Supporting Information

Synthesis of highly stable double-coated Zn-doped cesium lead bromide nanocrystals for indium ion detection in water

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Experimental section

Characterization methods.

UV-VIS absorption spectra of the NCs were recorded with a JASCO V-770 Spectrophotometer. PL spectra of the NCs were collected with Ocean insight Maya 2000 Pro high-sensitivity spectrometer using a 370 nm UV excitation source. X-Ray diffraction (XRD) patterns of the NCs films were measured with Bruker D8 diffractometer using Cu-K_α (λ=1.54 Å) as incident radiation. Transmission electron microscopy (TEM) and high-resolution transmission electron microscopy (HRTEM) images were collected from Jeol-JEM-2100 PLUS microscope operated at 200 kV. The fourier transform infrared (FTIR) analysis was carried out by using JASCO FT/IR-6600 infrared spectrometer. The heat stability test was carried out by using Ocean insight Maya 2000 Pro high-sensitivity spectrometer and using a 370 nm UV excitation source.

The PLQY of all the NCs was measured relative to known Quninsulfate Hydrate dye (Aldrich-Q0132, PLQY ~58% in 0.1 N H_2SO_4). PL spectra of the NCs and dye solutions were taken under the identical condition in Ocean insight Maya 2000 Pro-high-sensitivity spectrometer using 370 nm UV excitation light source. The optical density of the solutions was kept below 0.1. We measured absorbance and integrated PL intensity of NCs and dye solutions separately. We calculate the PLQY of the NCs by comparing the absorbance and integrated PL intensity values between NCs and dye.

Results and discussion:

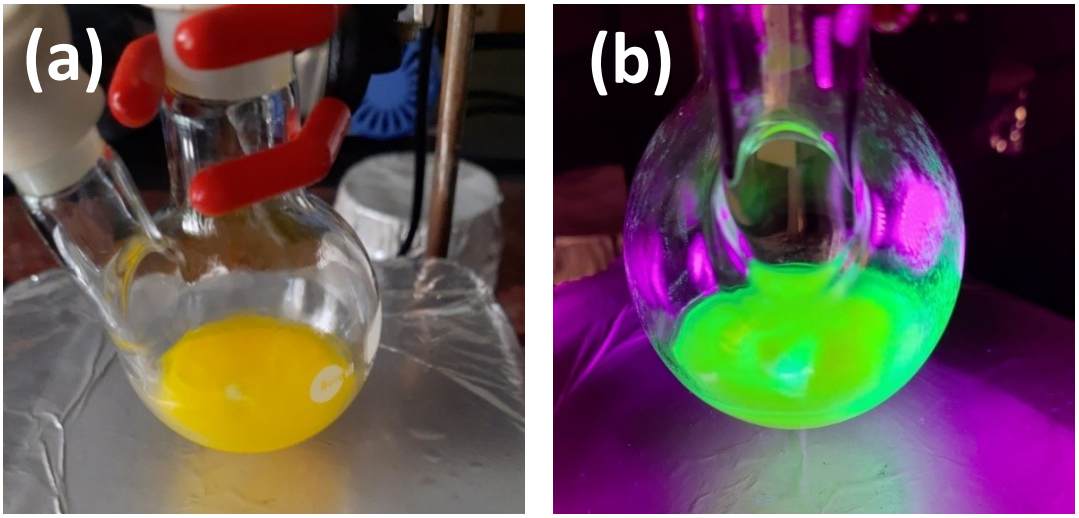


Figure S1. Photographic image of PVP-5 NCs (a) under daylight, and (b) under a UV light source.

