Electronic Supplementary Information

for

Intense photoluminescence from Cu-doped CdSe nanotetrapods triggered by ultrafast hole capture

Fariyad Ali,[a] Sharmistha Das,[a] Sucheta Banerjee,[b] Bala Gopal Maddala,[a]

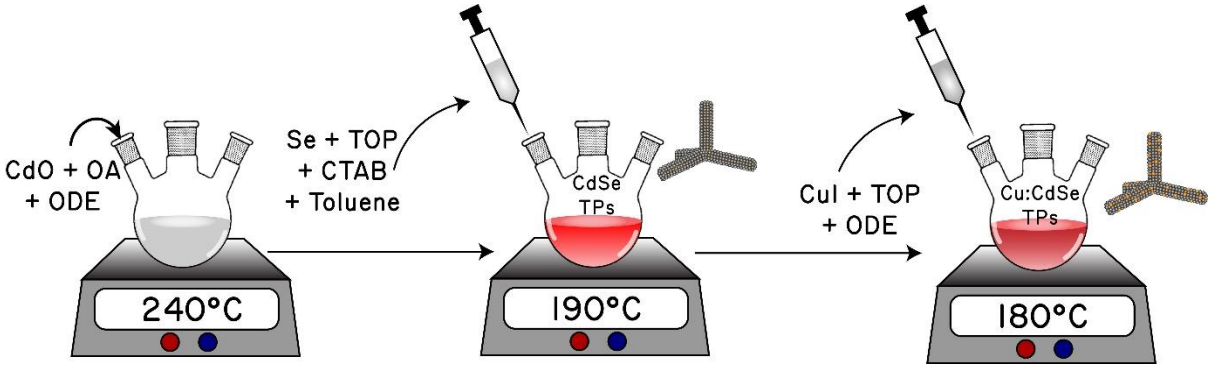
Gourab Rana,[a] Anindya Datta*[a]

[a]Department of Chemistry, Indian Institute of Technology Bombay, Powai, Mumbai 400 076, India

[b]Department of Chemistry, Sir Parashurambhau College, Tilak Road, Pune 411 030, India

e-mail: anindya@chem.iitb.ac.in, Phone: +91 22 2576 7149

Contents



Scheme S1. Synthesis of Cu-doped CdSe nanotetrapods (NTPs).

The one-pot hot injection synthesis procedure of Cu doped CdSe NTPs was adapted from literature with some modification (Scheme S1). CdSe NTPs were prepared in the method discussed earlier, with a reaction time of 25-30 minutes. Then, 100 μL to 1 ml of the Cu precursor i.e. mixture of 70 mg CuI, 6 ml ODE and 0.2 ml TOP was added to the reaction mixture at 180^{o}C. Aliquots of Cu doped CdSe NTPs were taken out by a syringe 10 minutes the injection.

Table S1. Quantitative/elemental composition data observed from ICP-AES.

Cu%	Cd (ppm)	Se (ppm)	Cu (ppm)	Cu/Cd
0.07	760.45	423.81	0.561	0.00073
0.2	720.67	405.11	1.461	0.00203
0.7	606.61	347.93	4.331	0.00714

