Electronic Supplementary Material (ESI) for Materials Advances.
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Supporting information

Highly stable and water dispersible polymer-coated $CsPbBr_3$ nanocrystals for Cu-ion detection in water

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Experimental section:

Characterization methods*:* UV-visible absorption spectra of NCs were recorded with a Shimadzu UV-2700 Spectrophotometer. Steady-state photoluminescence (PL) spectra were collected with Ocean Insight MAYA 2000 Pro high sensitivity Spectrometer using a 370 nm UV excitation source. X-Ray diffraction (XRD) analysis was carried out with the 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) imaging were recorded by Jeol-JEM-2010 microscope operated at 200 kV to determine the shape and size of the NCs. The Fourier Transform Infrared (FTIR) analysis was carried out using JASCO FT/IR-6600 Infrared Spectrometer to confirm the silica and polymers encapsulation around the NCs.

Ion detection test: To probe the Cu^{2+} ions, the PL intensity of the samples was recorded after the subsequent addition of different metal ions. Firstly, aqueous solutions containing metal ions at same concentration (0.1 mM) including Ni^{2+}, Al^{3+}, In^{3+}, Co^{2+}, Fe^{2+}, Fe^{3+}, Zn^{2+} and Cu^{2+} were prepared. The NC aqueous solution was prepared by dispersing directly dispersing powder PbN-4 sample in DI water (concentration~ 5 mg/mL). Next, 100 µL of PbN-4 NC aqueous solution was taken in 7 glass vials and 100 µL of each of the aqueous solutions containing the metal ions were added and the PL intensity of the NC solution was observed.

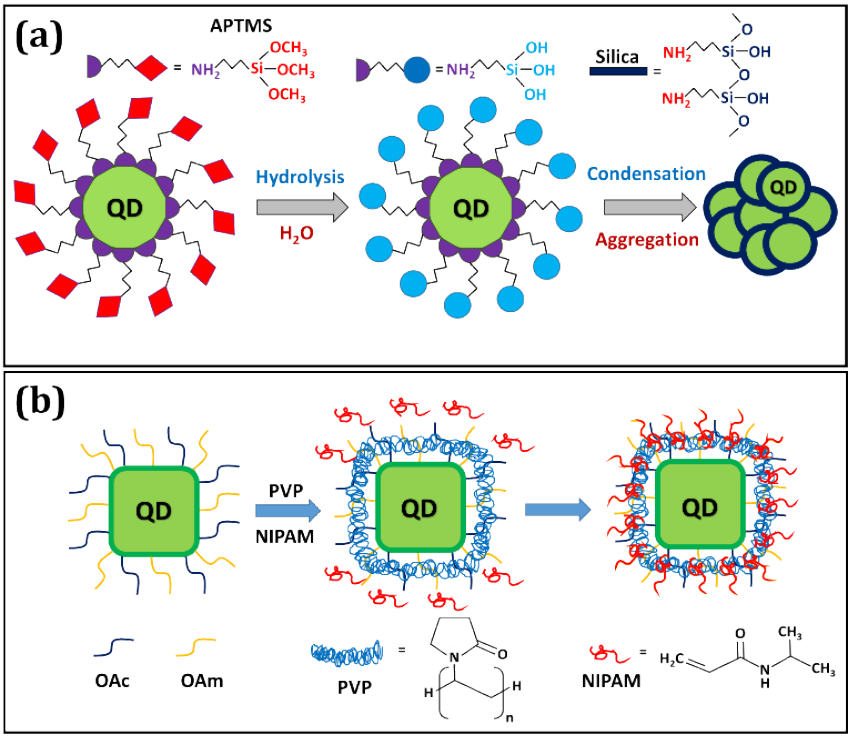


Figure S1. (a) Schematic representation of hydrolysis and condensation processes of APTMS for silica shelling around the perovskite NCs, and (b) Schematic representation of polymer coating around PbN NCs.

