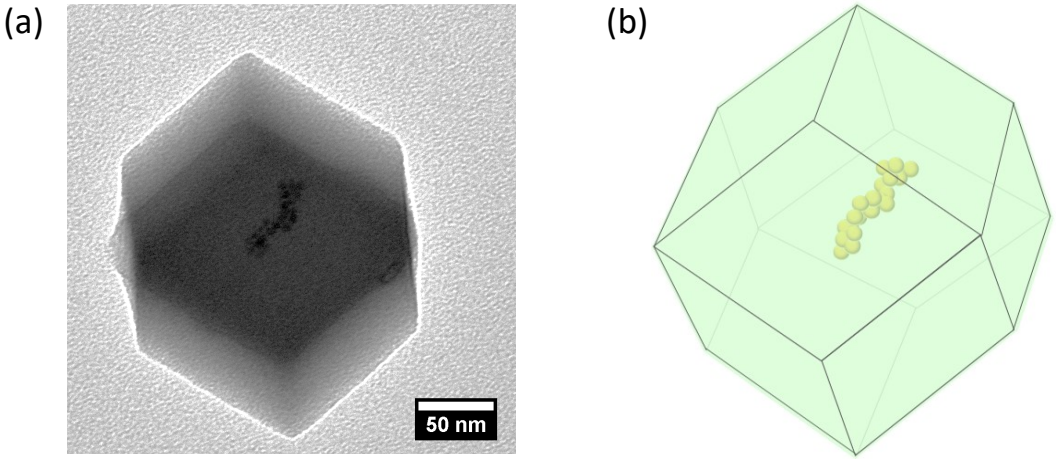

Fig. S2 TEM image (a) and schematic illustration (b) of CdSe/CdS QD@ZIF-8 composite.

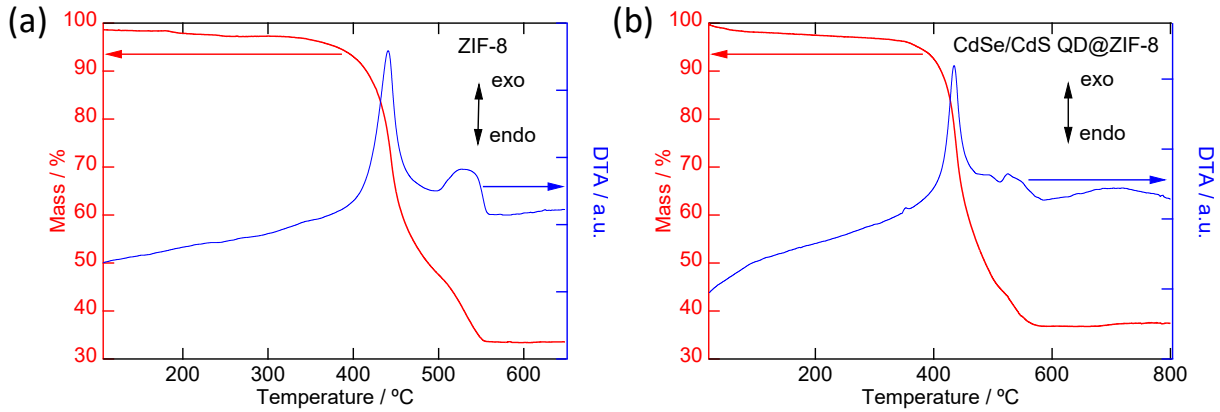

Fig. S3 TG (red lines) and DTA curves (blue lines) of ZIF-8 (a) and CdSe/CdS QD@ZIF-8 composite synthesized by dropwise addition.

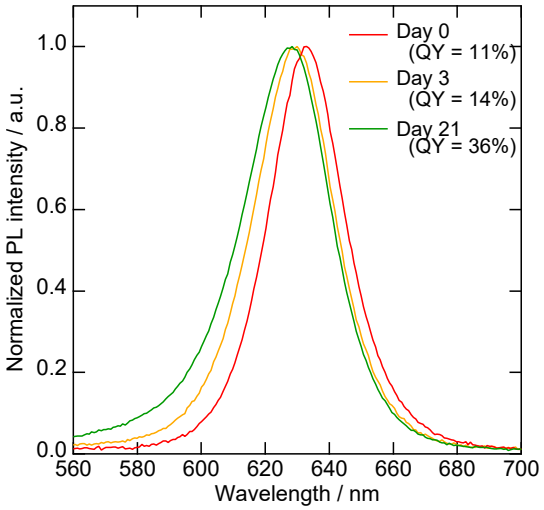

Fig. S4 Photoluminescence spectra (normalized at PL maxima) of CdSe/CdS QD@ZIF-8 composite recorded after the reaction (Day 0), 3 days (Day 3), and 3 weeks (Day 21). PL QYs for each sample were displayed in legends.

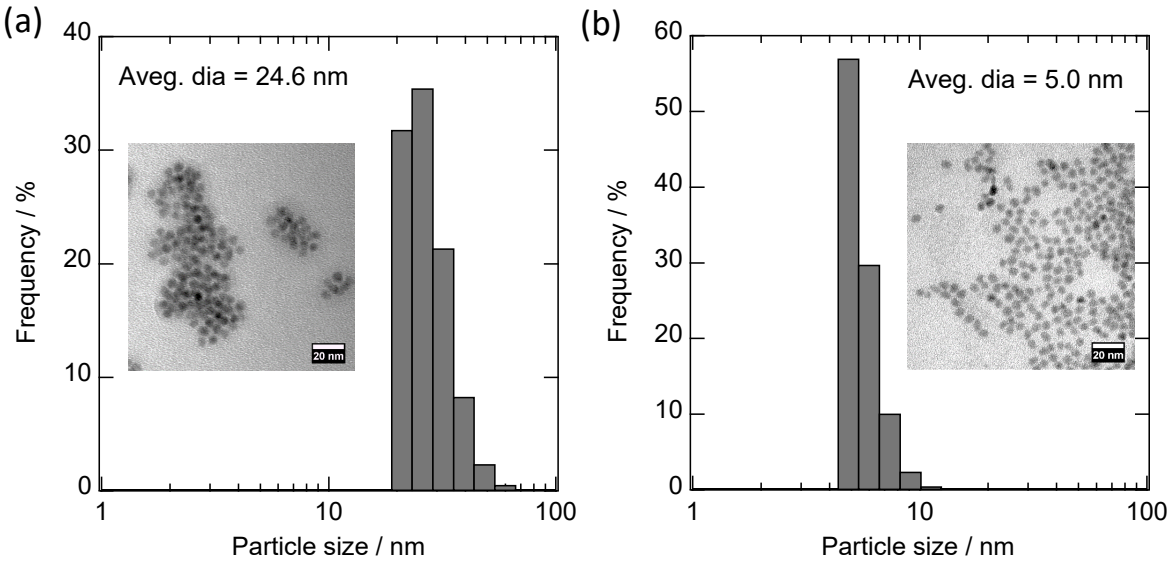

Fig. S5 Size distribution measured by DLS (in methanol solution) for pyridine-capped (a) and 4-*tert*-butylpyridine-capped (b) CdSe/CdS QDs. Insets are TEM images of each sample.