Electronic Supplementary Material (ESI) for RSC Advances.

Supplementary Information

Photoluminescence and photocatalytic activity of monodispersed colloidal "ligand free Ln^{3+}-doped $PbMoO_4$ nanocrystals"

Sagar Ganguli,[a] Chanchal Hazra,[a] Tuhin Samanta [a] and Venkataramanan Mahalingam [a*]

[a] Department of Chemical Sciences, Indian Institute of Science Education and Research (IISER), Kolkata, Mohanpur, West Bengal 741252, India.

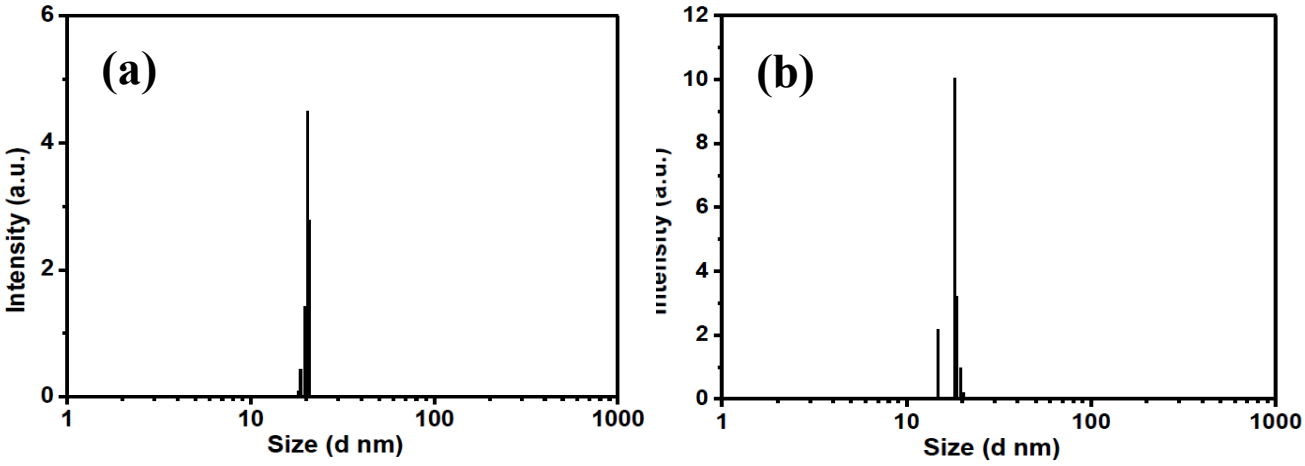

Fig. S1. DLS data of Eu^{3+}-doped $PbMoO_4$ nanocrystals (NCs): (a) Pb80 and (b) Pb110 indicating monodispersity and uniform size distribution.