Results and discussion:

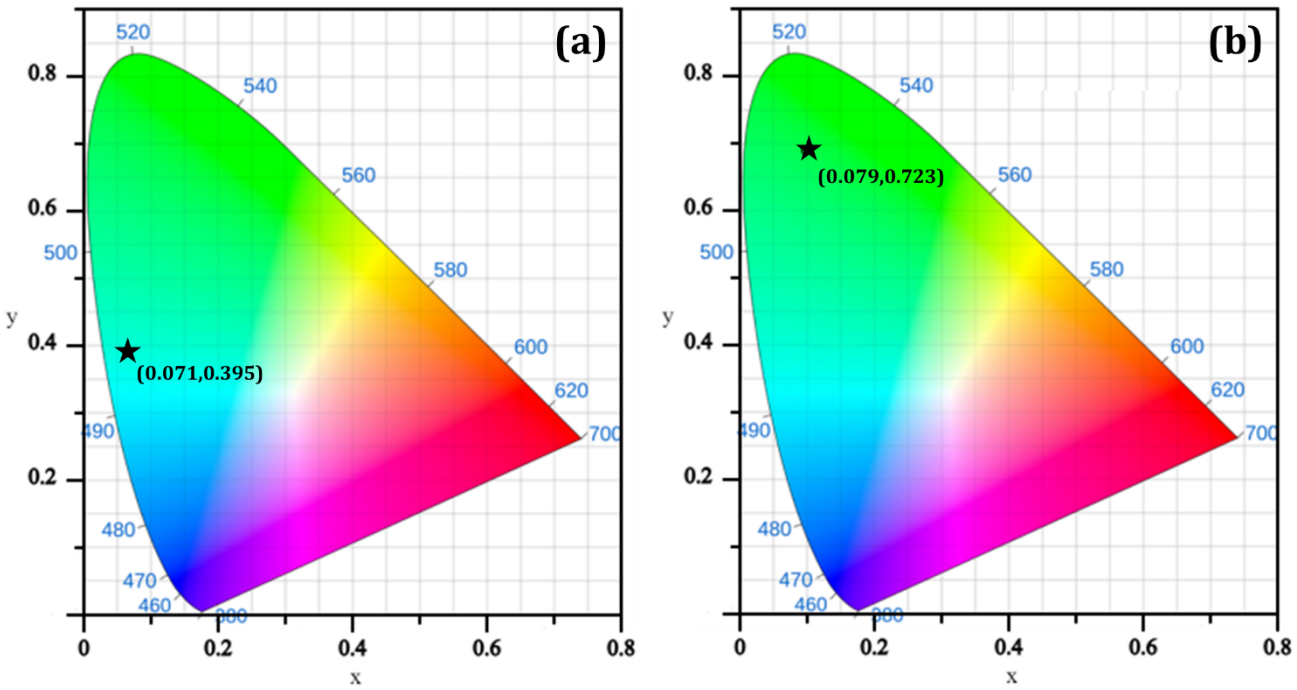


Figure S3. CIE color coordinates of (a) CPB@SiO_2 and (b) PbN-3 NCs.

