

Supporting information for

**Gold nanorod@iron oxide core-shell heterostructurs: synthesis,
characterization, and photocatalytic performance**

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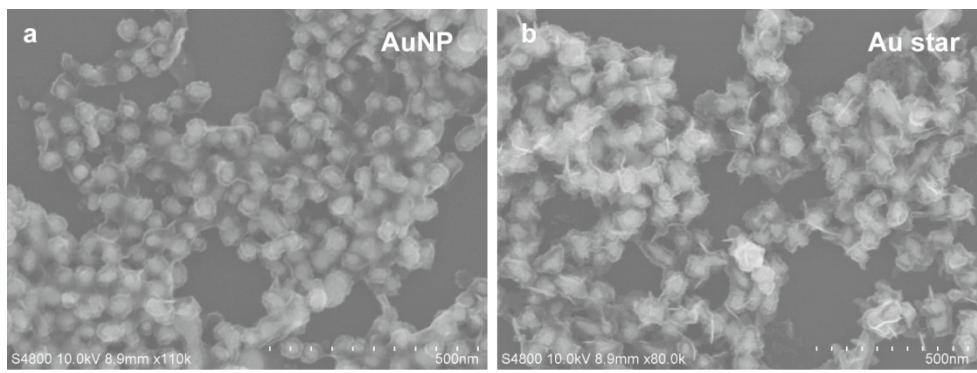


Fig. S1. Coating of Fe_2O_3 on other CTAB-capped nanostructures.

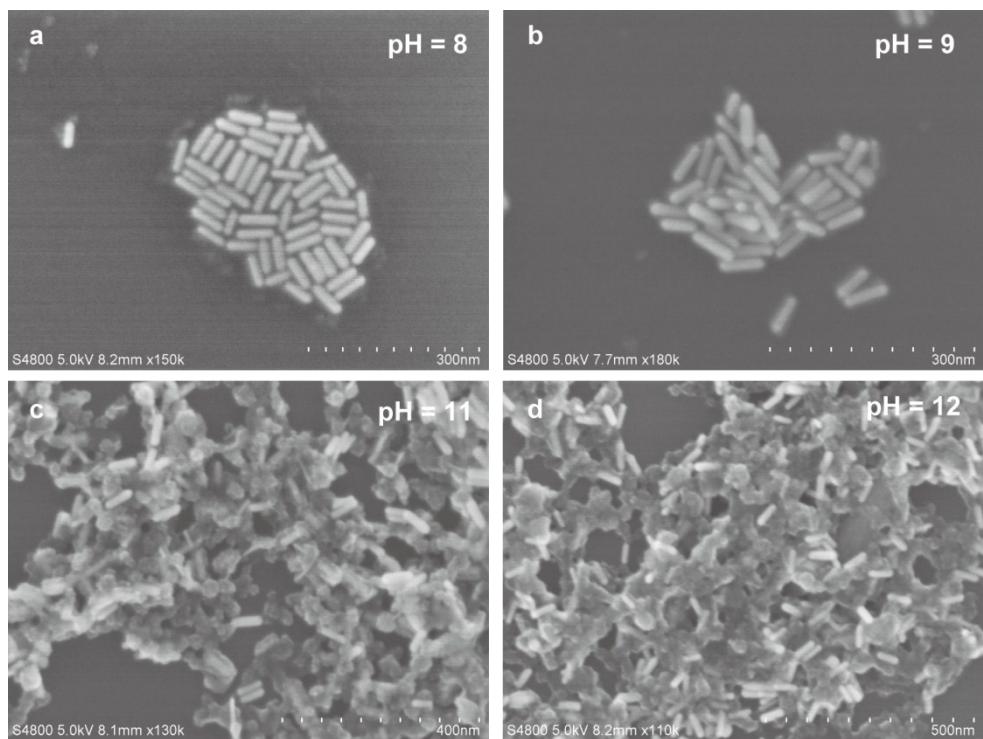


Fig. S2. (a-d) SEM images of AuNR@Fe₂O₃ nanostructures synthesized at various pHs of 8, 9, 11, and 12, respectively. The CTAB concentration is controlled at 0.2 mM.

