

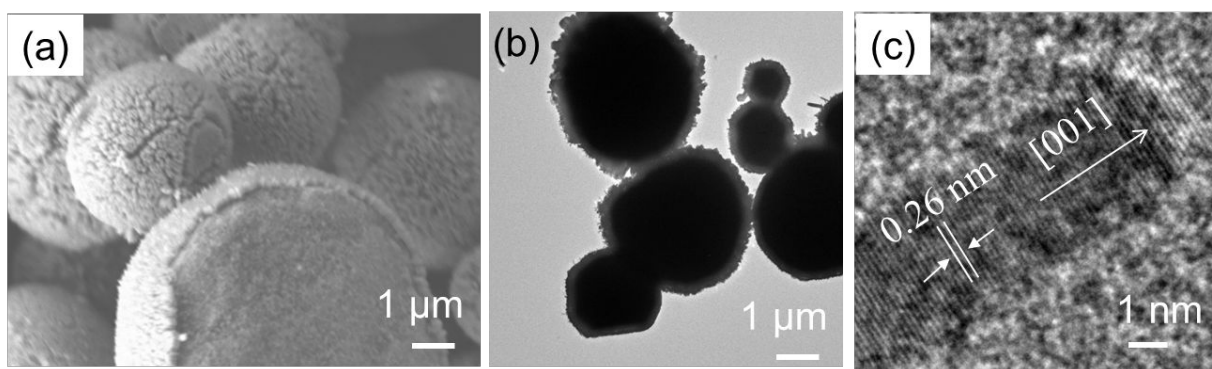
## Supporting Information

### ZnO Nanocrystal Coated Zinc Particles Degrade Dyes in Dark by Constantly Releasing $\cdot\text{O}_2^-$ and $\text{H}_2\text{O}_2$ \*\*

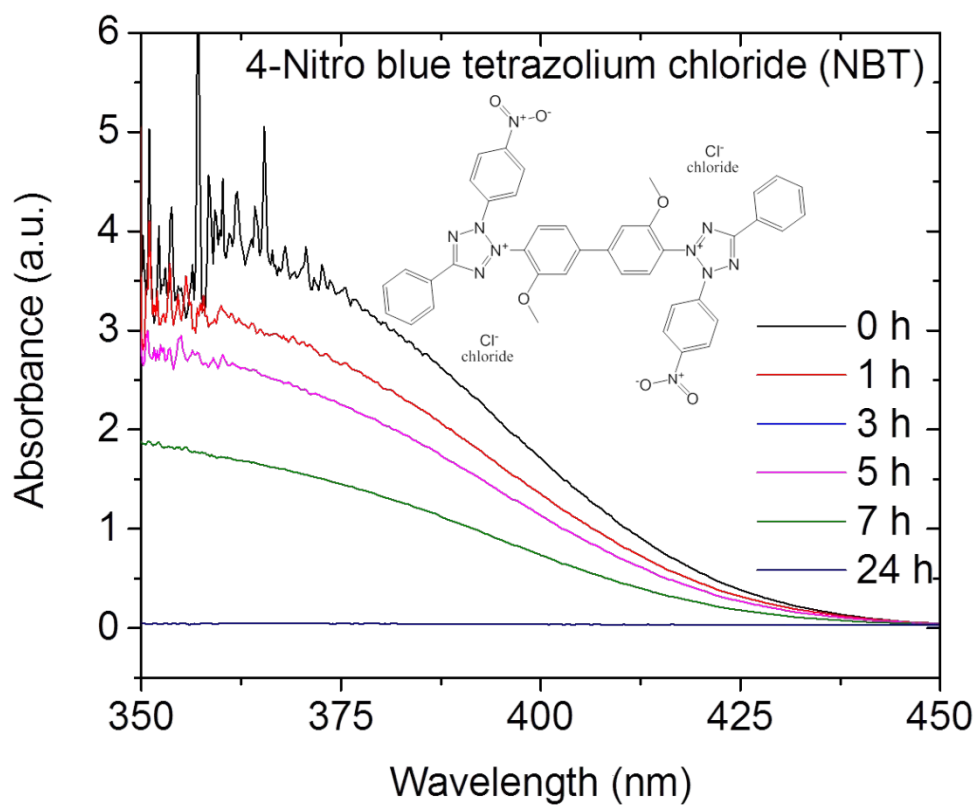
Guangshun Yi,\* Gunjan Agarwal and Yugen Zhang\*

