

Supporting Information

**Eu³⁺ ions as optical probe to follow the growth
of colloidal ZnO nanostructures**

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Quantum yield calculation

The quantum yield was calculated comparing with the excitation and luminescence of quinine-sulphate. The quantum yield of the ZnO: Eu³⁺ nanocrystals at different time interval was calculated from the following equation-

$$Q_{\text{sample}} = Q_{\text{ref}} (A / A_{\text{ref}}) (I_{\text{ref}} / I) (\eta^2 / \eta_{\text{ref}}^2)$$

(Where, Q_{sample} and Q_{ref} are the quantum yield of the nanocrystals and quinine-sulphate respectively, A is the absorbance, I is the integrated area of photoluminescence spectra, and η is the refractive index of the solution.)

The quantum yield of Quinine sulphate as the reference is 0.546. The quantum yields of the ZnO: Eu³⁺ nanocrystals at different time interval were estimated by comparing the integrated emission spectra of the aqueous solution with that of quinine sulphate solution. Both the sample and reference have the identical optical density at the excitation wavelength.

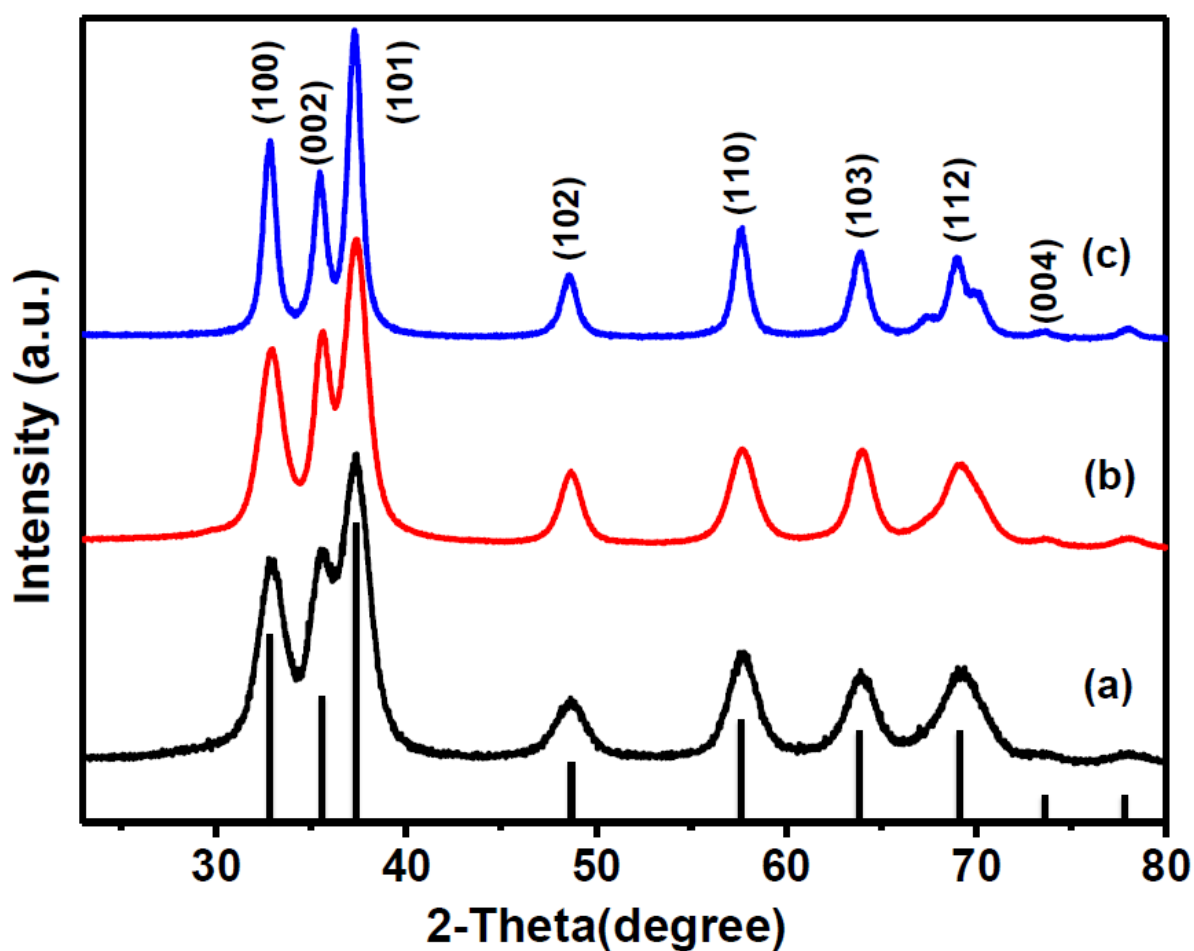


Fig. S1 XRD patterns of Eu^{3+} -doped ZnO nanoparticles measured after (a) 0 min, (b) 120 min and (c) 2100 min after the refluxing is stopped.