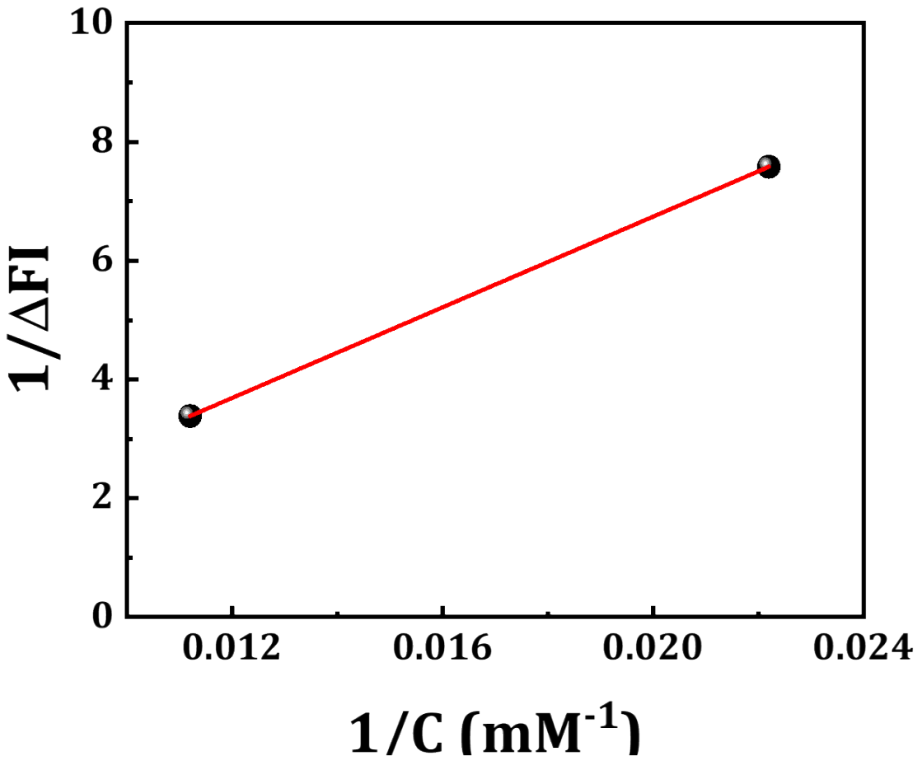


Figure S4. Double-reciprocal plot of [C] of NIPAM versus the change in the fluorescence intensity (Δ*FI*) of PbN NCs.

