

**Supporting Information for**  
**CuFe<sub>2</sub>O<sub>4</sub>@PDA Magnetic Nanomaterials with Core-shell Structure: Synthesis and Catalytic Application in Degradation of Methylene Blue in Water Solution**

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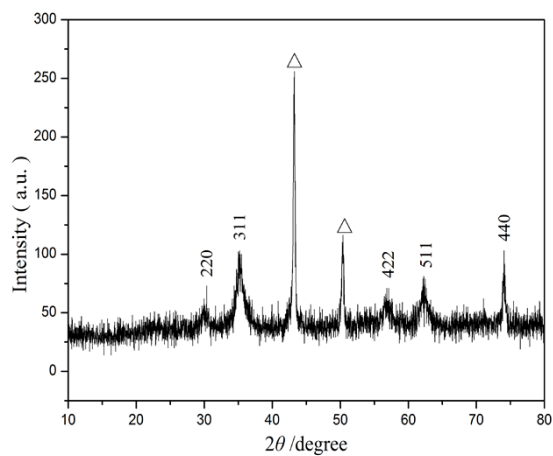
<sup>c</sup> *Key Laboratory of Nonferrous Metal Chemistry and Resources Utilization of Gansu Province, Lanzhou University, Lanzhou, 730000, China*

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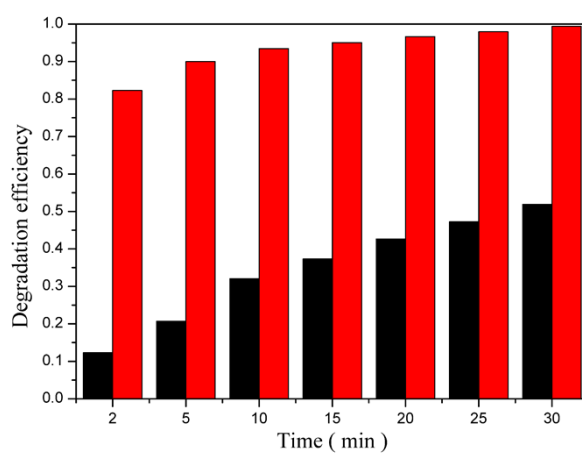
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E-mail address: chenxg@lzu.edu.cn.

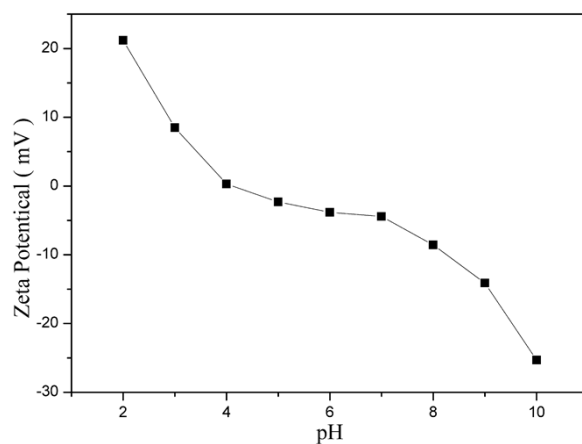
## Supplementary Figures



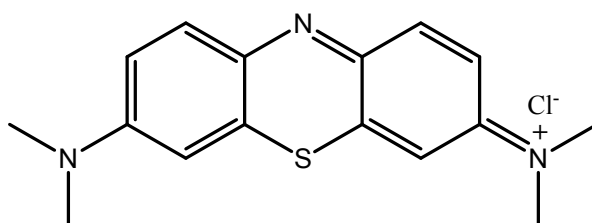
**Fig. S1.** XRD pattern of CuFe<sub>2</sub>O<sub>4</sub> MNPs. Symbols (Δ) represent peaks of Cu.



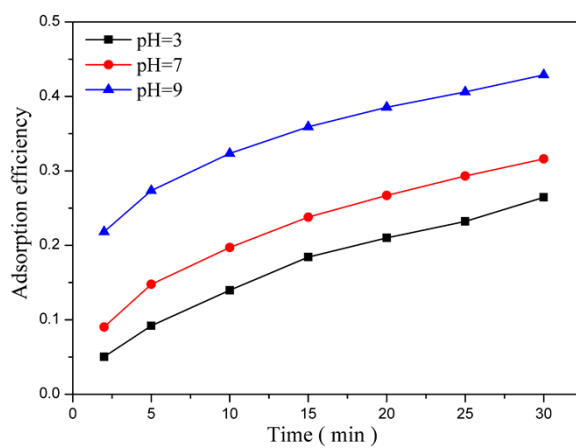
**Fig. S2.** The degradation efficiency of MB with CuFe<sub>2</sub>O<sub>4</sub>@PDA MNPs (red) and CuFe<sub>2</sub>O<sub>4</sub> MNPs (black).