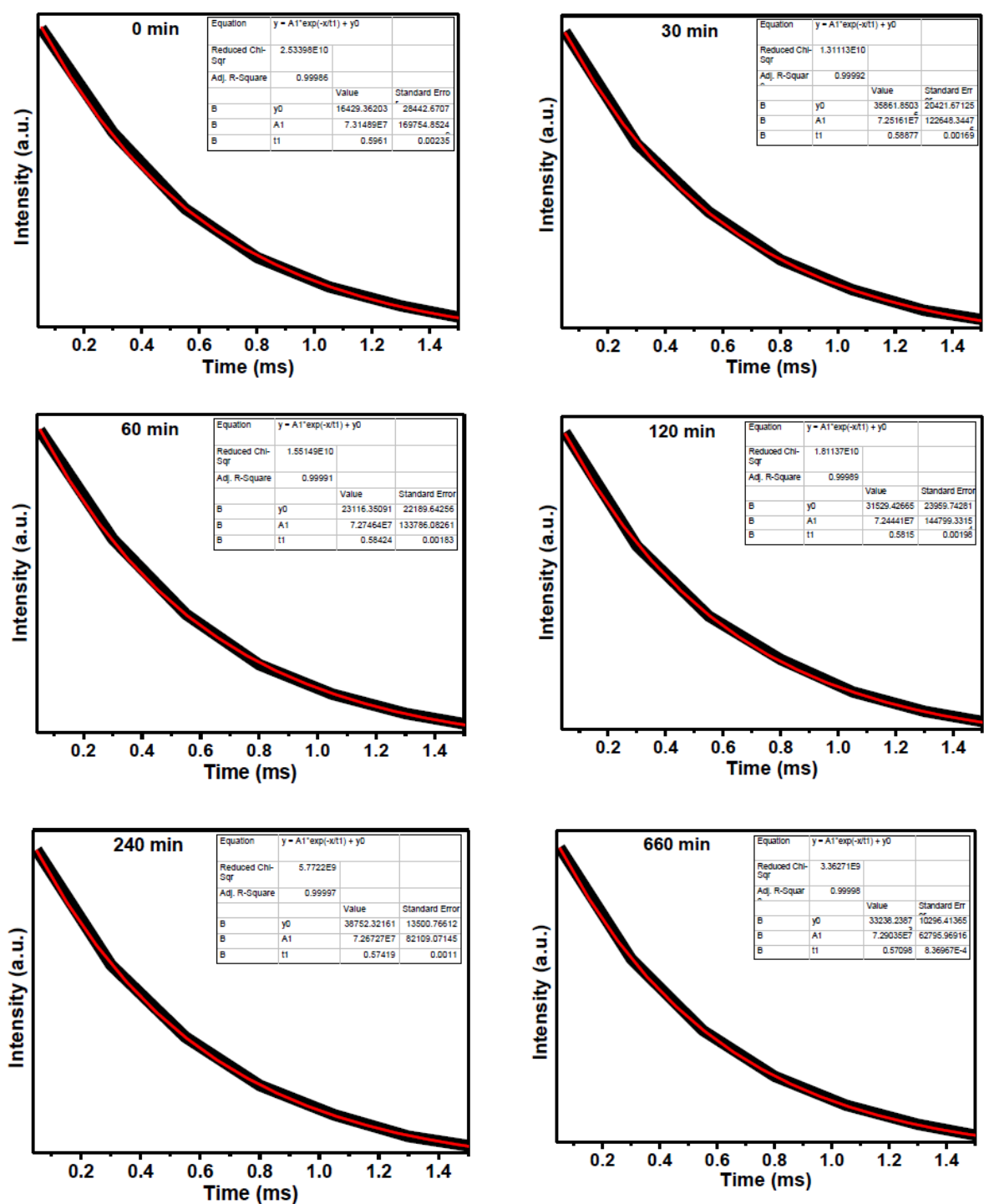


Fig. S2 Decay curves for the Eu^{3+} -doped ZnO nanocrystals measured at different intervals during their growth in solution.

