Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.

Supporting Information

Interface-spawned NiSe quantum dots: preparation, photoluminescent properties and applications

*Luting Ling, Lin Zhu, Qiang Zhang, Cai-Feng Wang, Su Chen**

State Key Laboratory of Materials-Oriented Chemical Engineering, and College of Chemistry and Chemical Engineering, Nanjing University of Technology, 5 Xin Mofan Road, Nanjing 210009, China
E-mail: chensu@njut.edu.cn

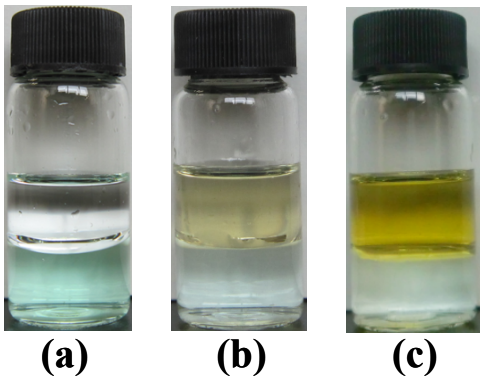

Figure S1. The photograph of the reaction system: (a) before reaction, (b) heated at 95 °C for 7 h (NiSe QDs prepared at 95 °C), and (c) further heated at 200 °C for 7 h in the autoclave (NiSe QDs prepared at 200 °C).

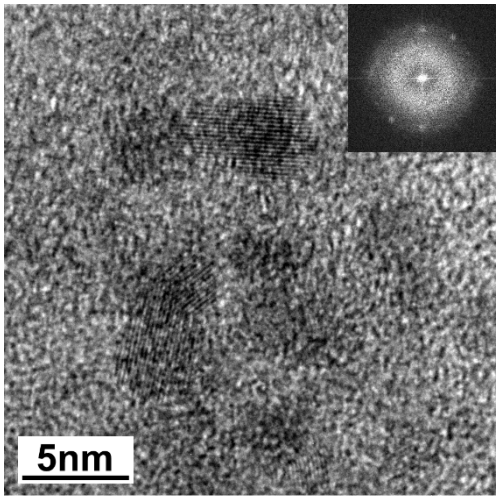

Figure S2. The TEM image and selected area electron diffraction (SAED) of NiSe QDs prepared at 95 °C.

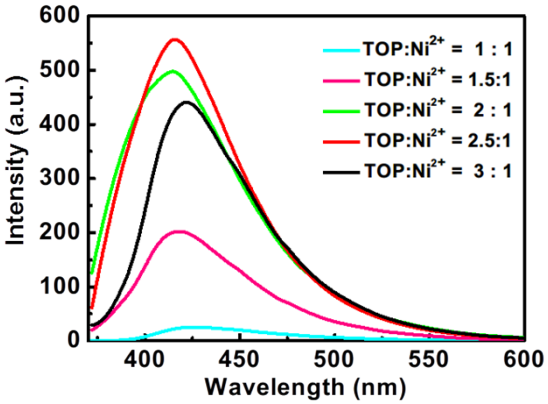

Figure S3. Effect of [TOP]/[Ni^{2+}] ratio on PL properties of NiSe QDs synthesized at 95 °C for 7 h. (λ_{ex}=360 nm).

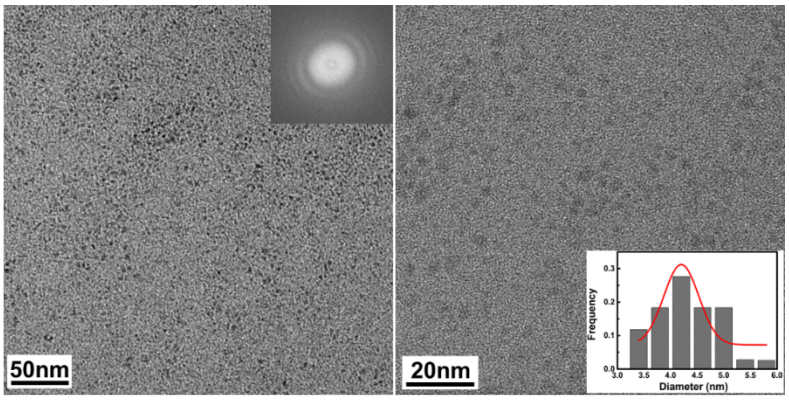

Figure S4. Additional TEM images of NiSe QDs prepared at 200 °C. Inset: the corresponding fast Fourier transform pattern and histogram distribution of diameters.