Institute of Bioengineering and Nanotechnology, 31 Biopolis Way, The Nanos, Singapore 138669, Singapore

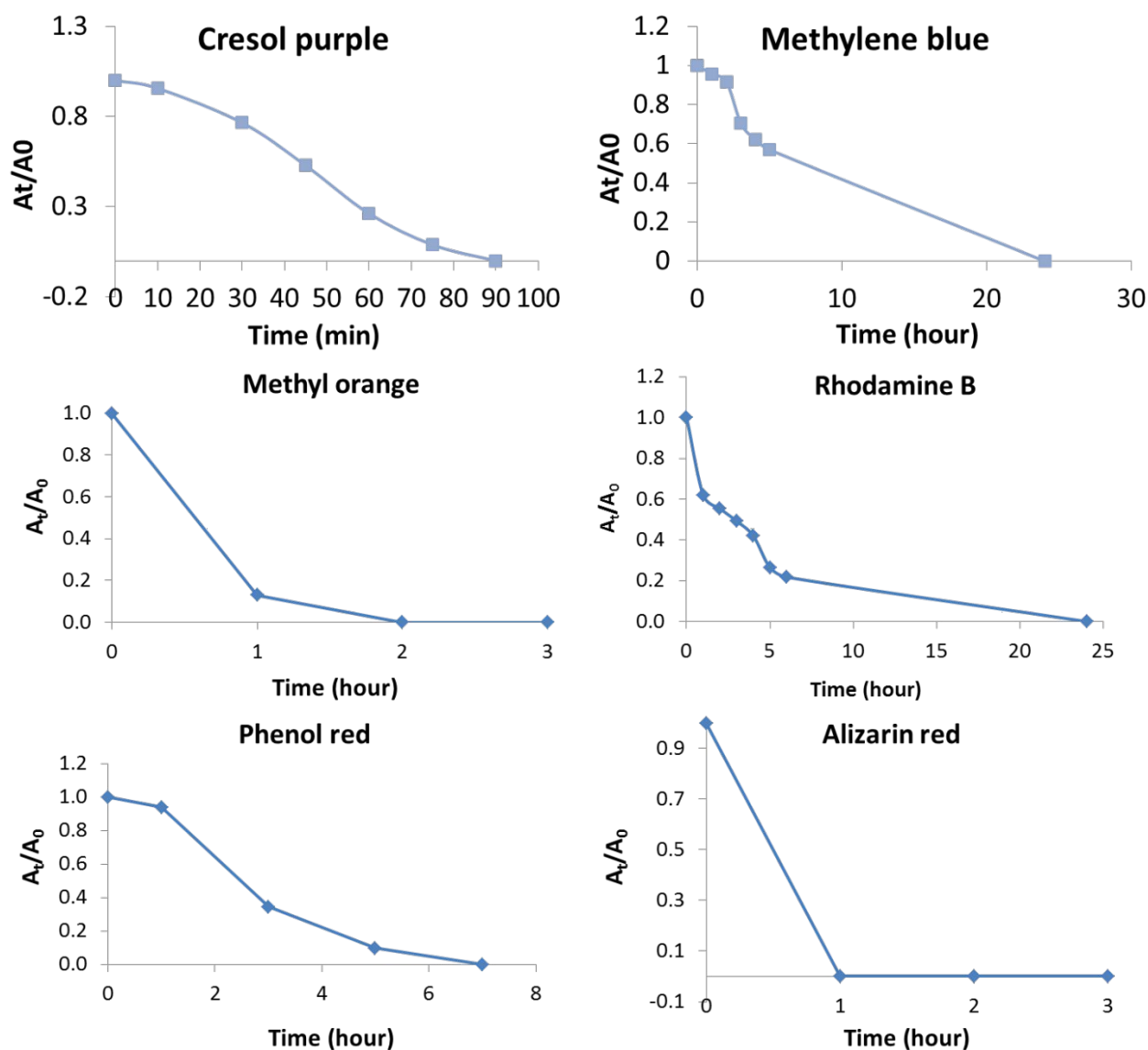
Email: [gsyi@ibn.a-star.edu.sg](mailto:gsyi@ibn.a-star.edu.sg); [ygzhang@ibn.a-star.edu.sg](mailto:ygzhang@ibn.a-star.edu.sg)