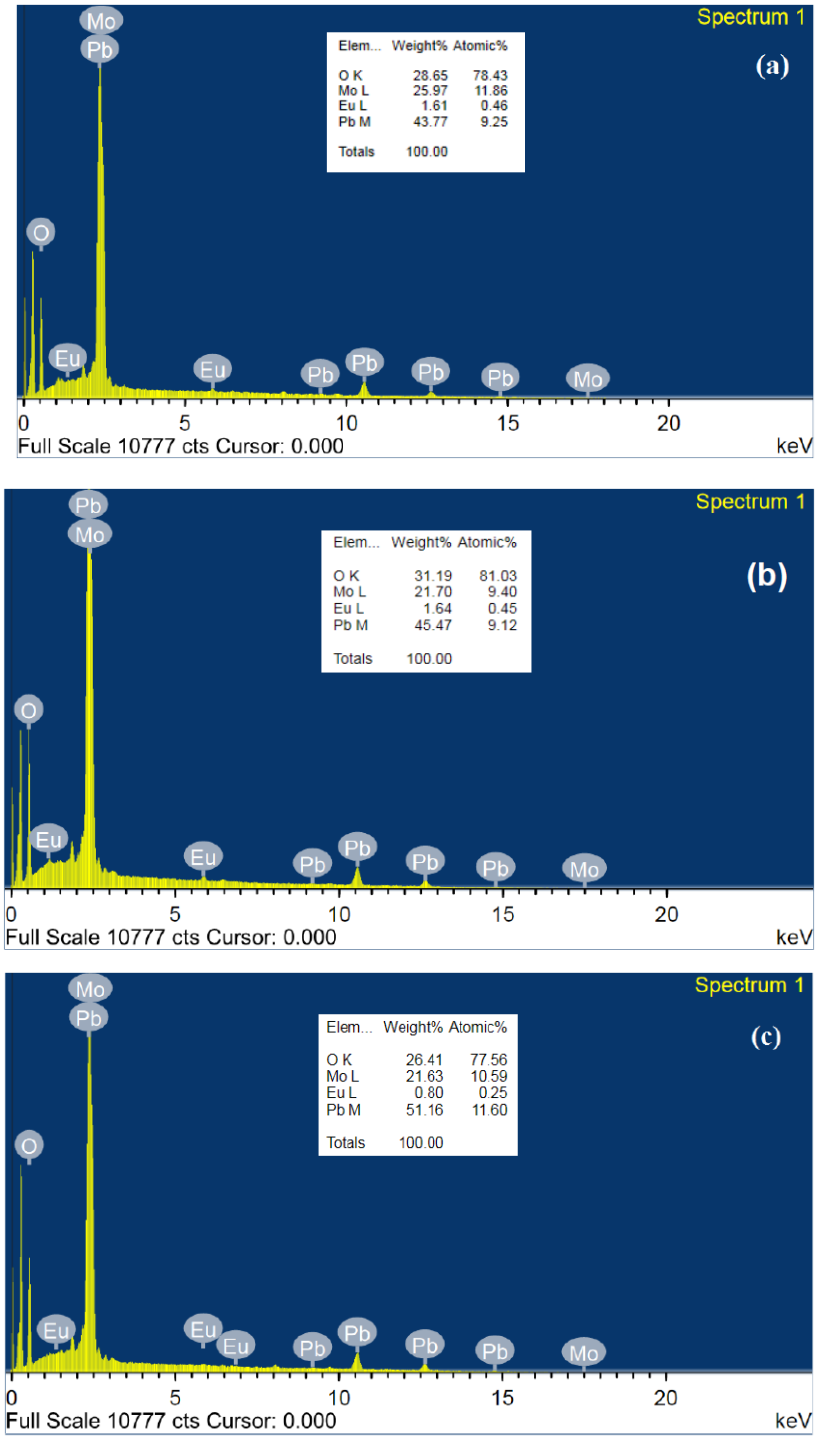

Fig. S2. EDS analysis of Eu^{3+} doped $PbMoO_4$ NCs: (a) Pb80, (b) Pb95 and (c) Pb110.