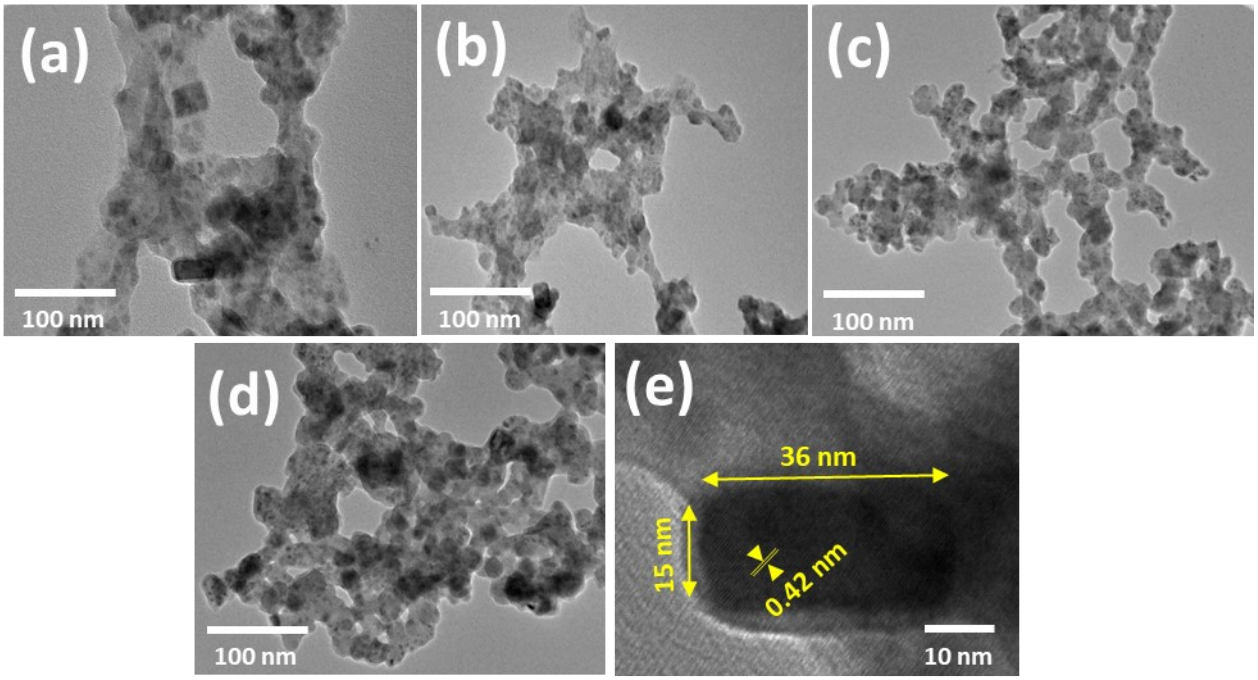


Figure S2. TEM images of (a) PVP-0, (b) PVP-2.5, (c) PVP-7.5, and (d) PVP-10 NCs. (e) HRTEM image of PVP-0 NCs.

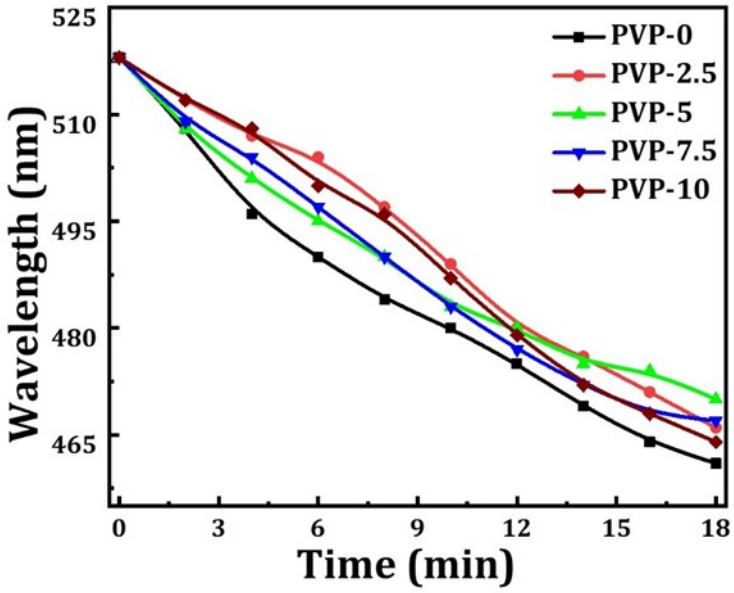


Figure S3. The shift in PL peak position of different double-coated Zn-doped $CsPbBr_3$ NCs over time during addition of TBA-Cl prescursor as shown in legends.