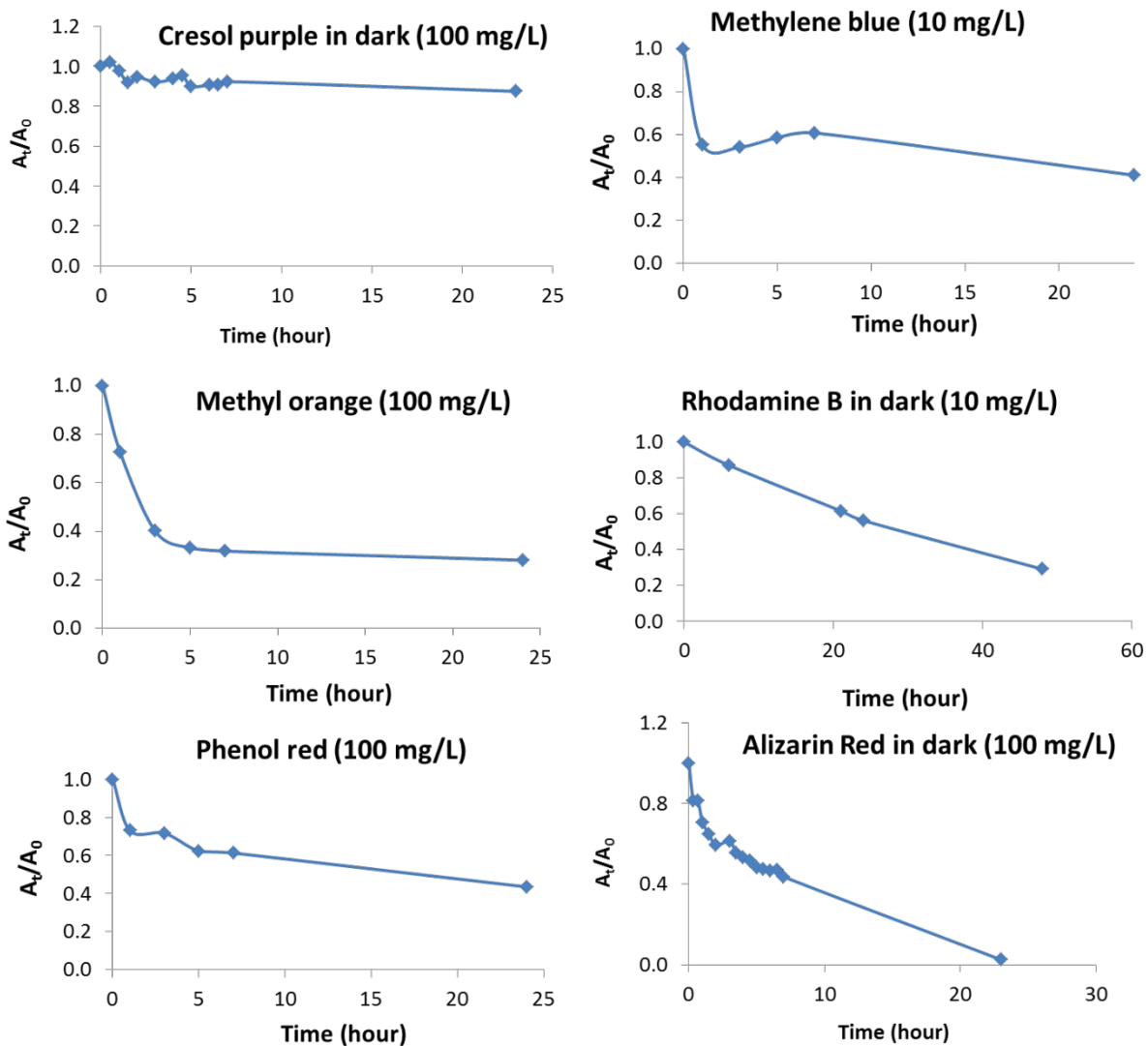
**Figure S1:** (a) SEM images and (b) TEM image of ZnO nanocrystal coated zinc particles. (c) HRTEM image of a ZnO pillar on Zn/ZnO core-shell particles.