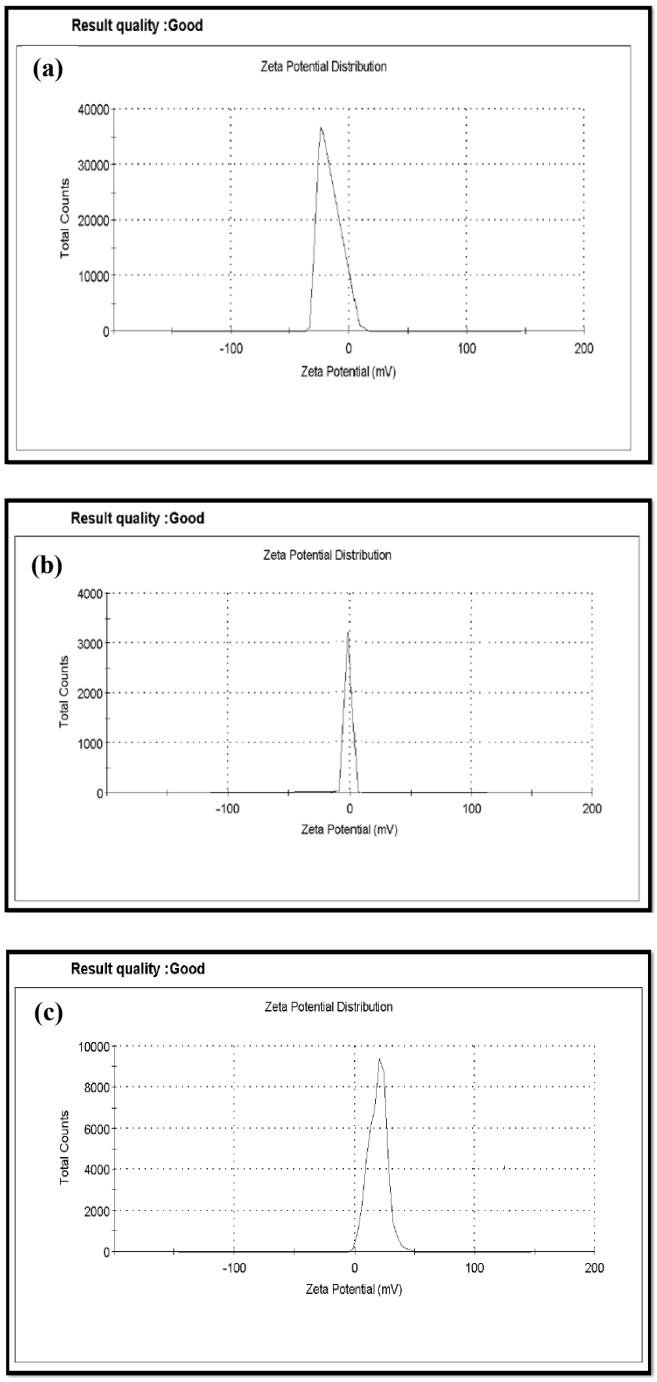

Fig. S3. Zeta potential measurement of Eu^{3+} doped $PbMoO_4$ NCs: (a) Pb80, (b) Pb95 and (c) Pb110.

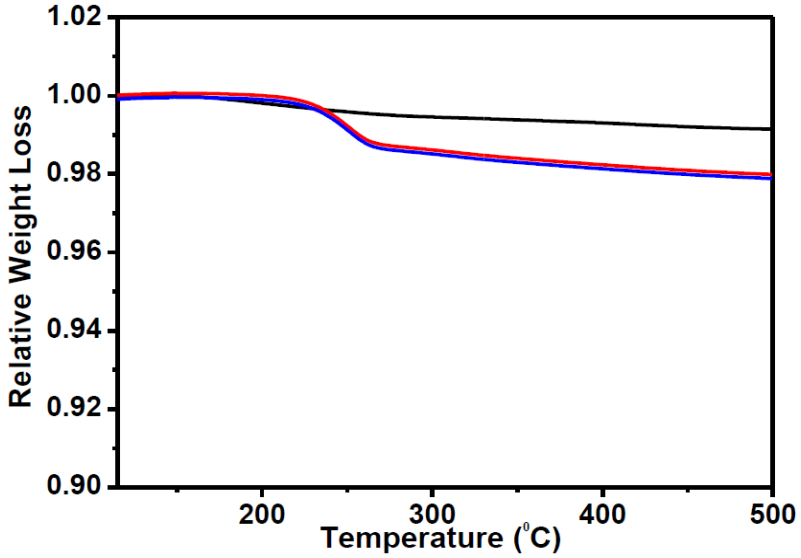

Fig. S4. TGA analysis of Eu^{3+}-doped $PbMoO_4$ NCs: (black) Pb80, (red) Pb95 and (blue) Pb110.

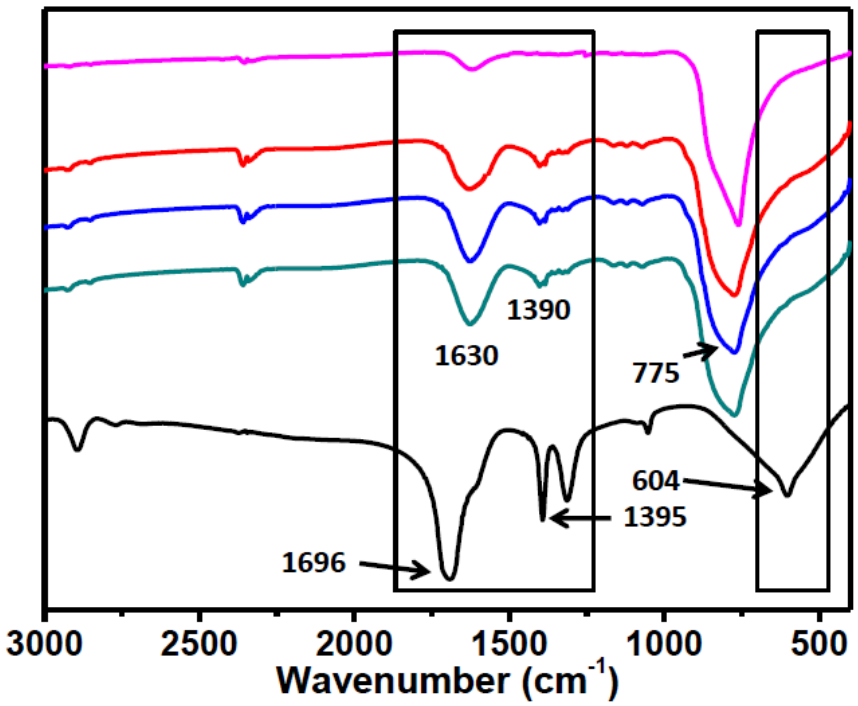

Fig. S5. FTIR analysis of Eu^{3+}-doped $PbMoO_4$ NCs: (black) Formamide, (green) Pb110, (blue) Pb95, (red) Pb80 and (pink) $PbMoO_4$ prepared using water as solvent.