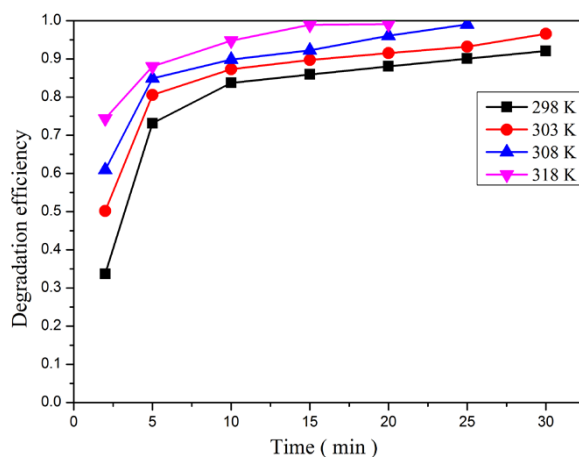
**Fig. S3.** Zeta potentials of CuFe<sub>2</sub>O<sub>4</sub>@PDA MNPs under different pH values.



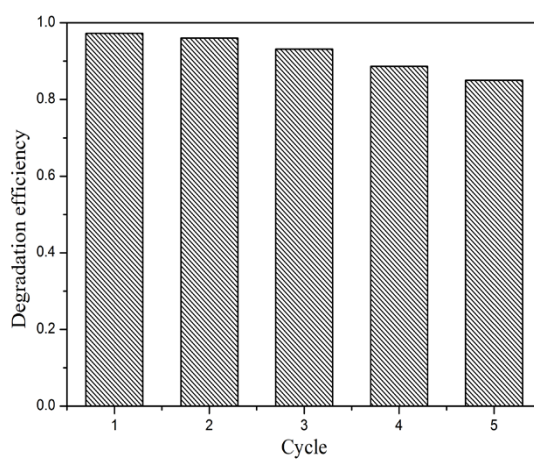
**Fig. S4.** The molecular structure of MB.



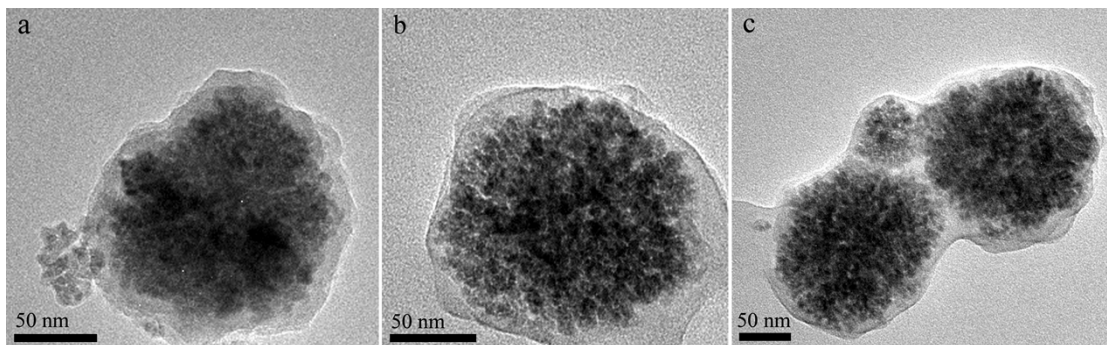
**Fig. S5.** The adsorption efficiency of MB solution by CuFe<sub>2</sub>O<sub>4</sub>@PDA MNPs at pH 3, pH 7, and pH 9.



**Fig. S6.** Degradation of MB in systems of  $\text{H}_2\text{O}_2\text{-CuFe}_2\text{O}_4\text{@PDA}$  MNPs with increasing reaction time at different temperature: 298 K, 303 K, 308 K, 318 K.



**Fig. S7.** Catalytic activity of  $\text{CuFe}_2\text{O}_4\text{@PDA}$  MNPs over various cycles of reutilization using identical reaction conditions.