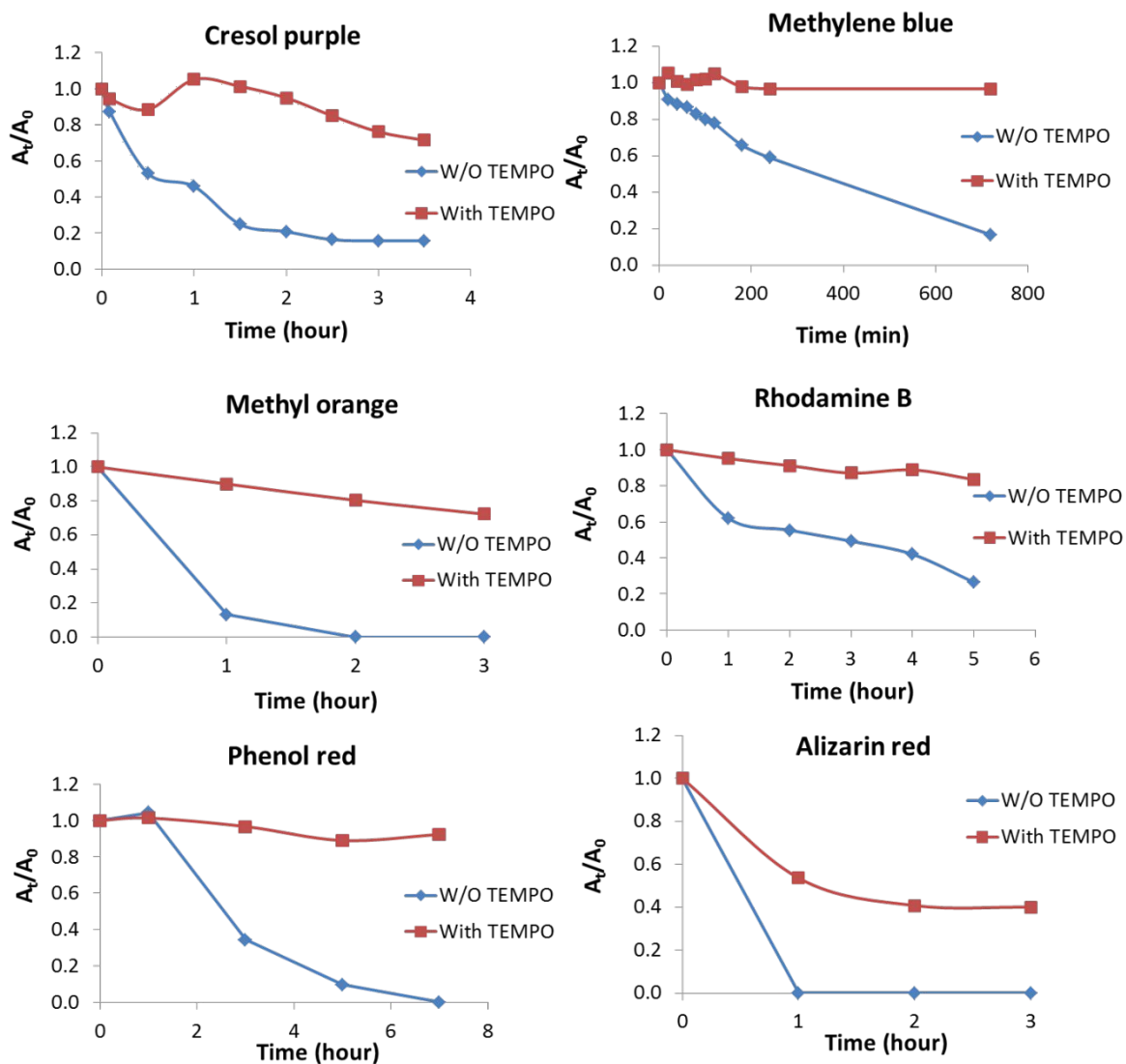
**Figure S2:** 10 ml 1000 mg.L<sup>-1</sup> NBT in water with 0.2 g Zn/ZnO. The absorption peak NBT continue to decrease, and come to zero at 24 h, indicating the continuous generation of  $\cdot\text{O}_2^-$  by Zn/ZnO and react with NBT. NBT = Nitroblue tetrazolium.