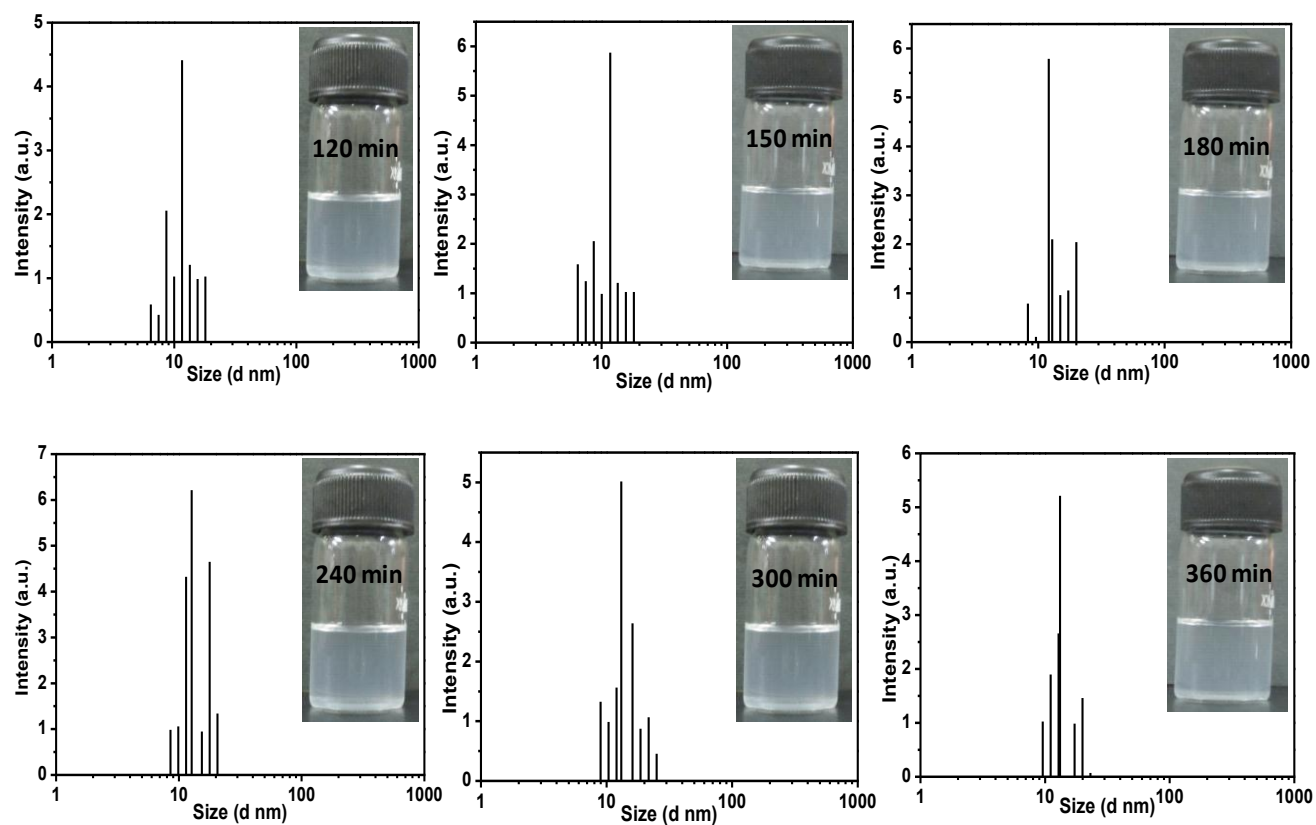


Fig. S3 The digital image of Eu^{3+} -doped ZnO nanocrystals measured upto 360 minutes after of the addition of octanethiol at 120 minutes.