**Fig. S8.** TEM images of (a)  $\text{CuFe}_2\text{O}_4@\text{PDA}$  MNPs dispersed in aqueous solution for a month, (b)  $\text{CuFe}_2\text{O}_4@\text{PDA}$  MNPs dispersed in acid solution with pH 2 for 24 h, and (c)  $\text{CuFe}_2\text{O}_4@\text{PDA}$  MNPs dispersed in acid solution with pH 3 for 24 h.

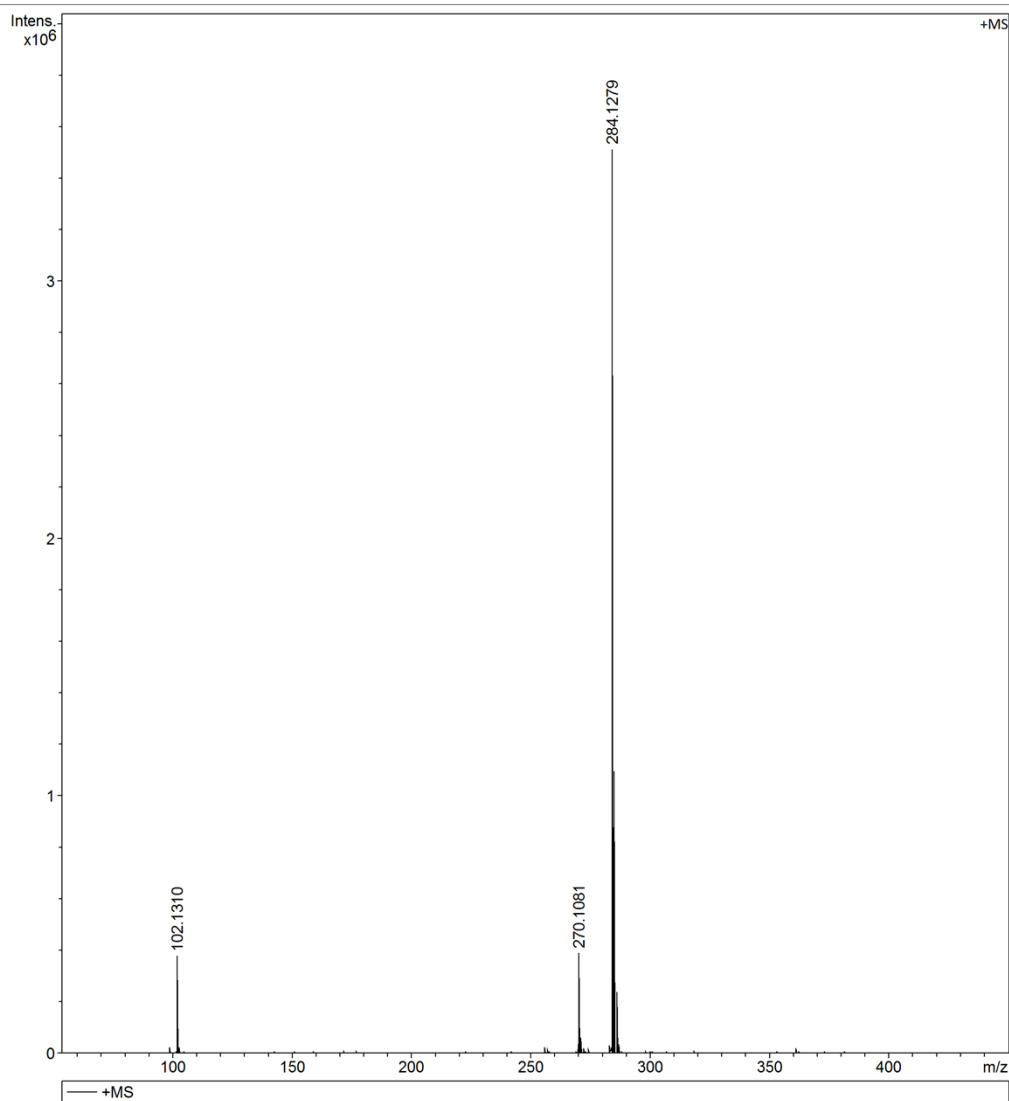
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Sample Name  
Comment