**Figure S3:** Dye degradation experiments under room light. Conditions: 100 ml 10 mg.L<sup>-1</sup> dyes in water (methylene blue and rhodamine B: 1 mg.L<sup>-1</sup>), with 0.2 g Zn/ZnO. The experiments were conducted under room light with magnetic stir at 1000 rpm at room temperature.



**Figure S4.** Degradation profiles of high concentrations of dye. Reaction conditions: Zn/ZnO, 0.2 g; dye: 100 ml; room temperature in the dark under magnetic stir at 1000rpm.



**Figure S5.**  $\cdot\text{O}_2^-$  scavenger quenching experiments. 5 mM of TEMPO was added to each the solution, and dye solution without TEMPO was used as positive control. Conditions: 100 ml  $10 \text{ mg.L}^{-1}$  dyes in water (methylene blue and rhodamine B:  $1 \text{ mg.L}^{-1}$ ), with 0.2 g catalyst. The experiments were conducted in dark under magnetic stir at 1000 rpm at room temperature.

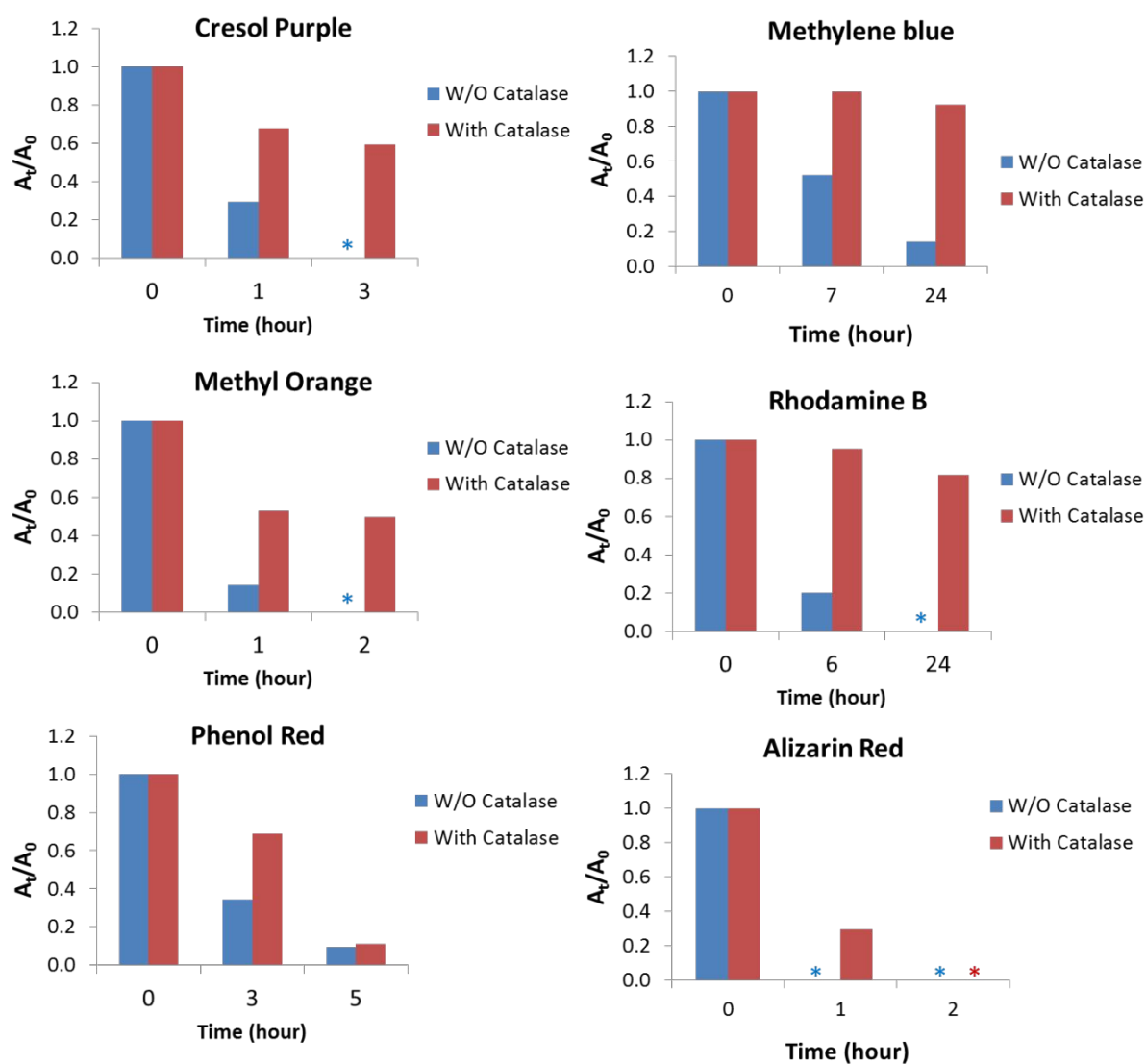