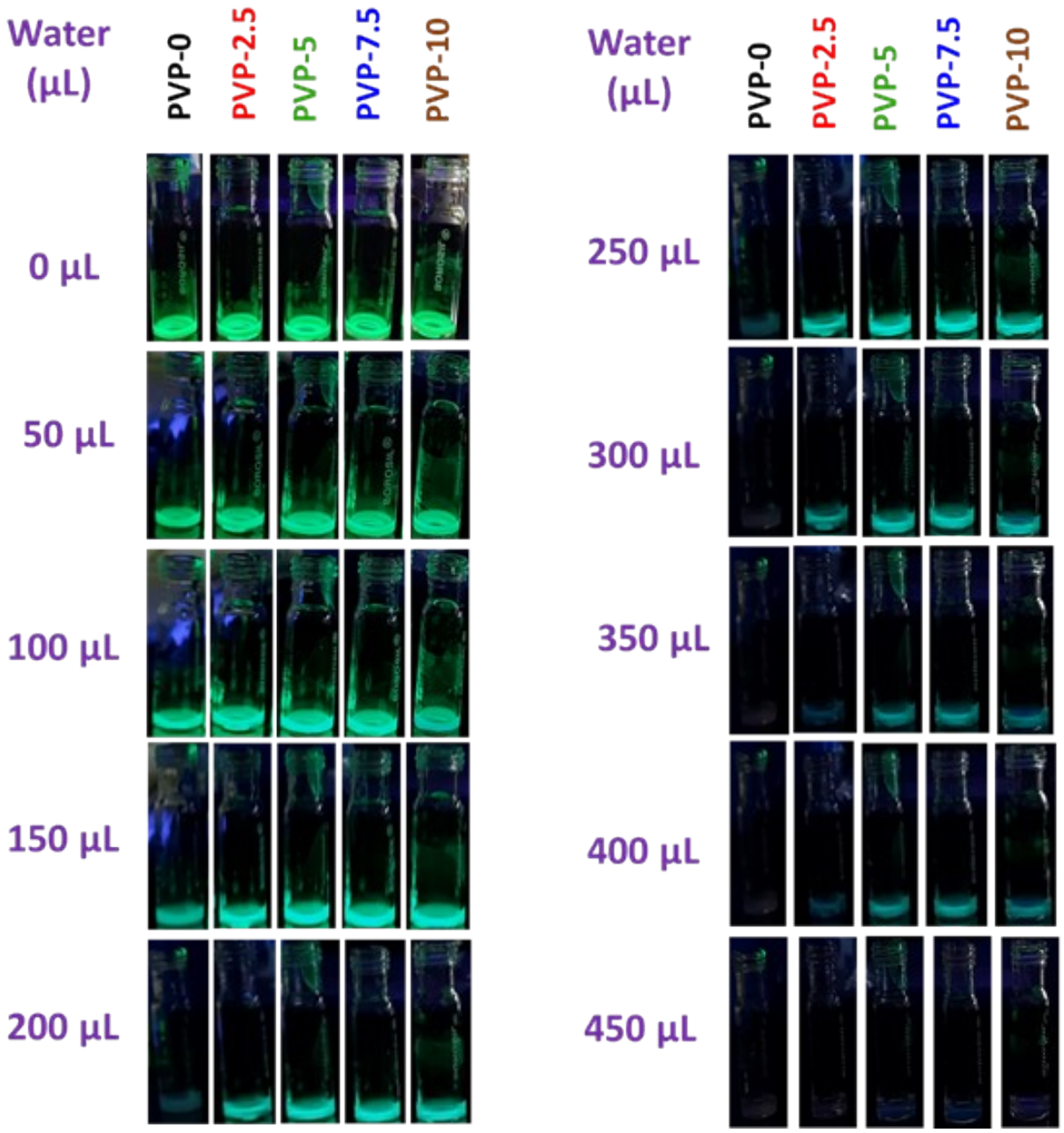
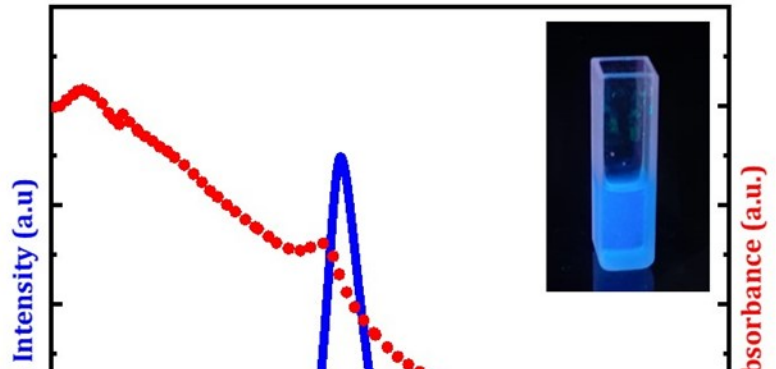