Acquisition Date 1/27/2015 6:53:20 PM

Operator LZU  
Instrument micrOTOF



**Fig. S9.** Mass spectrum of the MB solution.

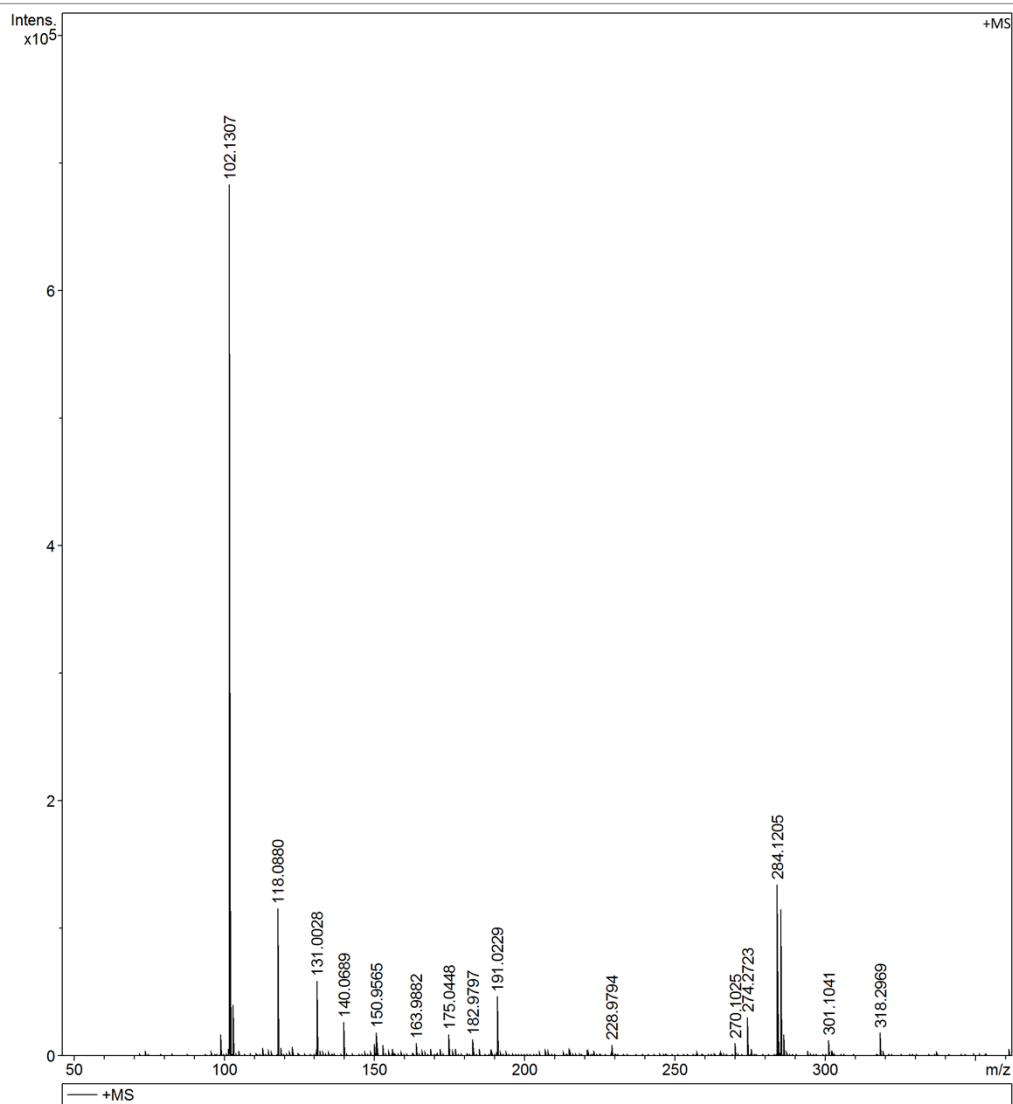
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Operator LZU  
Instrument micrOTOF



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by: LZU

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**Fig. S10.** Mass spectrum of resultant solution after degraded by  $\text{CuFe}_2\text{O}_4@PDA$  MNPs.