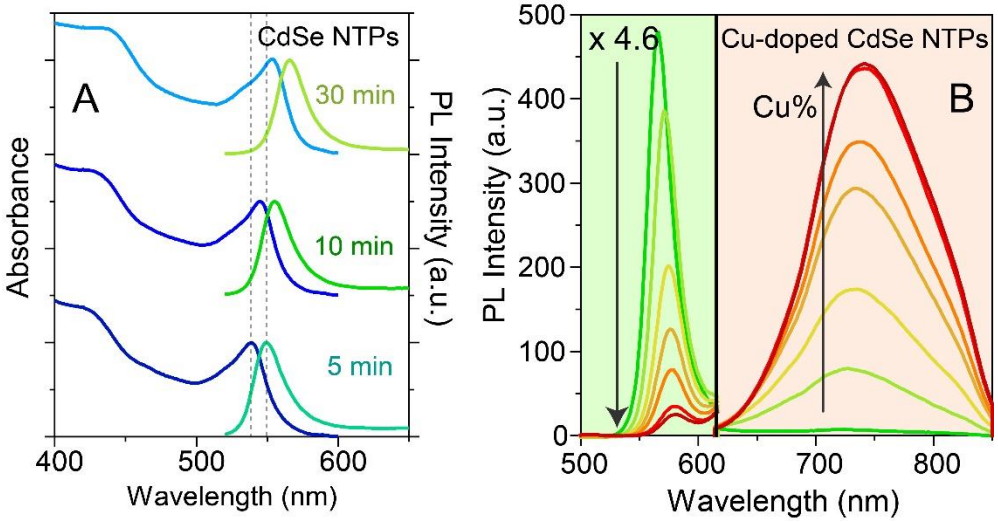


Figure S1. (A) As the reaction time increases after Se precursor injection the size of the NTPs increase as evidenced by the progressive red shift in absorption and emission spectra (λ_{ex} = 440 nm). (B) PL spectra of Cu-doped CdSe NTPs (λ_{ex} = 440 nm) with increasing Cu%. BE PL band in magnified (× 4.6 times) for better visibility. As dopant concentration increases (higher doping level) BE emission is severely suppressed with concurrent enhancement of the CT band. This confirms that dopant emission is Cu doping dependent.

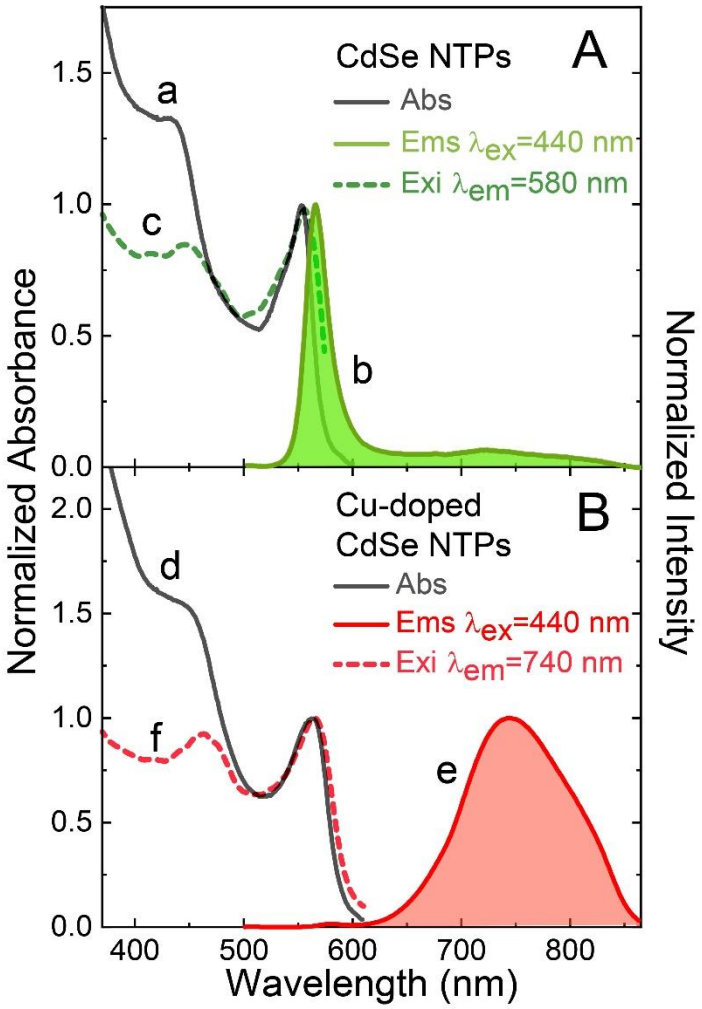


Figure S2. Absorption (a,d), PL (b, e) and photoluminescence excitation (PLE) (c, f) for (A) CdSe NTPs and (B) Cu-doped CdSe NTPs. Excellent overlap of absorbance PL excitation spectra indicates the absence of any emissive impurity.

