

Electronic Supplementary Material

High-efficiency CdTe/CdS core/shell nanocrystals in water enabled by photo-induced colloidal hetero-epitaxy of CdS shelling at room temperature

Hakimeh Zare¹, Maziar Marandi², Somayeh Fardindoost¹, Vijay Kumar Sharma^{3,4}, Aydan Yeltik³, Omid Akhavan^{1,5}, Hilmi Volkan Demir^{3,4} (✉), and Nima Taghavinia^{1,5} (✉)

¹ Institute for Nanoscience and Nanotechnology, Sharif University of Technology, Tehran 14588, Iran

² Department of Physics, Faculty of Sciences, Arak University, Arak 38156-8-8349, Iran

³ Department of Physics, Department of Electrical and Electronics Engineering, and UNAM-Institute of Materials Science and Nanotechnology, Bilkent University, Ankara, Turkey

⁴ Luminous! Center of Excellence for Semiconductor Lighting and Displays, Microelectronics Division, School of Electrical and Electronics Engineering, and Physics and Applied Physics Division, School of Physical and Mathematical Sciences, Nanyang Technological University, Singapore 639798, Singapore

⁵ Physics Department, Sharif University of Technology, Tehran 14588, Iran

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Effect of pH

In all delivered experiments, the pH of the solutions in the ultraviolet (UV) illumination stage was set to 7.0. Nevertheless, higher and lower pH values are also investigated due to the different rate of CdS formation in these new states. Figure S1(a) demonstrates the evolution of the photoluminescence (PL) quantum yield (QY) of the main sample prepared at different pH values during illumination. Although the rate of CdS formation is increased at higher pH, the best PL QY is achieved with a solution pH of 7.0. The reason for the high PL QY seems to be related to the better quality shell that is formed in this medium rate of CdS formation. Figure S1(b) represents the time evolution of the PL peak position of the main sample during illumination. The red shift in PL peak position occurs much faster in higher pH, which could be related to the faster formation of the CdS shell on the surface of the CdTe nanocrystals (NCs).

Address correspondence to Hilmi Volkan Demir, volkan@bilkent.edu.tr, hvdemir@ntu.edu.sg; Nima Taghavinia, taghavinia@sharif.edu

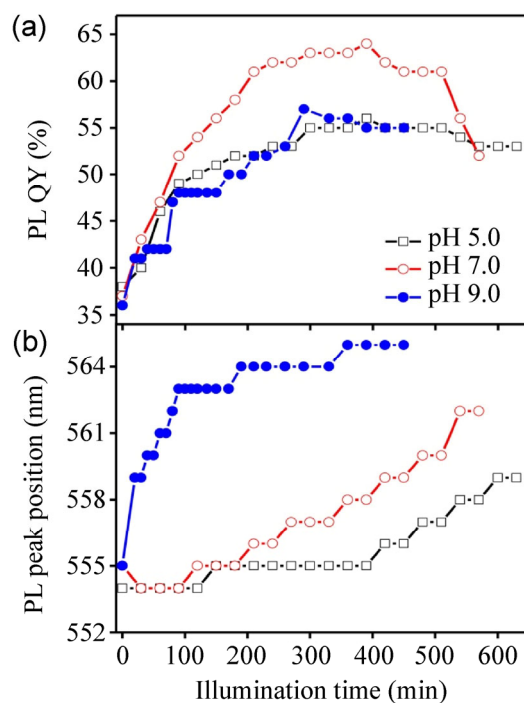


Figure S1 Temporal evolution of (a) PL QY and (b) PL peak position of CdTe/CdS core/shell quantum dots (QDs) under different illumination times and at different pH values.