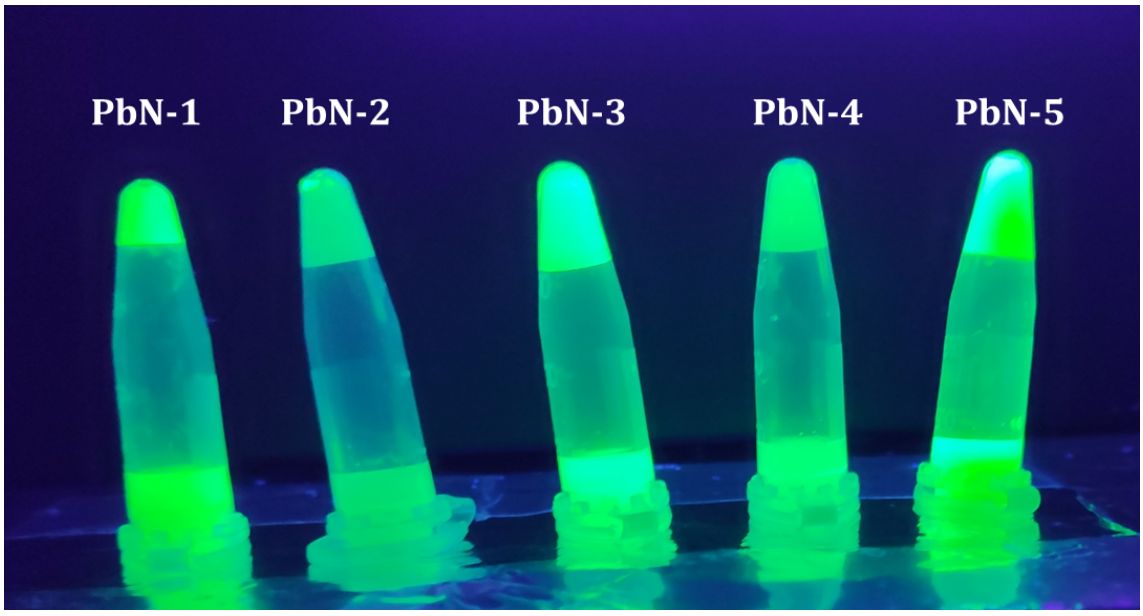
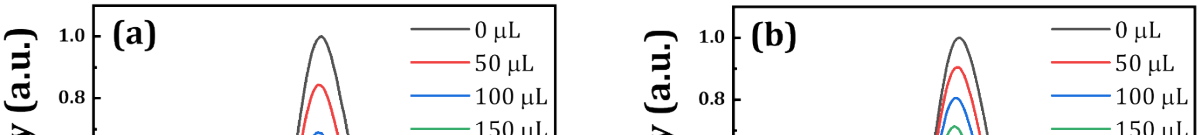
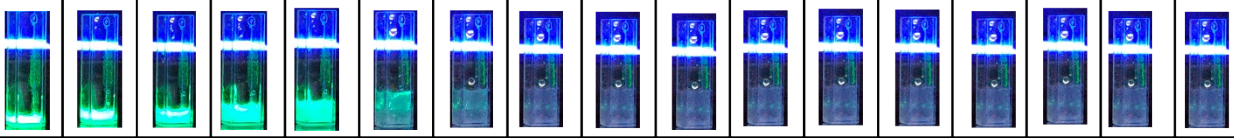
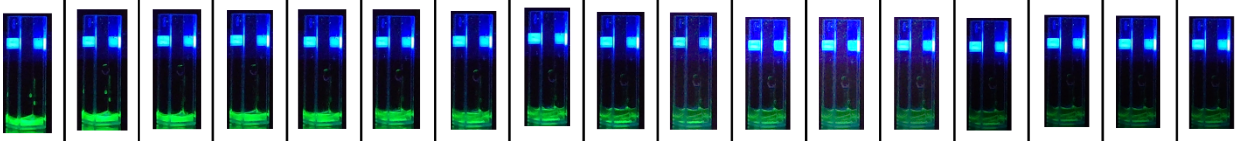
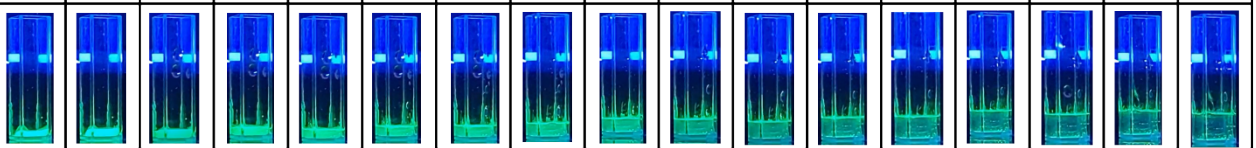
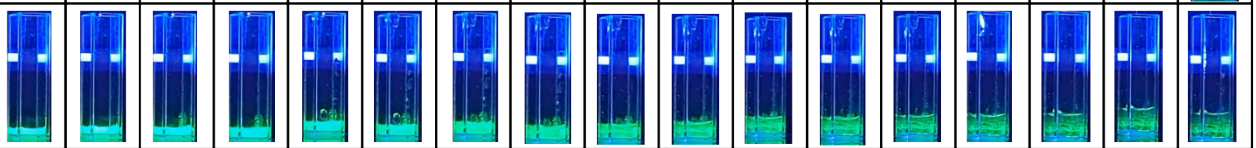
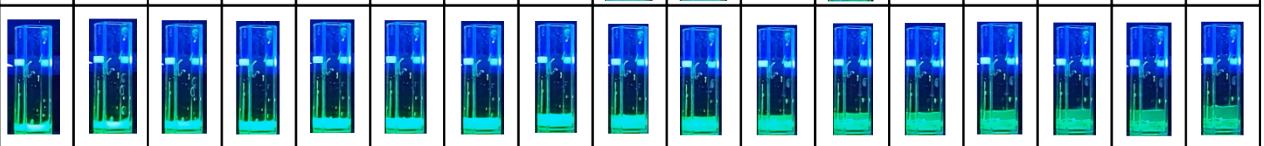


Figure S5. Photographic image of PbN NCs dispersed in water under a UV lamp.



	0 µL	50 µL	100 µL	150 µL	200 µL	250 µL	300 µL	350 µL	400 µL	450 µL	500 µL	550 µL	600 µL	650 µL	700 µL	750 µL	800 µL
CPB@SiO_2																	
PbN-1																	
PbN-2																	
PbN-3																	
PbN-4																	