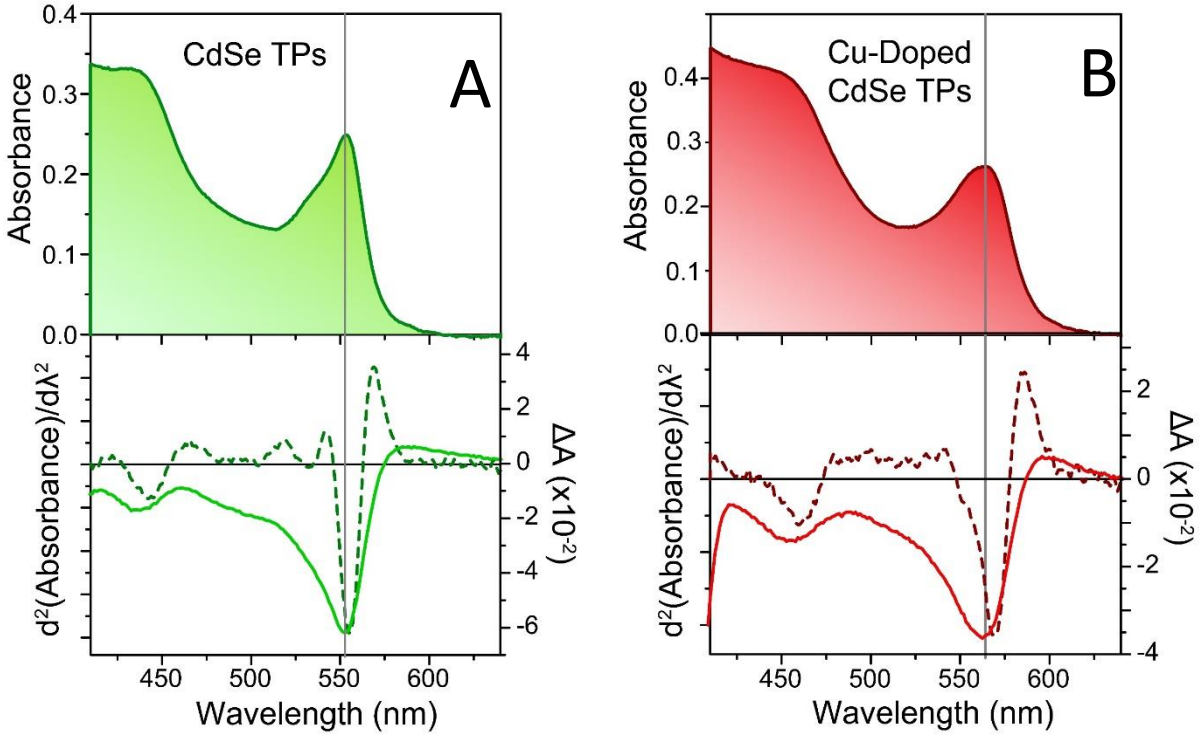


Figure S3. Comparison of absorption spectra and second-order derivative spectra for (A) CdSe NTPs and (B) Cu-doped CdSe NTPs.

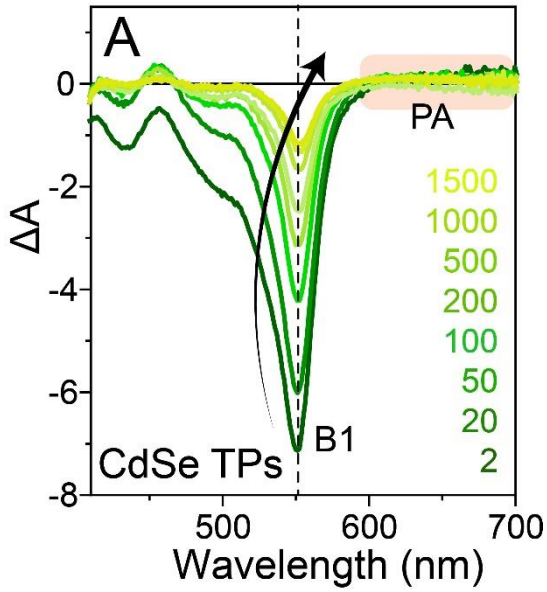


Figure S4. Transient absorption spectra for CdSe NTPs at selected delay times as indicated.