Figure S4. Water stability test of PVP-0, PVP-2.5, PVP-5, PVP-7.5, and PVP-10 NCs under a UV lamp with different amount DI water was added in the corresponding NCs solution.



Heat Stability Test.

Heat stability test was performed for PVP-0 and PVP-5 NCs thin-films and the photographic image of this experiment is shown in Figure S6. A hot plate was set to heat at 100 °C and the NCs films were directly placed on it. The films were excited by a 370 nm UV light source. An optical fibre was placed vertically above the NCs film in such a way that the maximum number of photons can be collected through the fibre and transported to the spectrometer. The measurements were taken every 2 min intervals for an hour.

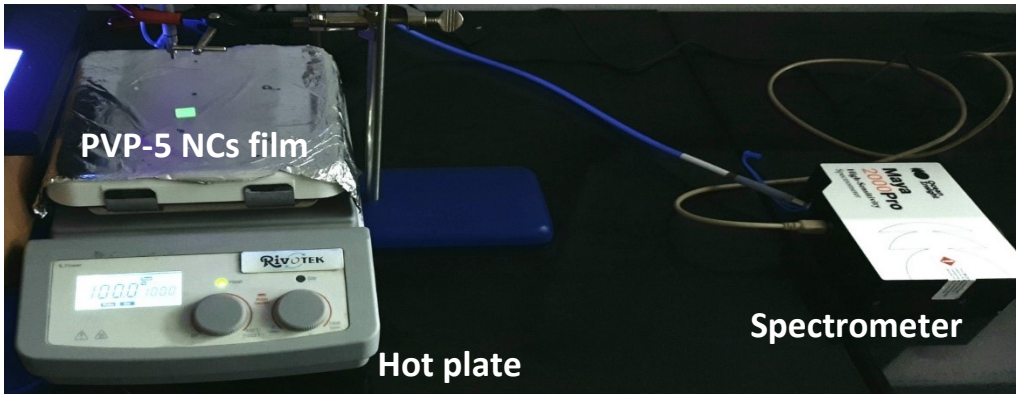


Figure S6. Photographic image of heat stability test set up.

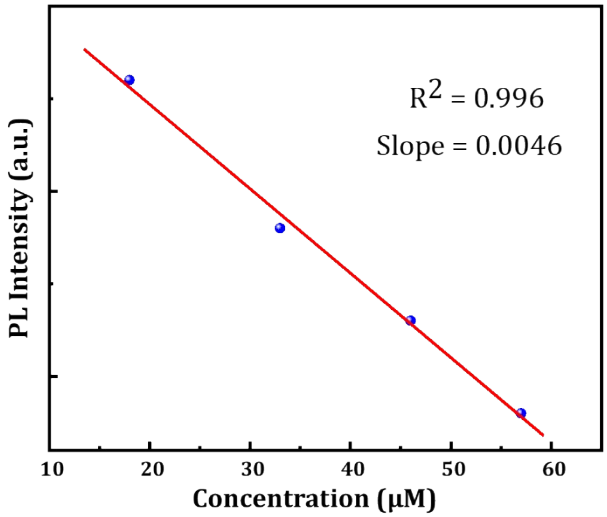


Figure S7. Calibration plot against the different concentrations of In-ions.