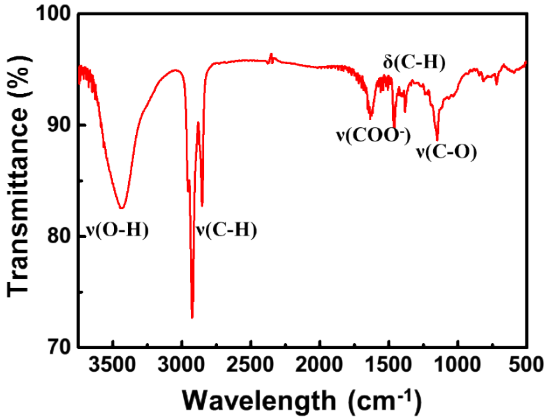

Figure S5. The Fourier transform infrared (FTIR) spectrum of the product of the control sample.

As shown in Figure S5, the peak of $–COO^-$ stretching mode appears in the control sample, which doesn't exist in any starting materials. The existence of carboxyl group along with the hydroxyl group is quite common in fluorescent CDs, which confirms the reaction of TOP. Besides, the FTIR spectrum is similar to that of TOP, indicating only partial ligand reacted and the rest can still passivated the QDs, not leading to the precipitation of all the QDs.

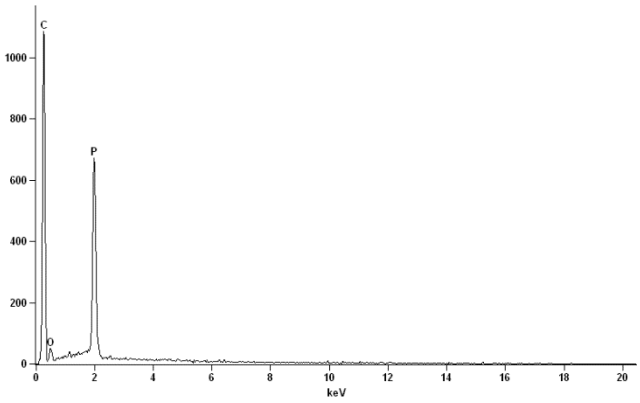

Figure S6. The energy-dispersive X-ray spectroscopy (EDS) of the control sample.

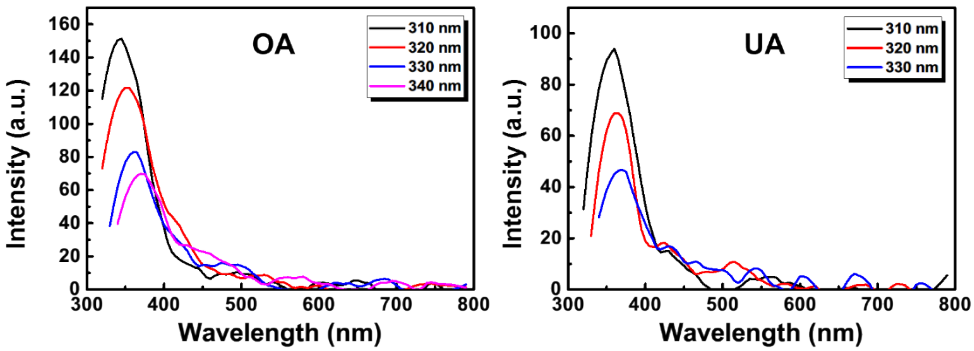

Figure S7. The PL spectra of OA and UA solutions after solvothermal treatment.

Figure S8. The photograph of a piezoelectric inkjet print head during inkjet printing, which demonstrates the excellent stability of the ink droplet.

Figure S9. Different PL patterns via inkjet printing using NiSe QDs prepared at 95 °C as the fluorescent ink.