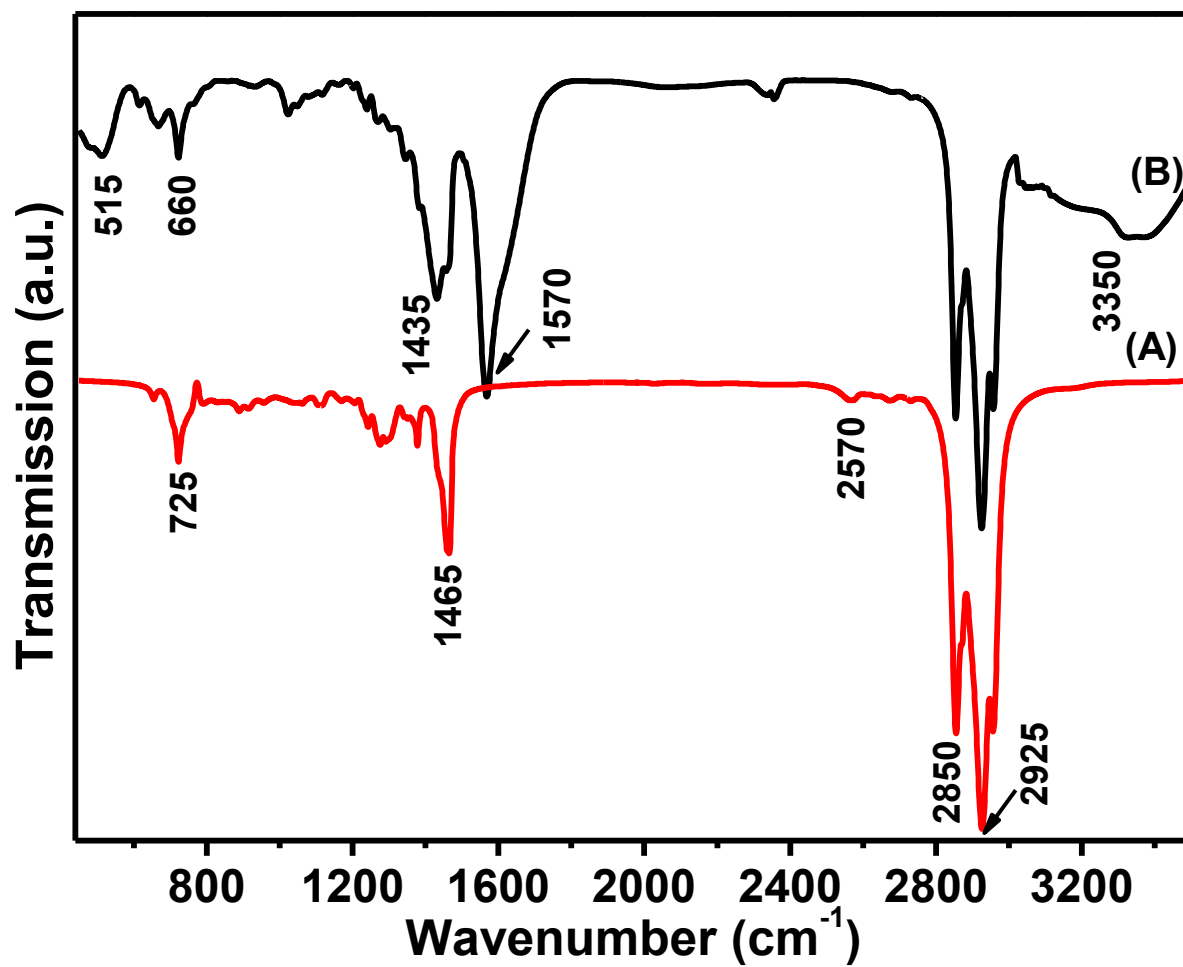


Fig. S4 FTIR spectra of (A) octanethiol and (B) octanethiol capped Eu³⁺-doped ZnO nanoparticles.