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Intermediate

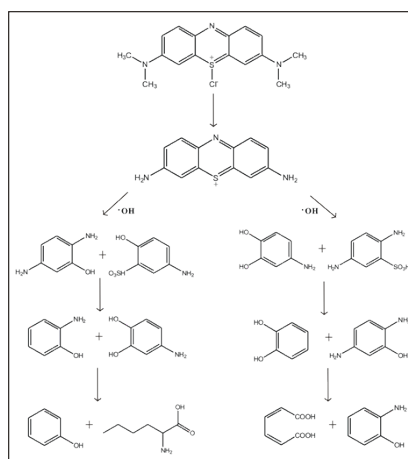
Molecular Weight

Molecular structure

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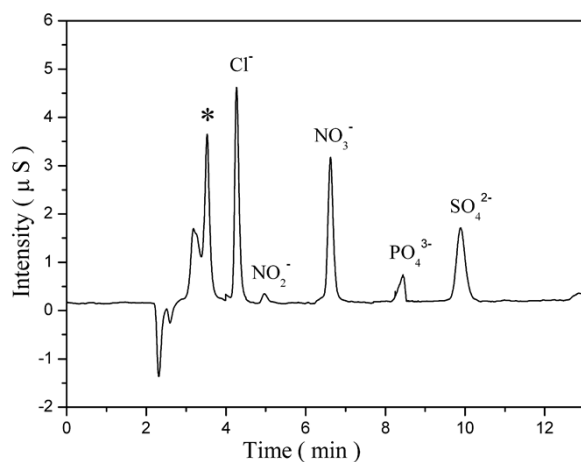
3, 7-diamino-phenothiazine-5-ium	228	
2, 5-diaminobenzenesulfonic acid	188	
DL-Norleucine	131	

Table S1. Data of mass spectral peaks for some fresh intermediates in degradation process.

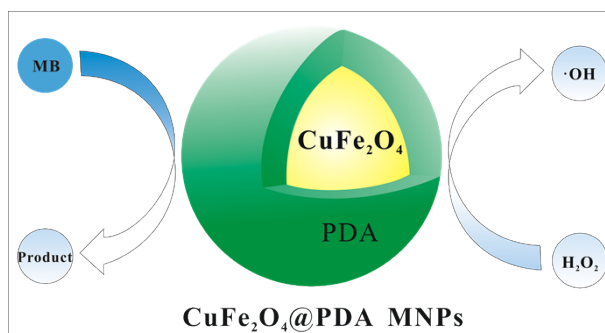


**Fig. S11.** Proposed generation pathway of some fresh intermediates were detected in mass spectrum.

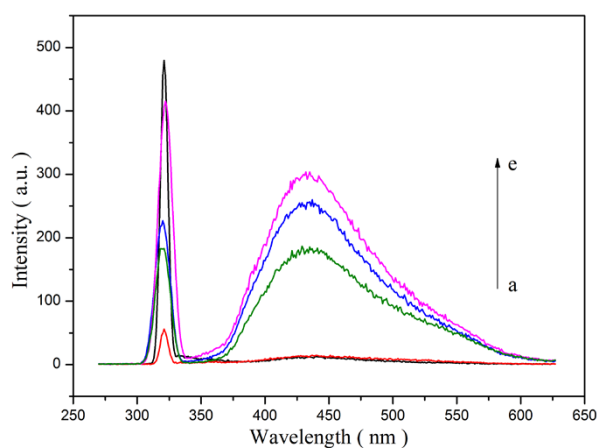




**Fig. S12.** Ion chromatography spectra of resultant solution after degraded by CuFe<sub>2</sub>O<sub>4</sub>@PDA MNPs. \*, is still not clear, may be organic acids. PO<sub>4</sub><sup>3-</sup> derives from the impurity of H<sub>2</sub>O<sub>2</sub> solution.



**Fig. S13.** Feasible mechanism of MB degradation on CuFe<sub>2</sub>O<sub>4</sub>@PDA MNPs at the existence of H<sub>2</sub>O<sub>2</sub>.



**Fig. S14.** The effect of  $\text{CuFe}_2\text{O}_4@\text{PDA}$  MNPs on the formation of hydroxyl radical with terephthalic acid as a fluorescence probe. (a)  $0.2 \text{ mg mL}^{-1}$   $\text{CuFe}_2\text{O}_4@\text{PDA}$  MNPs, without  $\text{H}_2\text{O}_2$ ; (b-e) 0, 0.2, 1, and  $2 \text{ mg mL}^{-1}$   $\text{CuFe}_2\text{O}_4@\text{PDA}$  MNPs,  $500 \text{ mM H}_2\text{O}_2$ . Reaction conditions:  $0.625 \text{ mM}$  terephthalic acid and different solutions were incubated in ultrapure water (pH 6.0) at  $30^\circ\text{C}$  for 1 h.