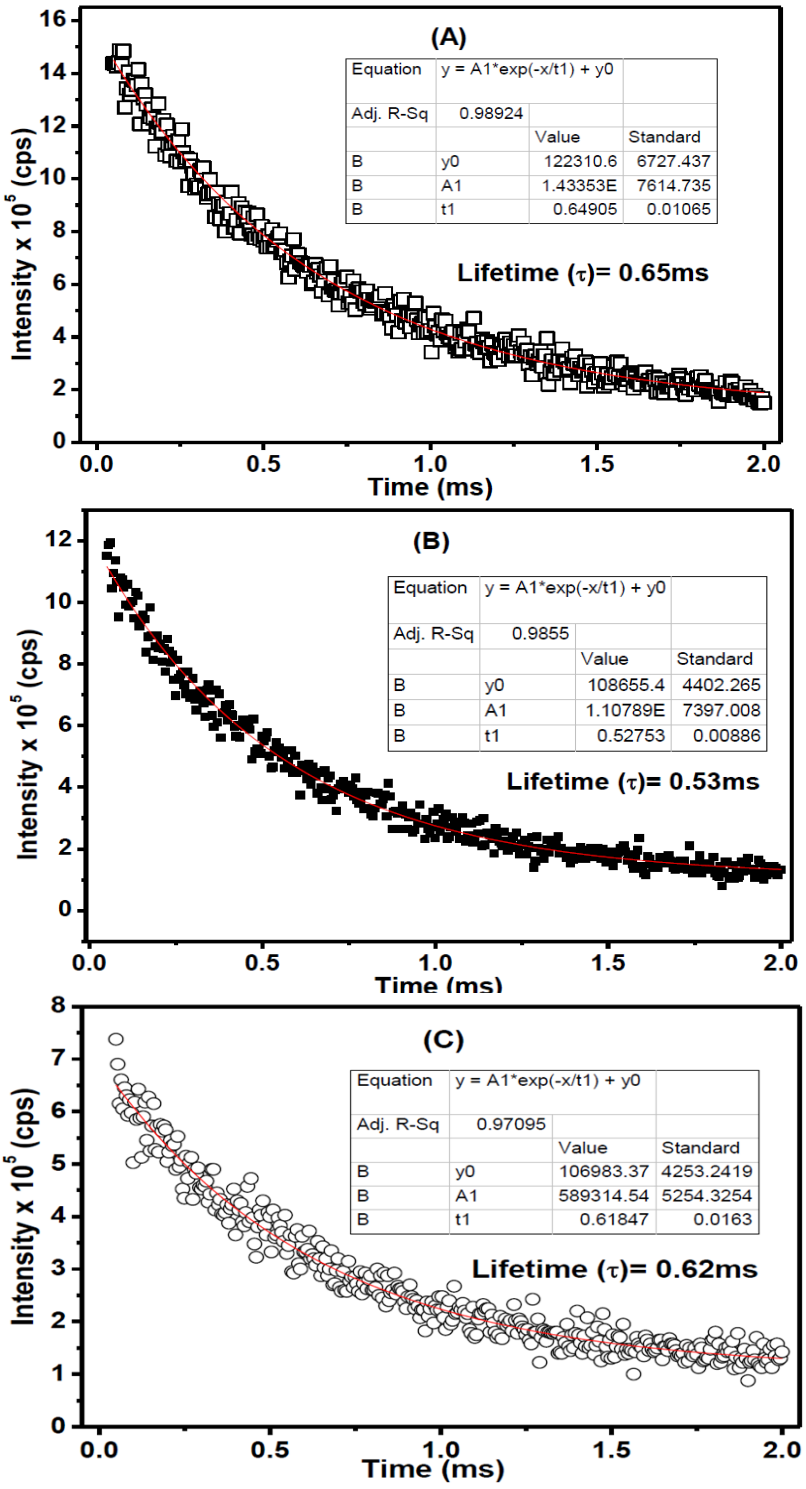

Fig. S6. Lifetime measurement data of Eu^{3+} doped $PbMoO_4$ NCs: (A) Pb80, (B) Pb95 and (C) Pb110.