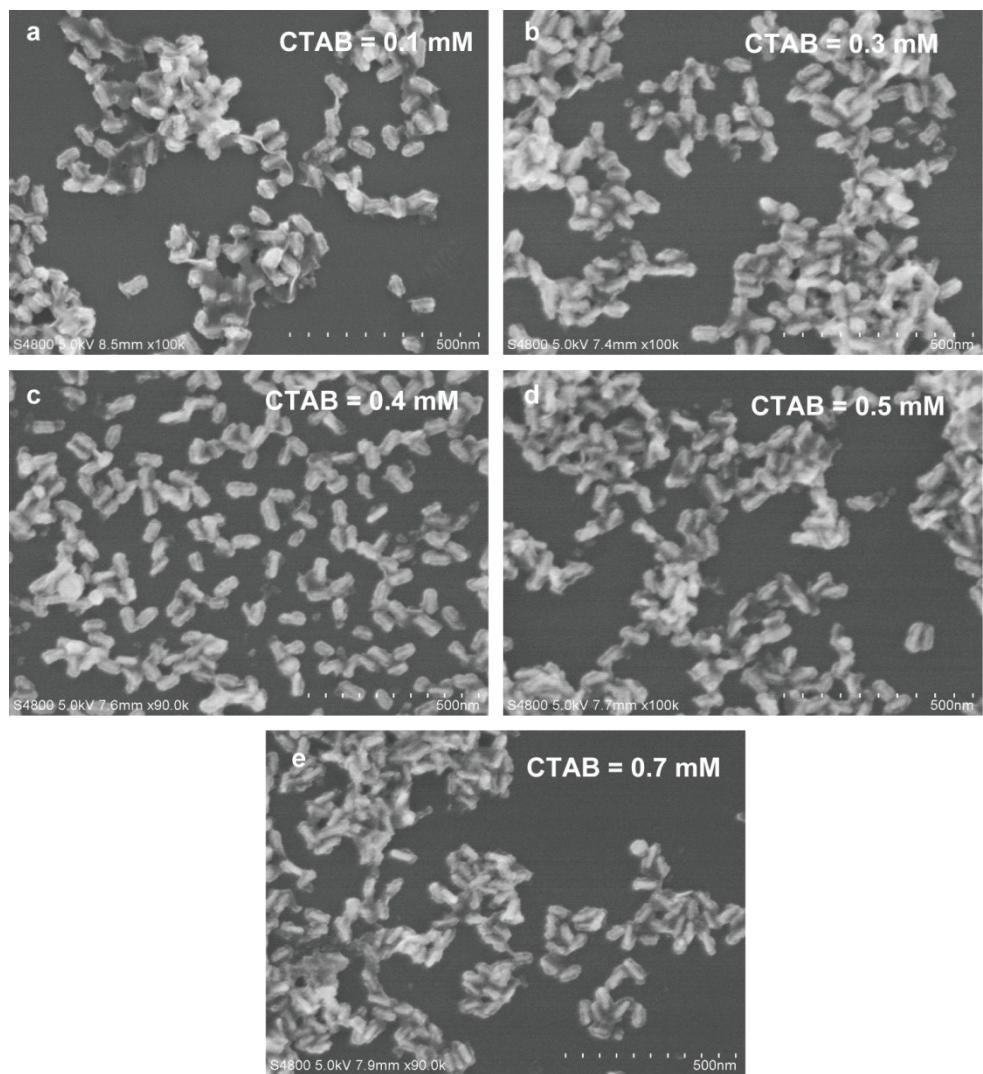


Fig. S3. (a–e) SEM images of AuNR@Fe₂O₃ nanostructures synthesized at various CTAB concentrations of 0.1, 0.3, 0.4, 0.5, and 0.7 mM, respectively. The pH is controlled at 10.