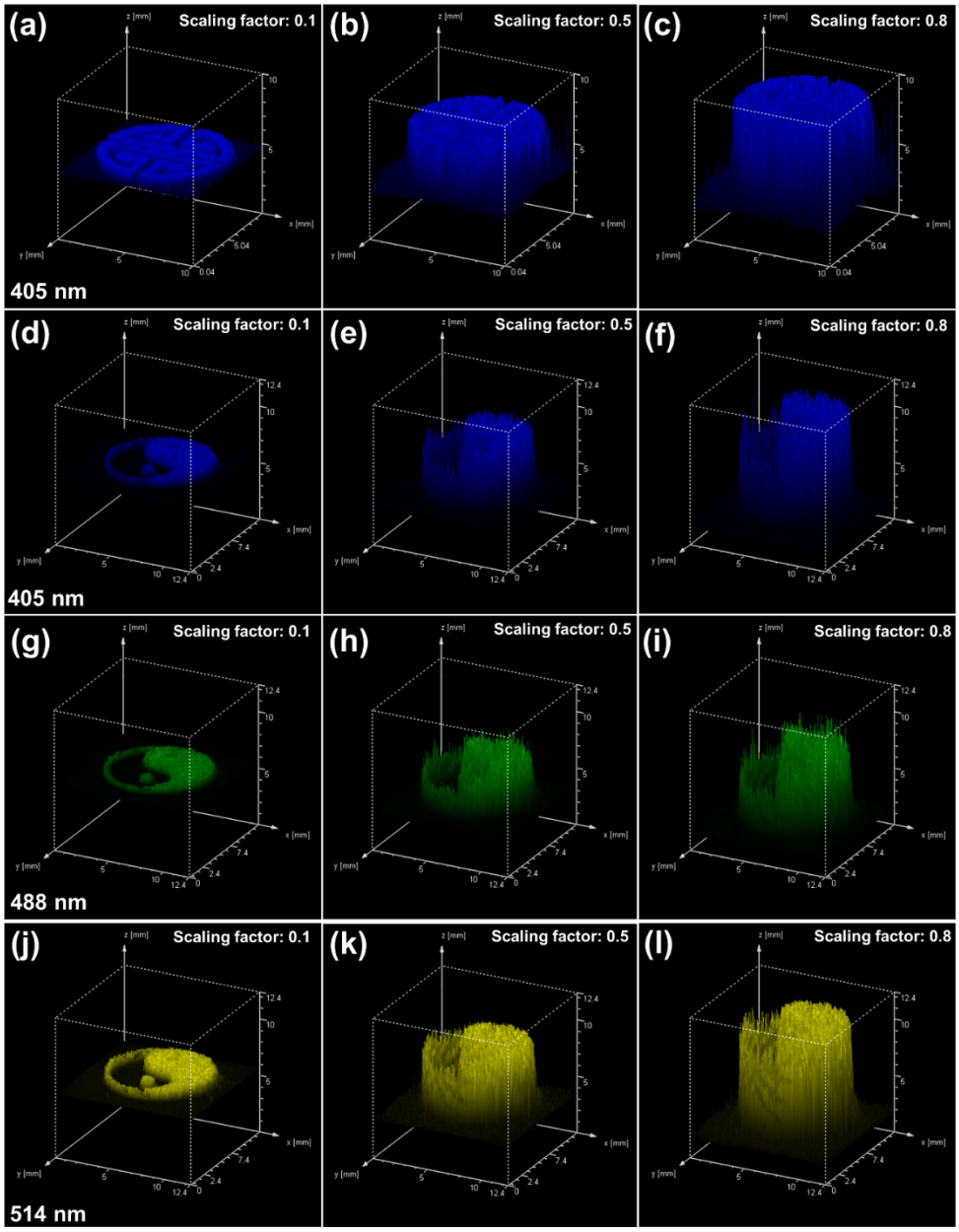

Figure S10. PL intensity distributions of the inkjet printing patterns with a scaling factor of 0.1, 0.5 and 0.9: (a-c) NiSe QDs prepared at 95 ^{o}C with excitation wavelength of 405 nm; solvothermal-treated sample of NiSe QDs at 200 ^{o}C with excitation wavelengths of (d-f) 405 nm, (g-i) 488 nm, (j-l) 514 nm respectively.

As shown in Figure S9, the PL intensity distributions throughout the patterns are uniform. And the 488 nm excited pattern exhibits relatively lower intensity as compared with those excited by 405 nm and 514 nm, though the measuring conditions are the same (same laser intensity, pinhole, gate voltage, etc.), which indicates the excitation dependence of the QDs.