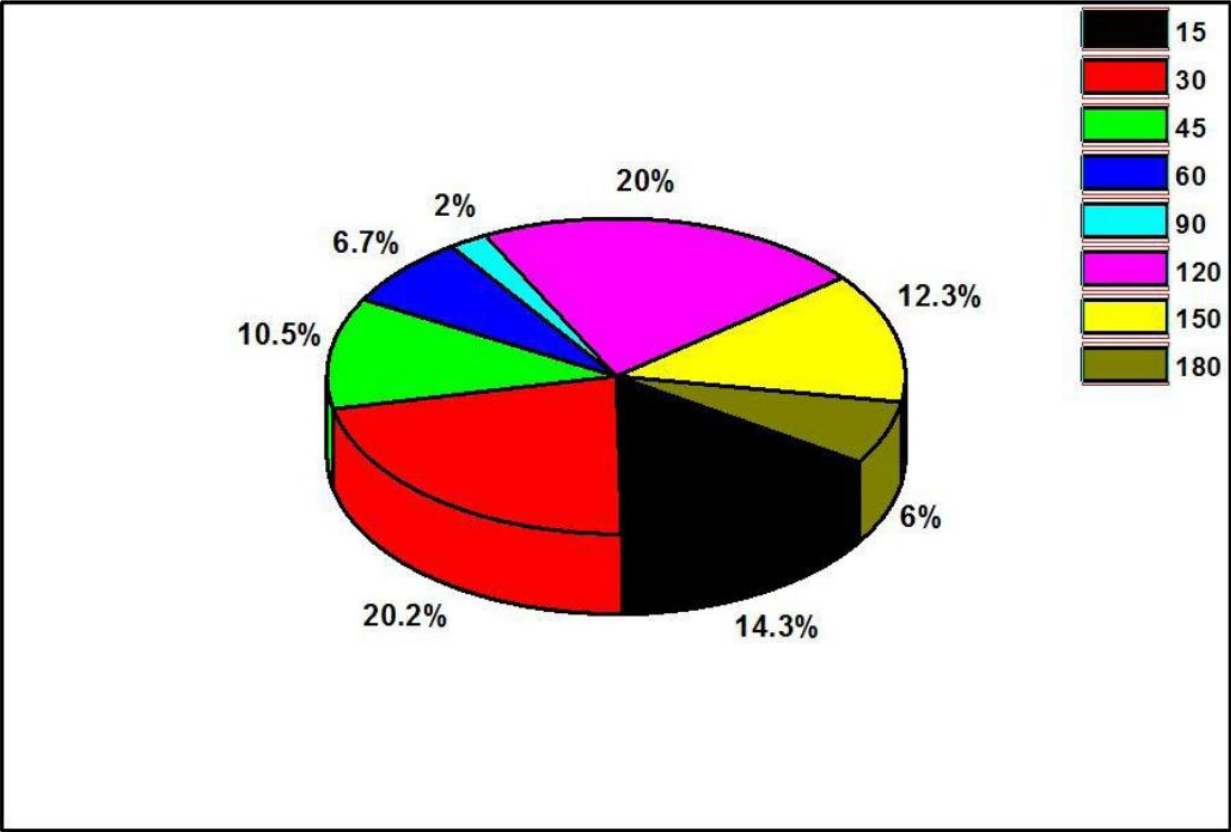


Fig. S5 RhB dye degradation pie chart as a function of time.