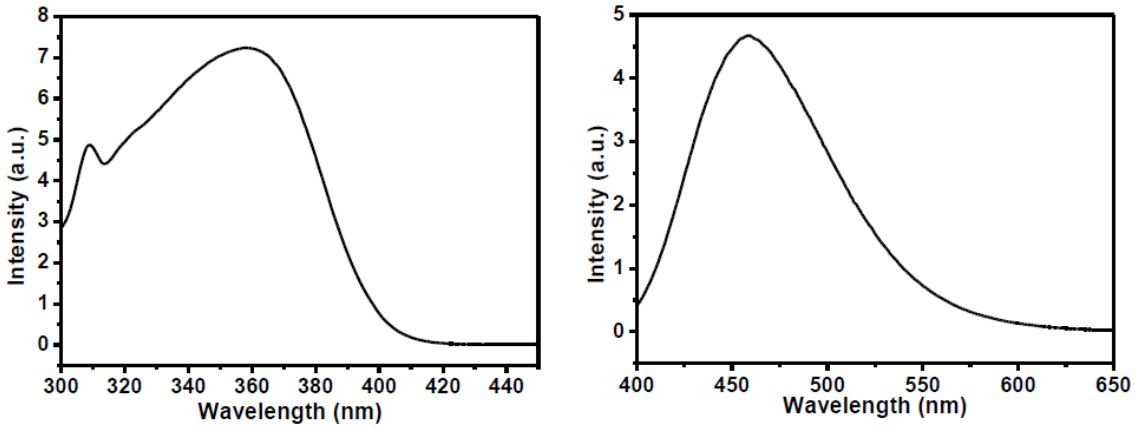

Fig. S7. Absorption (left) and emission (right) spectra of quinine sulphate.

Quantum Yield Calculation

The quantum yield was determined by comparing the luminescence with quinine-sulphate. The quantum yield of Eu^{3+}-doped $PbMoO_4$ NCs was calculated from the following equation- $Q_{sample} = Q_{ref}\ (A/A_{ref})\ (I_{ref}/I)\ (n^2/n^2_{ref})$ where, Q_{sample} and Q_{ref} are the quantum yields of the nanocrystals and quinine-sulphate respectively, A is the absorbance, I is the integrated area of photoluminescence spectra, and n is the refractive index of the solution. The quantum yield of Quinine sulphate as the reference is 0.546. The quantum yield of molybdate NCs was estimated by comparing the integrated emission spectra of the aqueous solution with that of Quinine sulphate solution. The sample and the reference have the identical optical density at the excitation wavelength. The calculated quantum yield was about 24.55%, 24.09% and 8.01% for Pb80, Pb95 and Pb110 NCs, respectively.