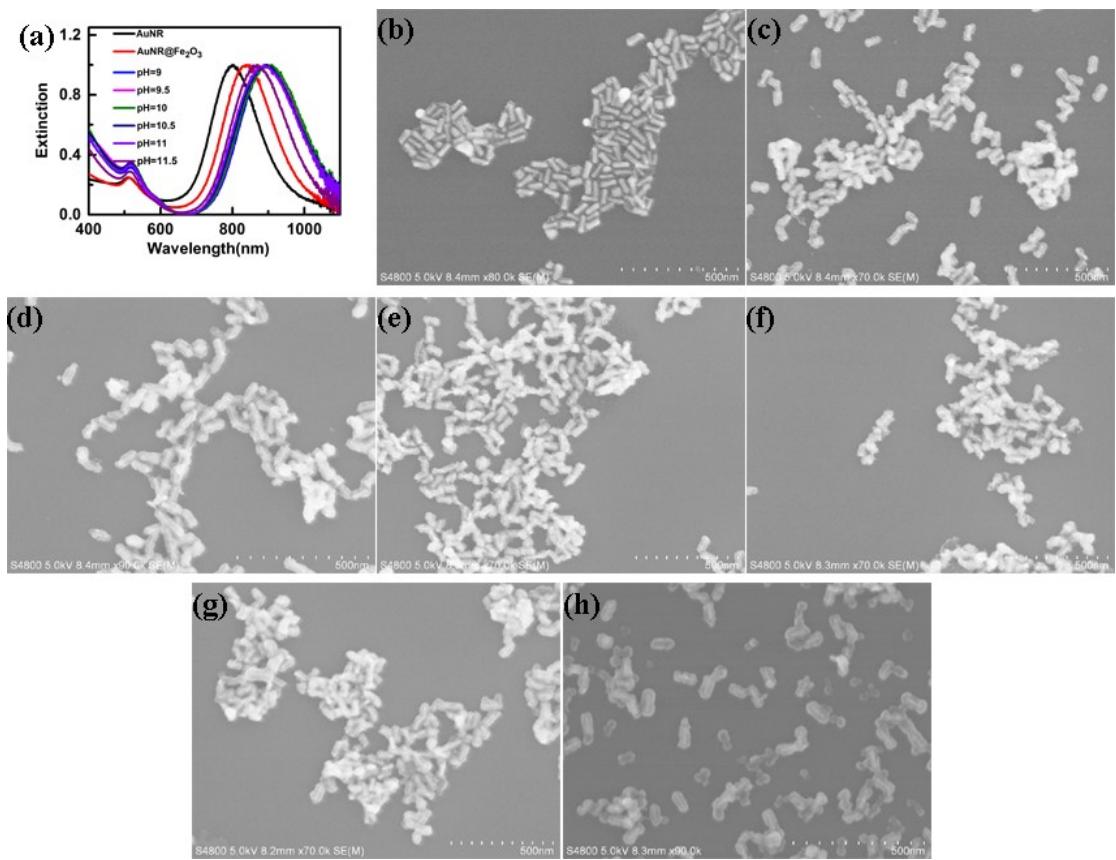


Fig. S4. (a) Normalized extinction spectra recording the encapsulation of Fe_3O_4 on the surface of AuNR@ Fe_2O_3 nanostructures at various pH values. The CTAB concentration is controlled at 0.3 mM. (b) The SEM image of AuNR@ Fe_2O_3 nanostructures. (c-h) Corresponding SEM images of resultant AuNR@ Fe_2O_3 @ Fe_3O_4 nanostructures synthesized at pH values of 9, 9.5, 10, 10.5, 11, and 11.5, respectively.