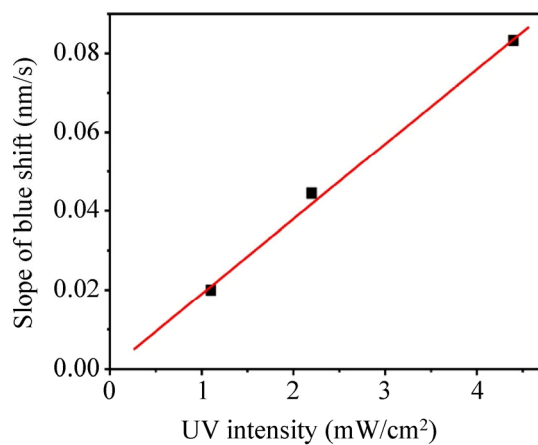


Figure S2 The initial slope of the blue shift for reference samples that do not contain Cd²⁺ and S₂O₃²⁻ ions. The values are calculated from the initial data points of Fig. 7(b). The “photo-etching” rate is shown to be linear with the illumination intensity.

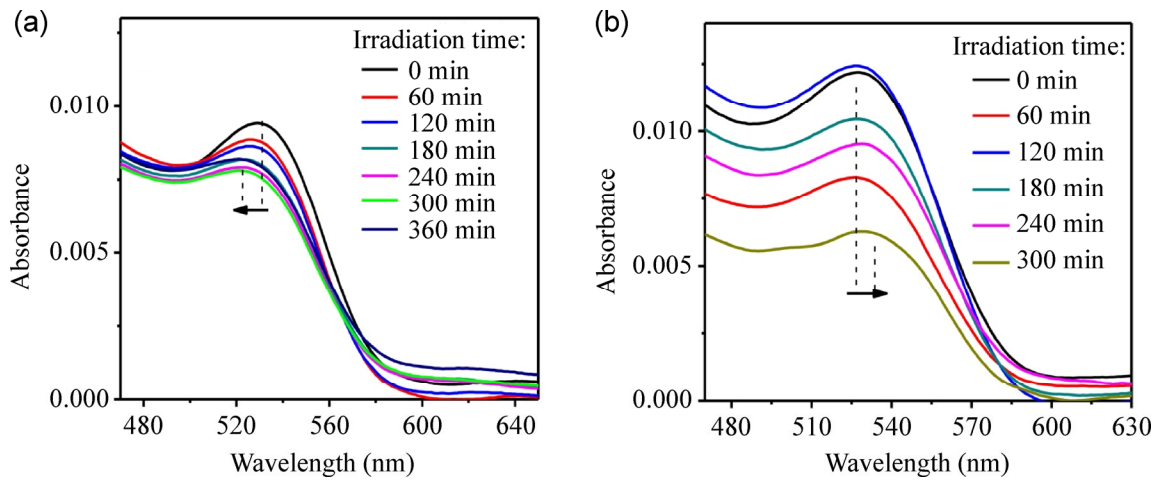


Figure S3 (a) Absorbance spectra of centrifuged and re-dispersed CdTe QDs at different illumination times. (b) The same CdTe QDs illuminated under UV light in the presence of CdSO_4 and $\text{Na}_2\text{S}_2\text{O}_3$. The UV intensity in this case is 2.2 mW/cm^2 .

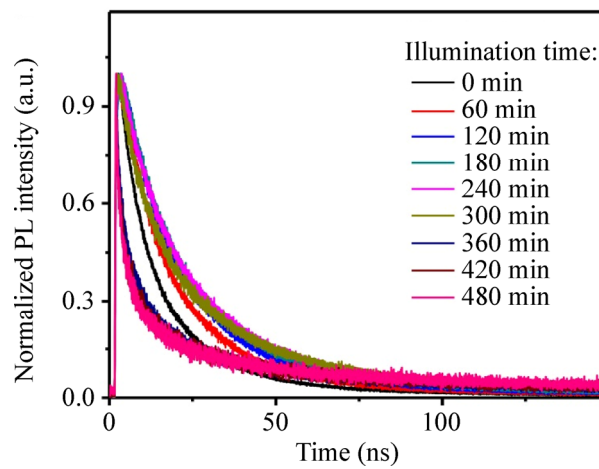


Figure S4 Luminescence decay curves of plain CdTe and CdTe/CdS QDs. Here, a 2.2-mW/cm^2 UV illumination intensity was used for shell growth.