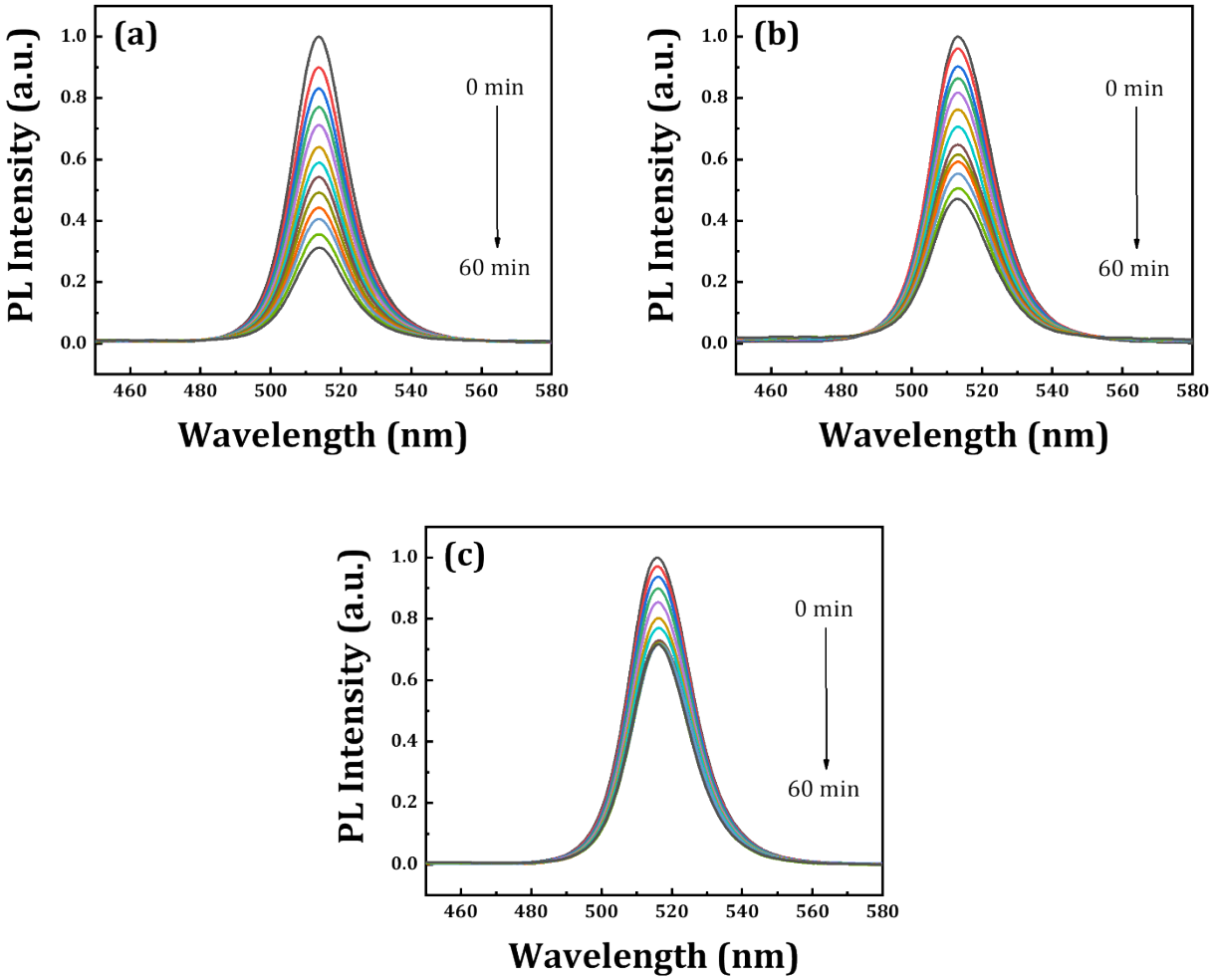


Figure S8. Water stability of (a) PbN-2, (b) PbN-3 and (c) PbN-5 as a function of time.

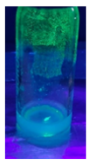
	0 min	15 min	30 min	45 min	60 min
CPB@SiO_2					
PbN-1					
PbN-2					
PbN-3					
PbN-4					
PbN-5					

Figure S9. Water stability test 2: Photographs of samples at a time interval of 15 mins after addition of DI water under a UV Lamp.