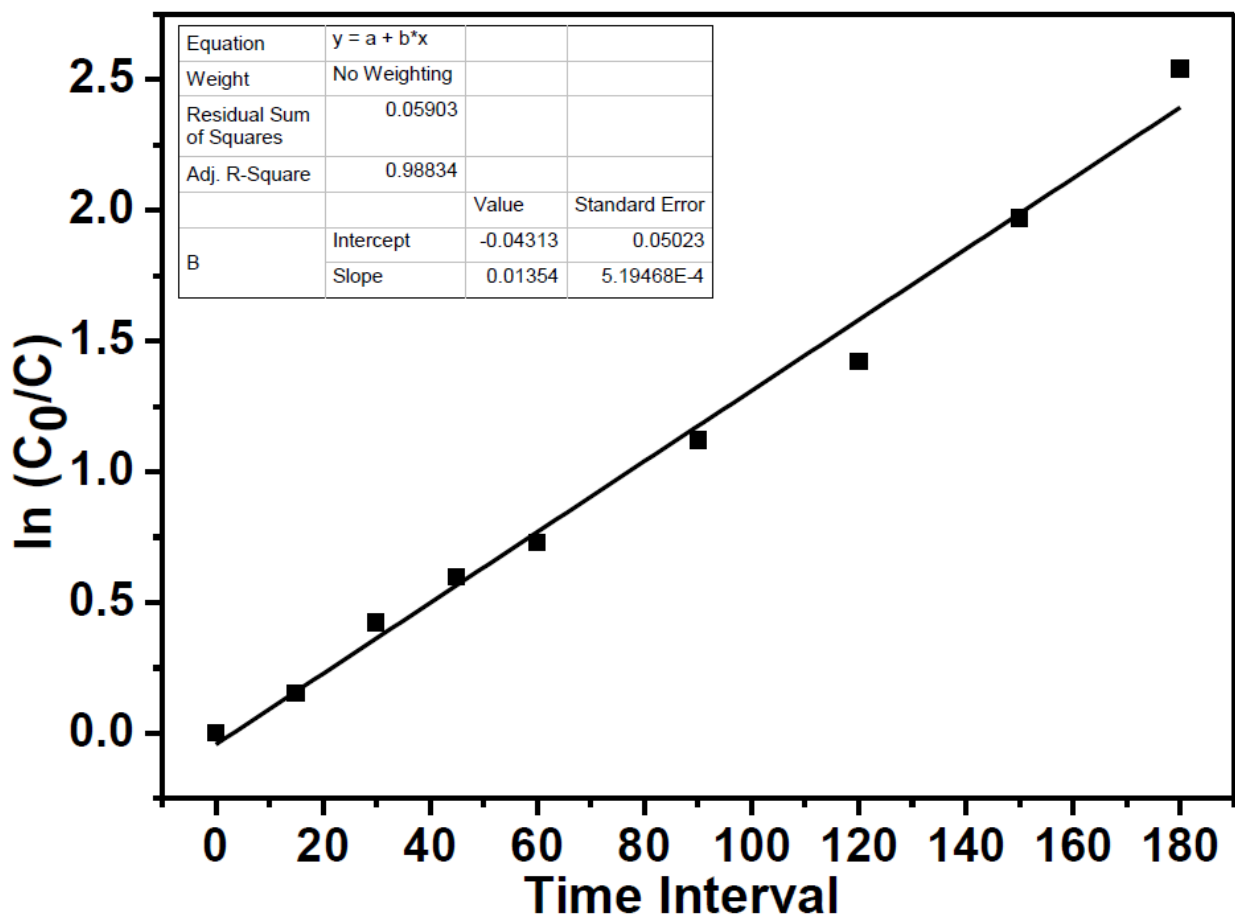


Fig. S6 Plot of ln (C₀/C) verses time showing the first order kinetics of RhB dye degradation over the surface of ZnO nanocrystals.