Figure S6.  $\text{H}_2\text{O}_2$  scavenger quenching experiments.  $1 \text{ mg.L}^{-1}$  of catalase was added to the solution except Alizarin ( $0.1 \text{ mg.L}^{-1}$ ), as the absorption peak of Alizarin will be overwhelmed by absorption peak of catalase. \* indicates no signal was detected. Conditions: 100 ml  $10 \text{ mg.L}^{-1}$  dyes in water (methylene blue and rhodamine B:  $1 \text{ mg.L}^{-1}$ ), with  $0.2 \text{ g}$  catalyst. The experiments were conducted in dark under magnetic stir at  $1000 \text{ rpm}$  at room temperature.

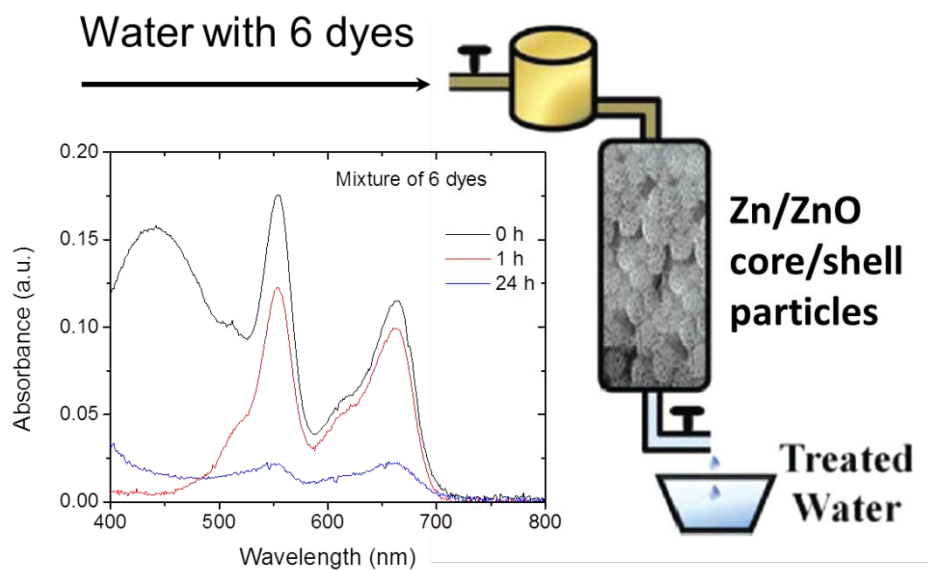


Figure S7. Degradation of a mixture of 6 dyes in a column filled with Zn/ZnO particles. Conditions: 100 ml of water containing 6 dyes was pumped through a column in dark. Conditions: dye concentration:  $1 \text{ mg.L}^{-1}$ , flow rate:  $20 \text{ ml.min}^{-1}$ , a column filled with 1 g Zn/ZnO was used for the experiment.