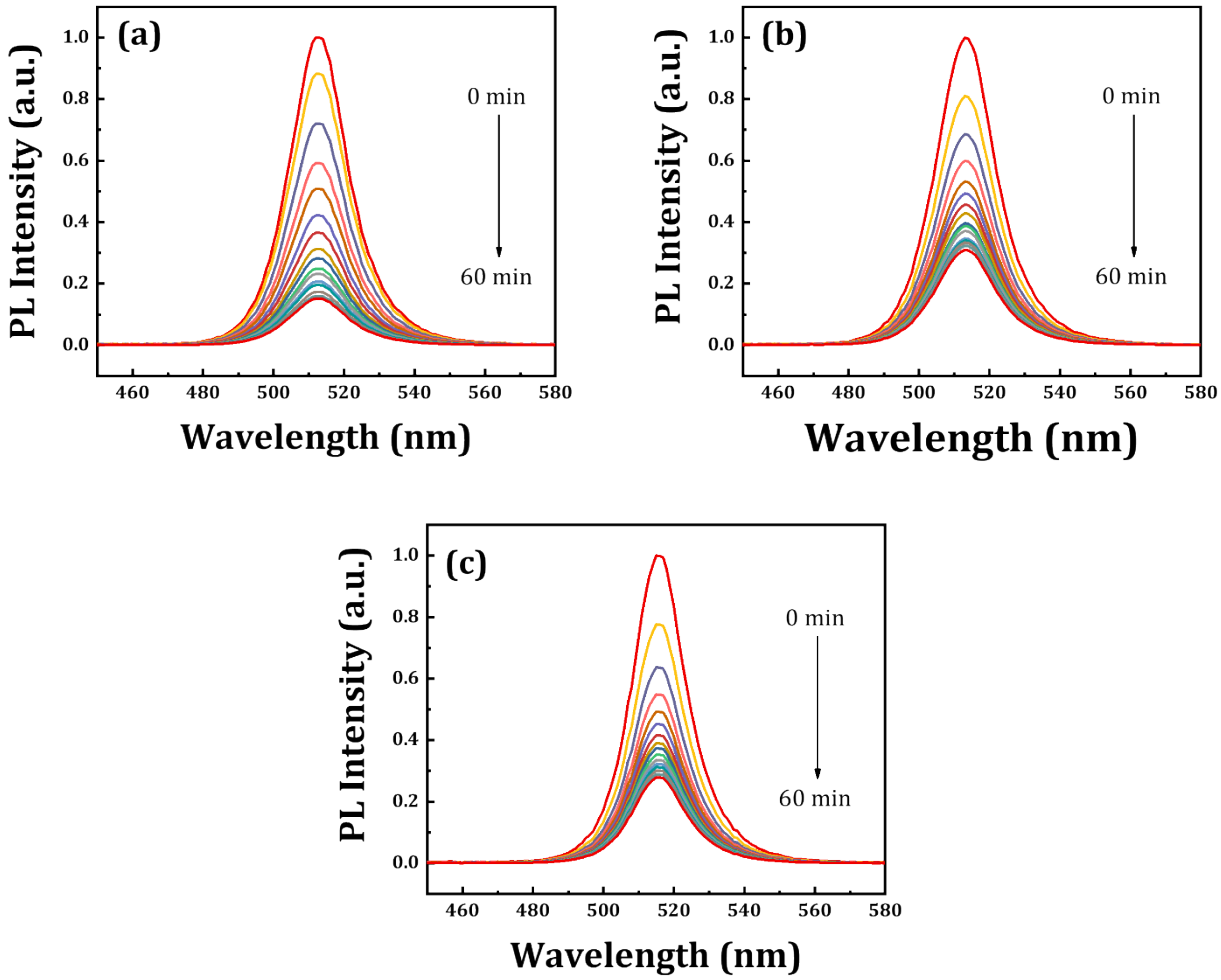


Figure S10. Heat stability of (a) PbN-2, (b) PbN-3 and (c) PbN-5 at 60°C as a function of time.