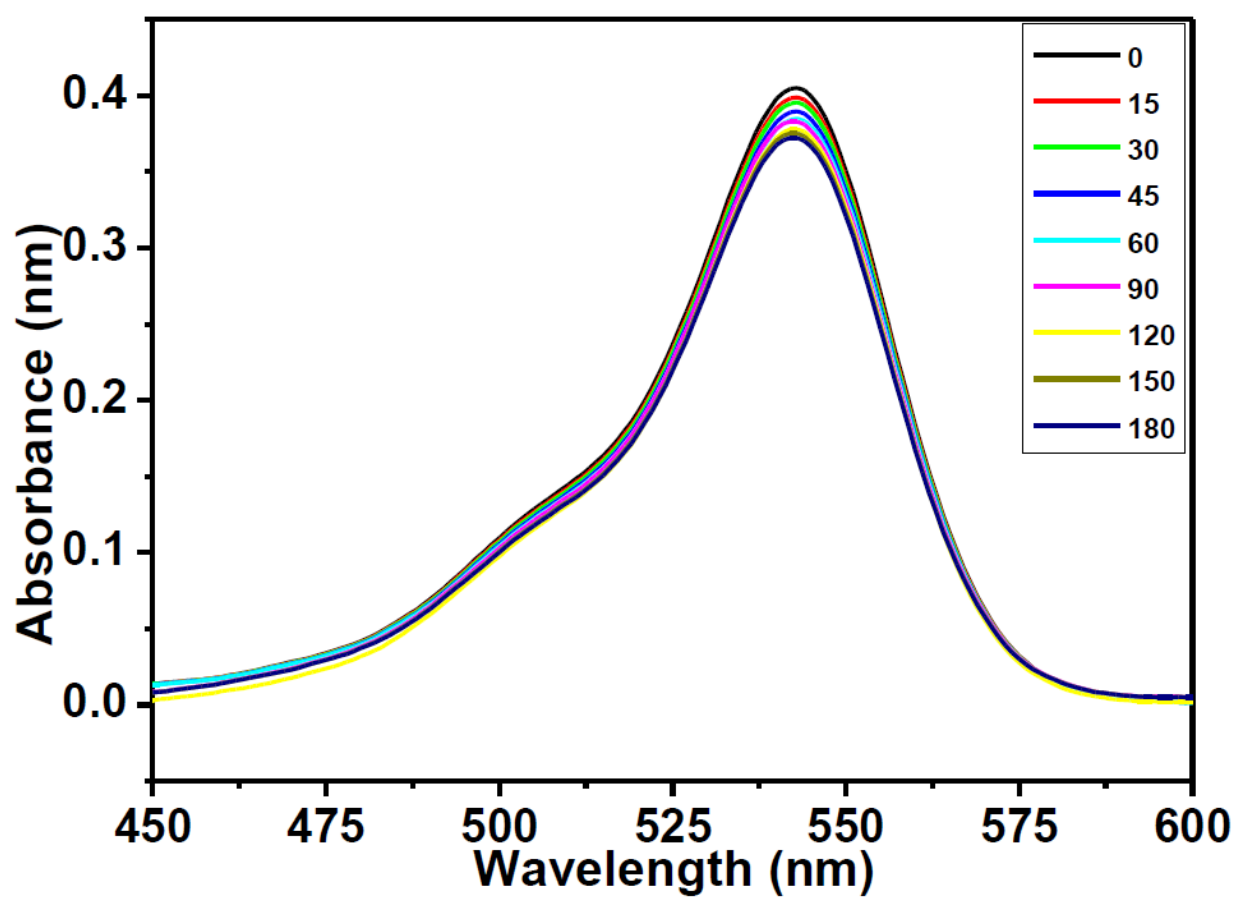


Fig. S7 UV-Vis spectra of RhB dye as a function of time over the surface of the 1-octanethiol capped ZnO nanocrystals under UV irradiation.