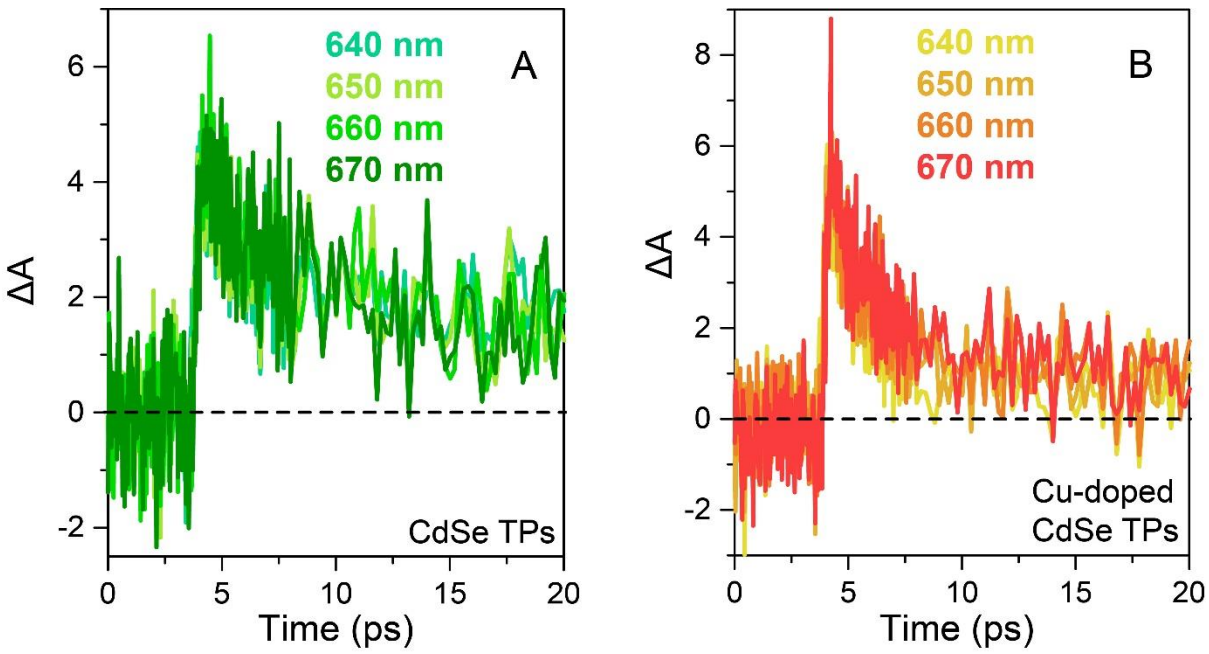


Figure S5. Wavelength independence of photoinduced absorption signal (PA) in (A) CdSe nanotetrapods and (B) Cu-doped CdSe nanotetrapods.

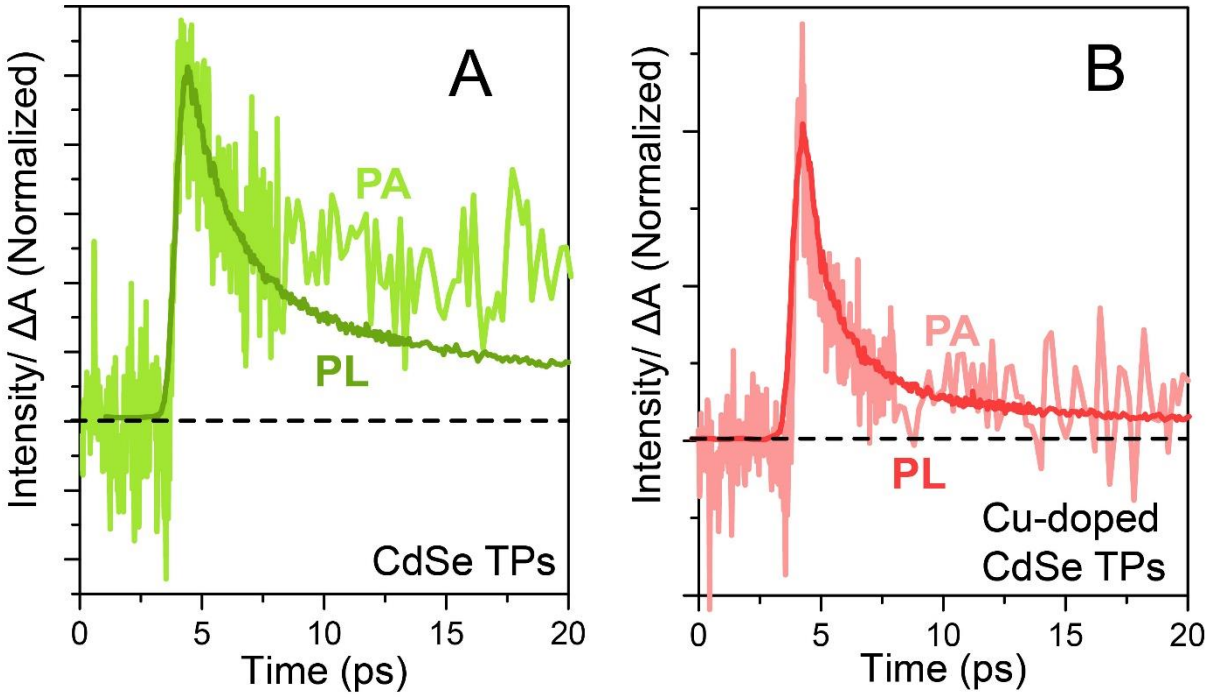


Figure S6. Comparison of photoinduced absorption (PA) and ultrafast PL transients for (A) CdSe nanotetrapods and (B) Cu-doped CdSe nanotetrapods. The initial part of the decays matches in both cases indicating the fast component arises due to the same excitonic pathway.