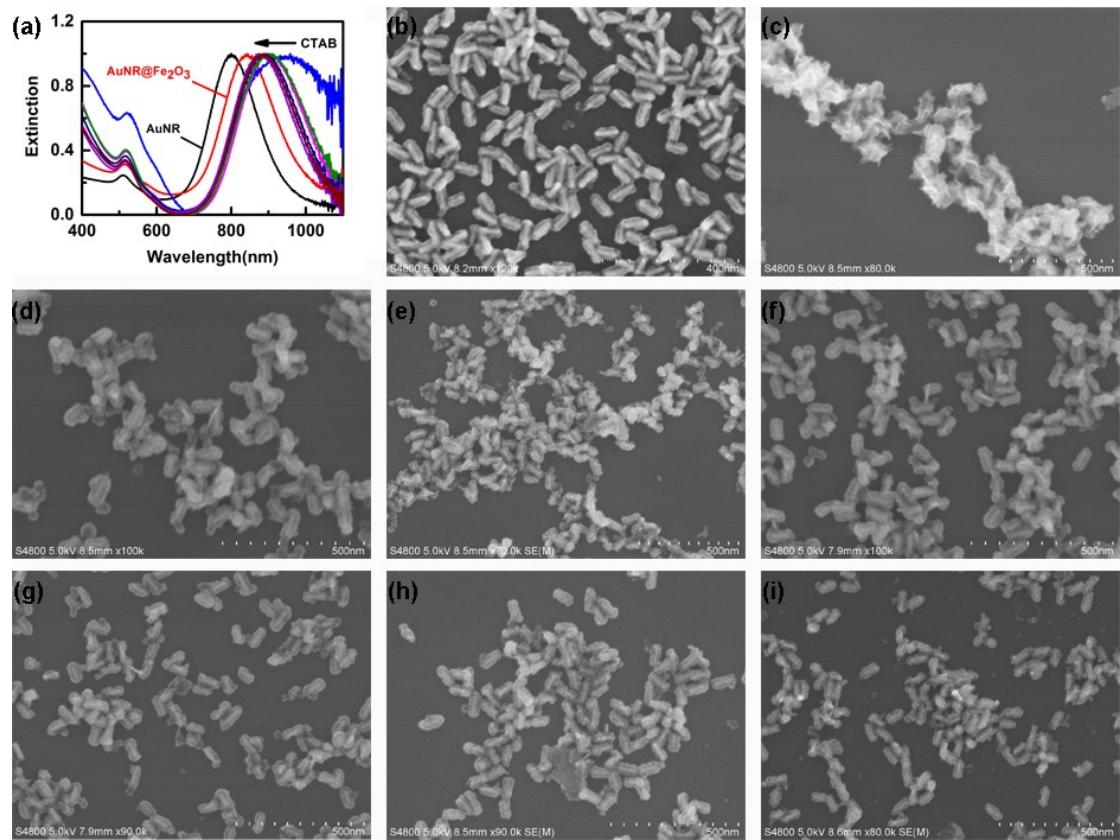


Fig. S5. (a) Normalized extinction spectra recording the encapsulation of Fe_3O_4 on the surface of AuNR@ Fe_2O_3 nanostructures at various CTAB concentrations. The pH is controlled at 10.5. (b) The SEM image of AuNR@ Fe_2O_3 nanostructures. (c–i) Corresponding SEM images of resultant AuNR@ Fe_2O_3 @ Fe_3O_4 nanostructures synthesized at CTAB concentrations of 0.25, 0.3, 0.4, 0.5, 0.7, 1, and 2 mM, respectively.