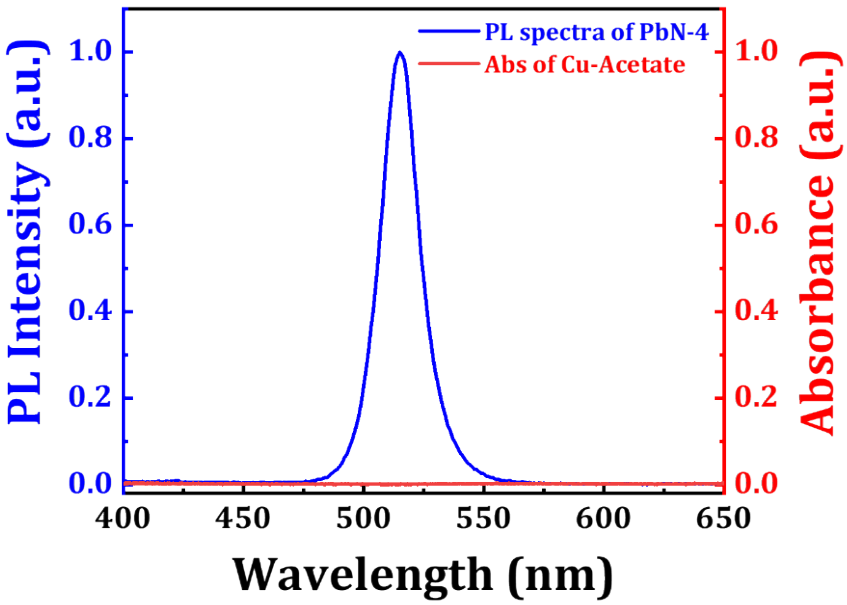


Figure S11. Absorption and PL spectra of Cu-acetate and PbN-4 NCs as shown in legends.

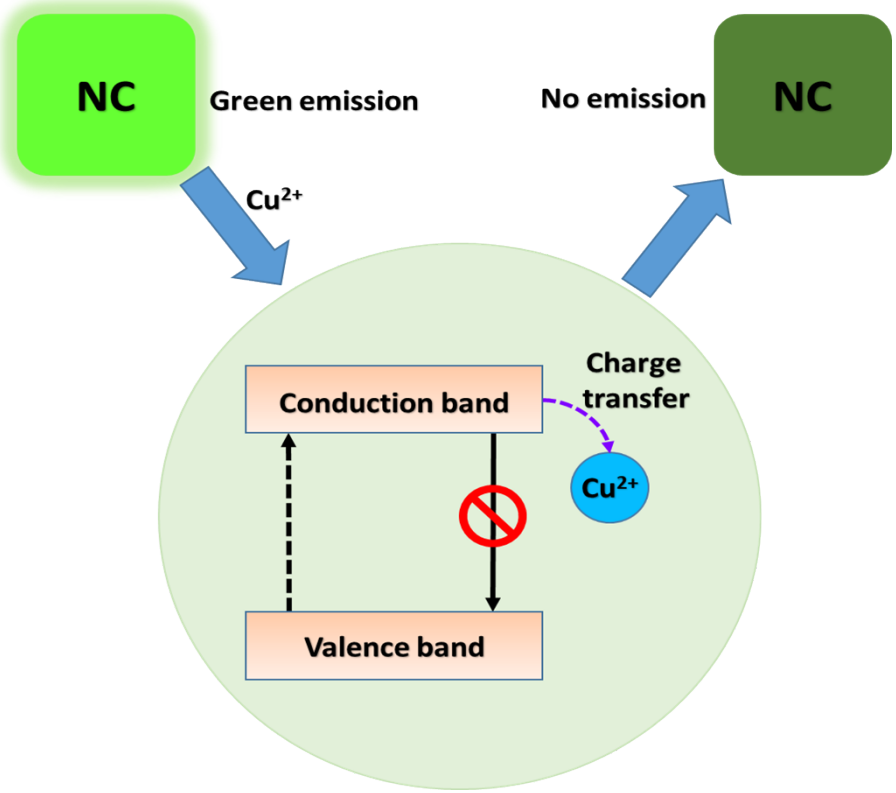


Figure S12. Schematic representation of charge transfer mechanism in NCs in presence of Cu^{2+}-ions.