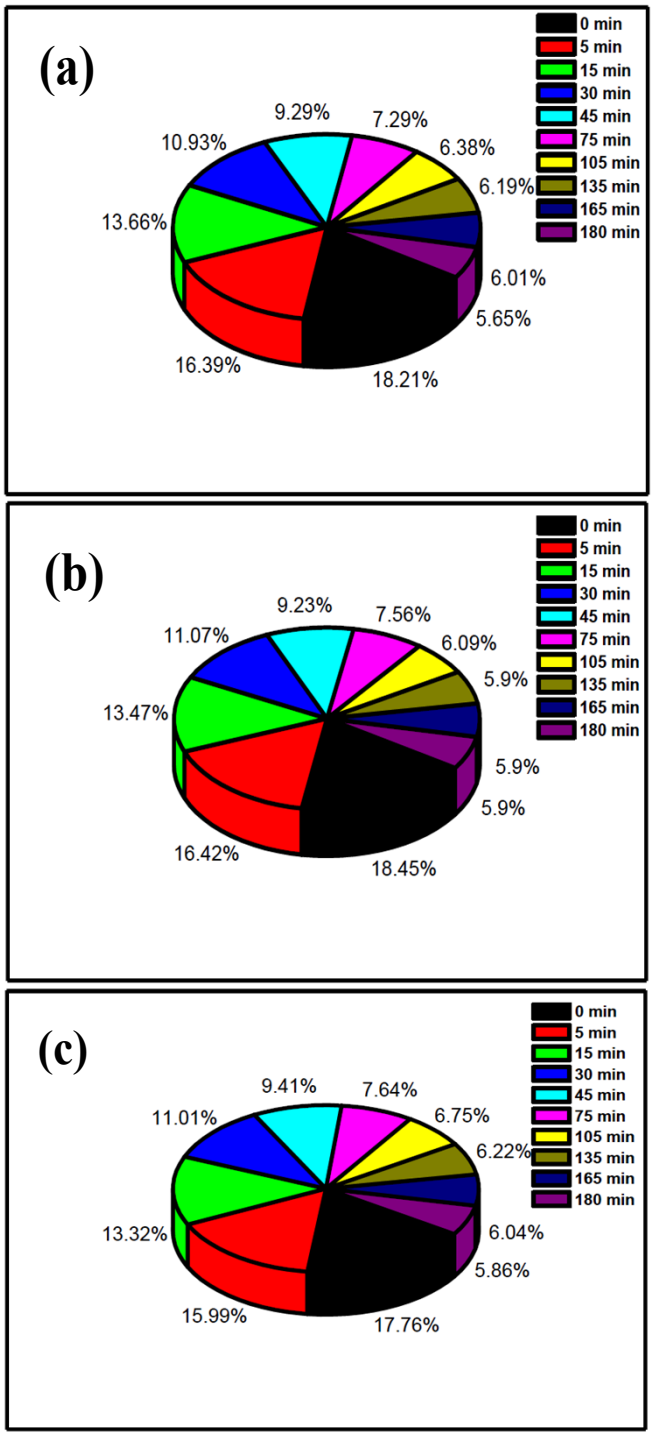

Fig. S8. Pie chart diagram of RhB dye degradation over the surface of (a) Pb80, (b) Pb95and (c) Pb110 NCs.

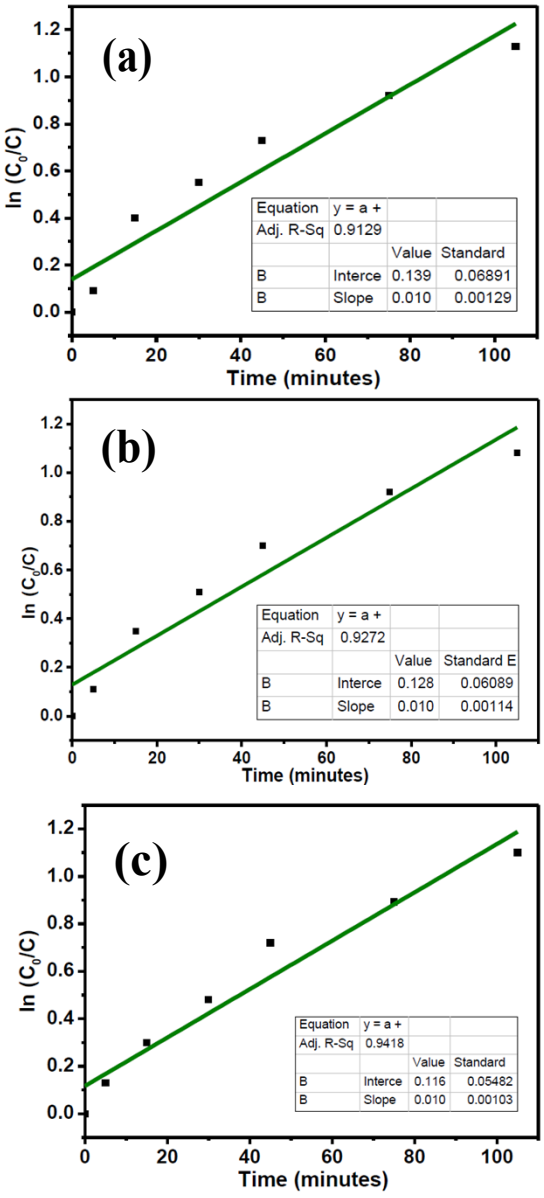

Fig. S9. Plot of $\ln(C_0/C)$ vs time (minutes) for the determination of rate constant of RhB dye degradation over the surface of (a) Pb80, (b) Pb95 and (c) Pb110 NCs.

Table 1. Comparison of dye degradation between our material and reported materials.

Method of preparation	Dye used	Degradation limit	Degradation time (min)	Rate (min^{-1})	Ref.
Coprecipitation	RhB	35%	240	--	43
Hydrothermal	RhB	20%	240	--	41
Microwave (our work)	RhB	70%	180	0.010	--