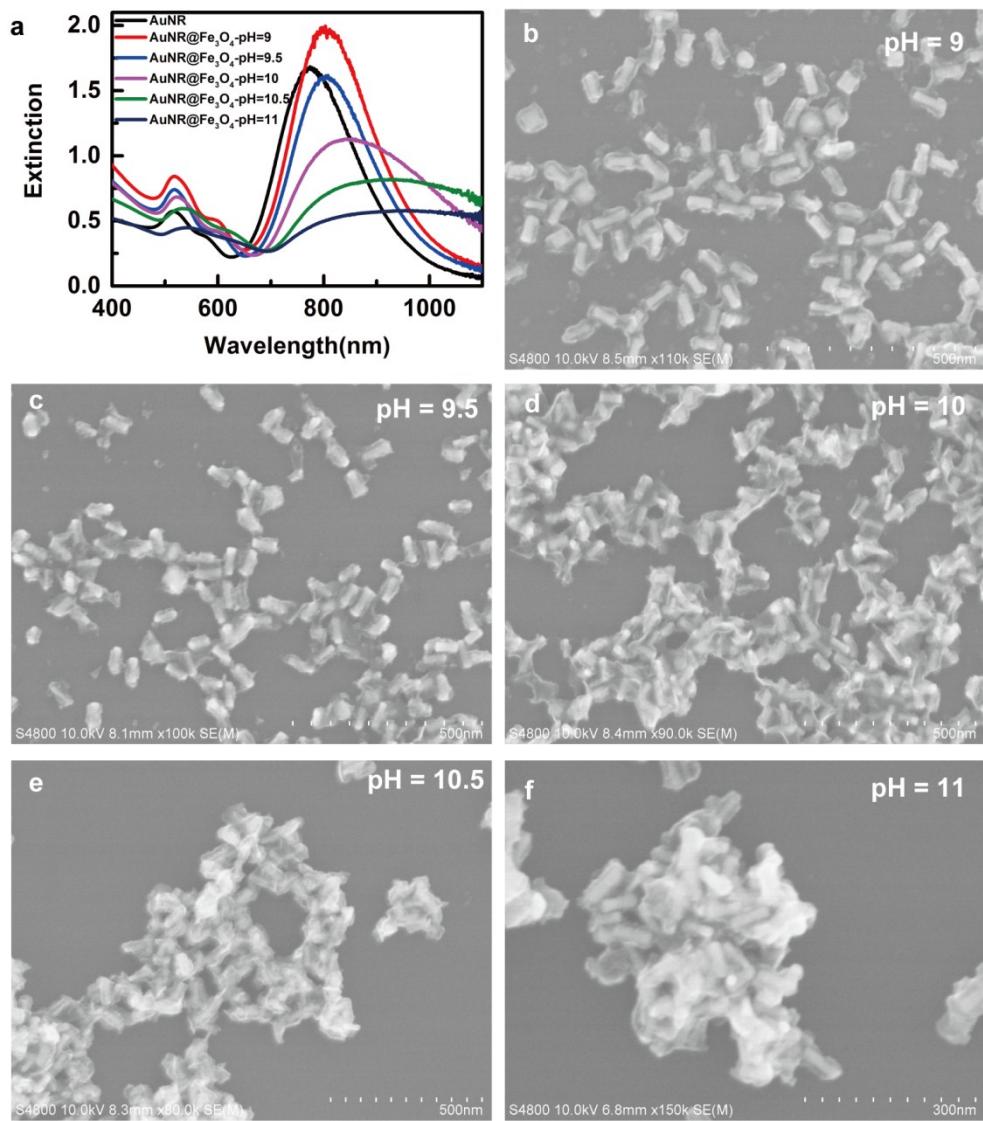


Fig. S6. (a) Extinction spectra recording the encapsulation of Fe₃O₄ on the surface of AuNRs at various pH values. The CTAB concentration is controlled at 0.15 mM. (b–f) Corresponding SEM images of resultant AuNR@Fe₃O₄ nanostructures synthesized at pH values of 9, 9.5, 10, 10.5, and 11, respectively.

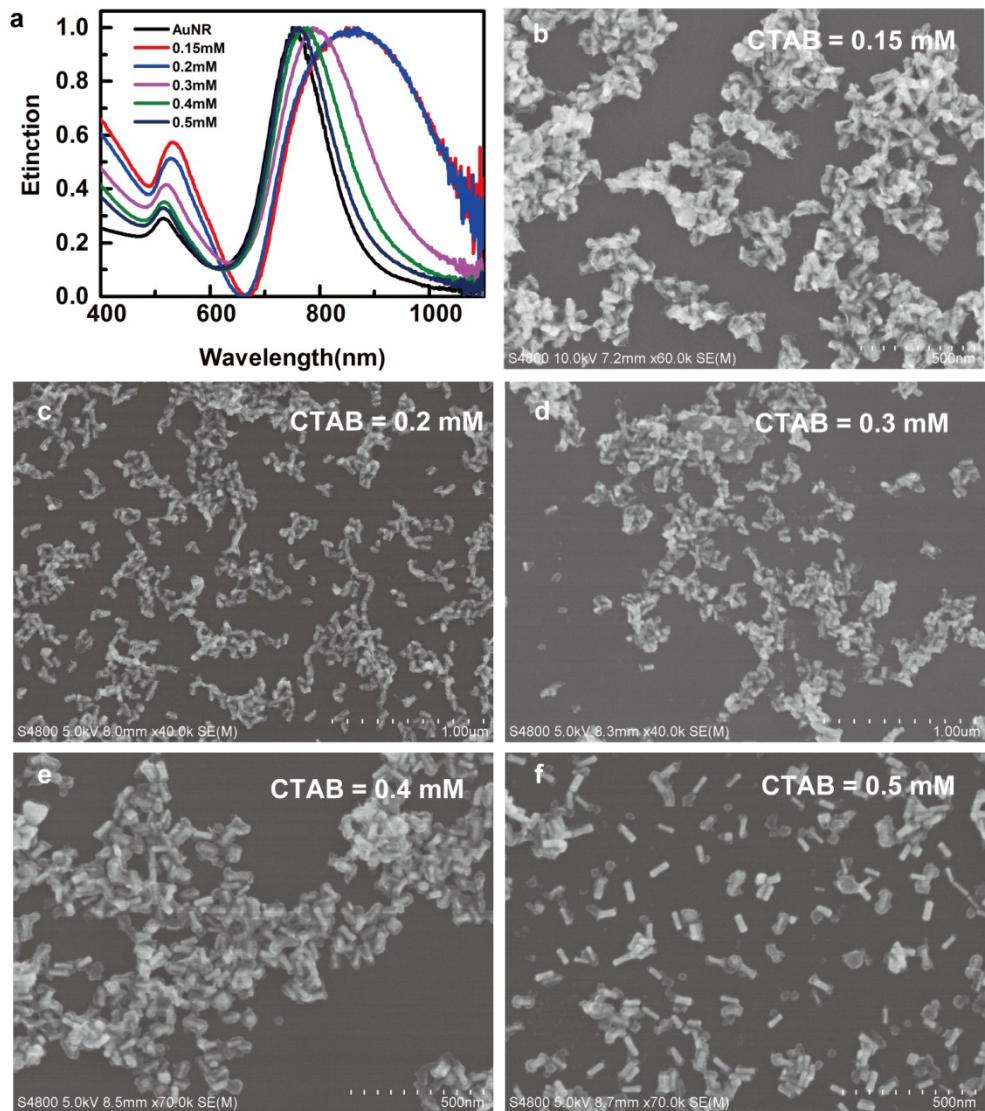


Fig. S7. (a) Normalized extinction spectra recording the encapsulation of Fe₃O₄ on the surface of AuNRs at various CTAB concentrations. The pH is controlled at 11. (b–f) Corresponding SEM images of resultant AuNR@Fe₃O₄ nanostructures synthesized at CTAB concentrations of 0.15, 0.2, 0.3, 0.4, and 0.5 mM, respectively.

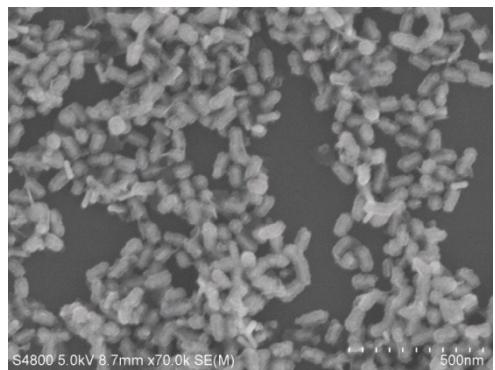


Fig. S8. The SEM image of AuNR@Fe₂O₃ nanostructures synthesized by adding 300 μ L of Fe(acac)₃.

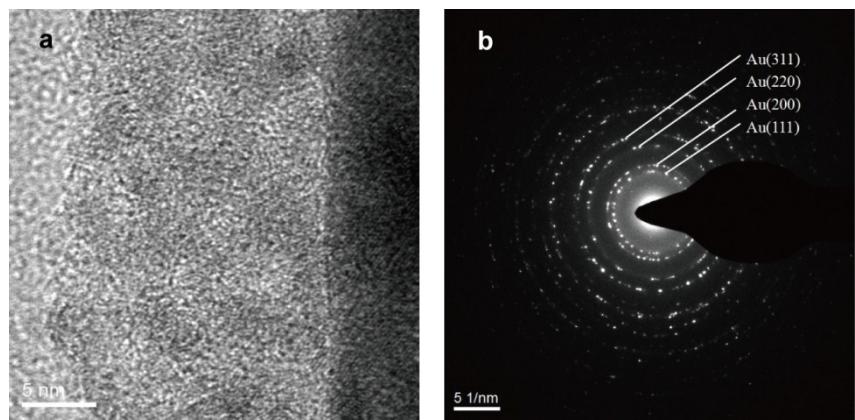


Fig. S9. (a) HRTEM image of the as-prepared $\text{AuNR}@\text{Fe}_3\text{O}_4$ nanostructure. (b) SEAD pattern with diffraction rings indexed.

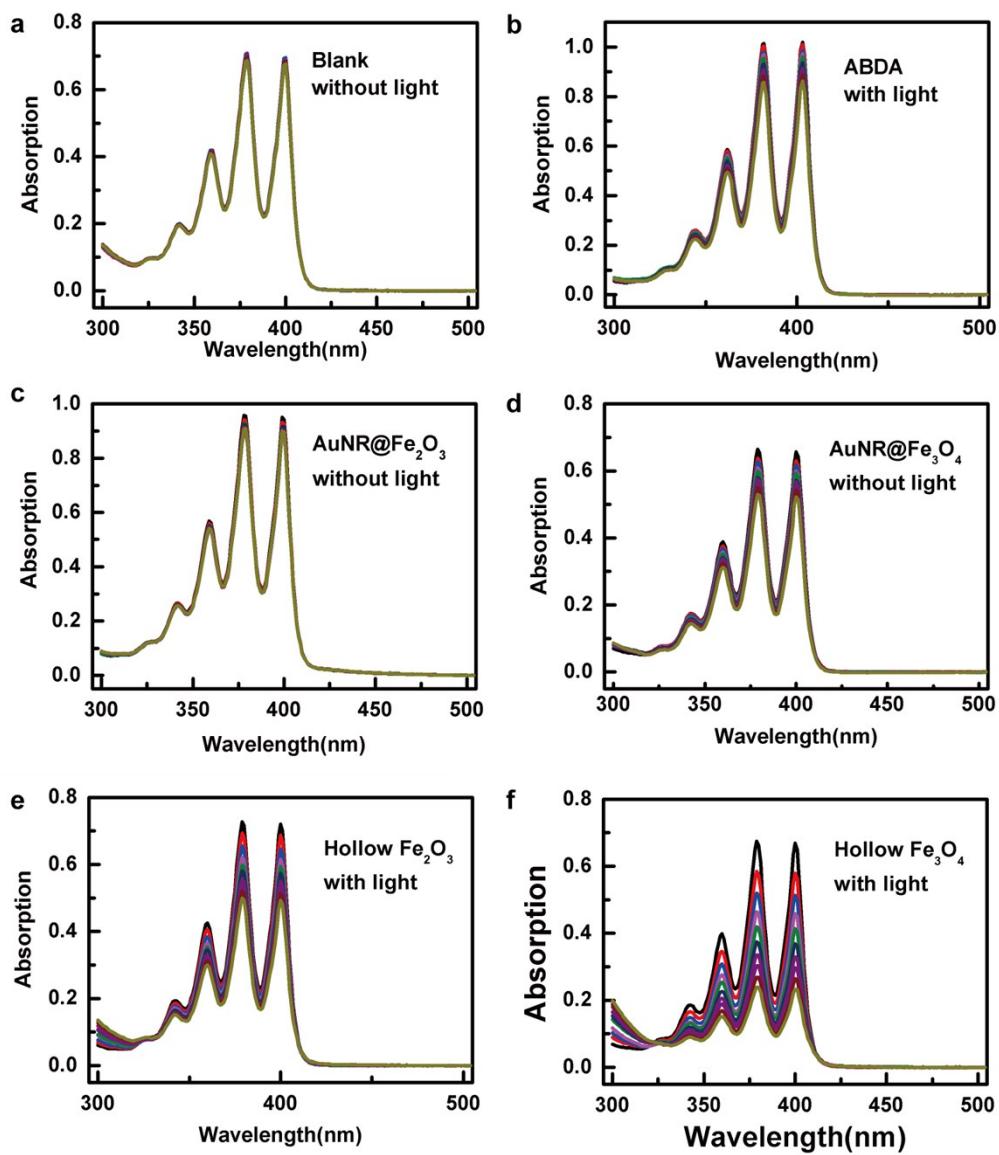


Fig. S10. Evolution of the ABDA absorption spectra of the reference samples.

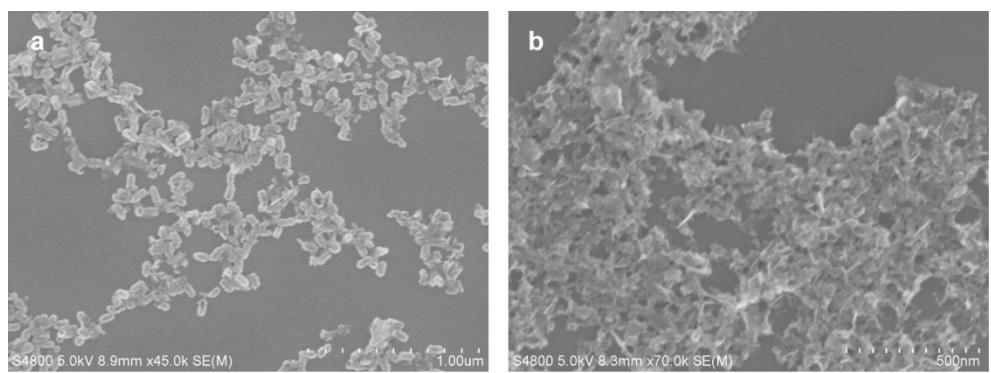


Fig. S11. (a) The SEM image of hollow Fe_2O_3 nanostructures. (b) That of hollow Fe_3O_4 nanostructures.