

## Supplementary information

### **Au-Ultrathin Functionalized Core-Shell (Fe<sub>3</sub>O<sub>4</sub>@Au) Monodispersed Nanocubes for Combination of Magnetic/Plasmonic Photothermal Cancer Cell Killing**

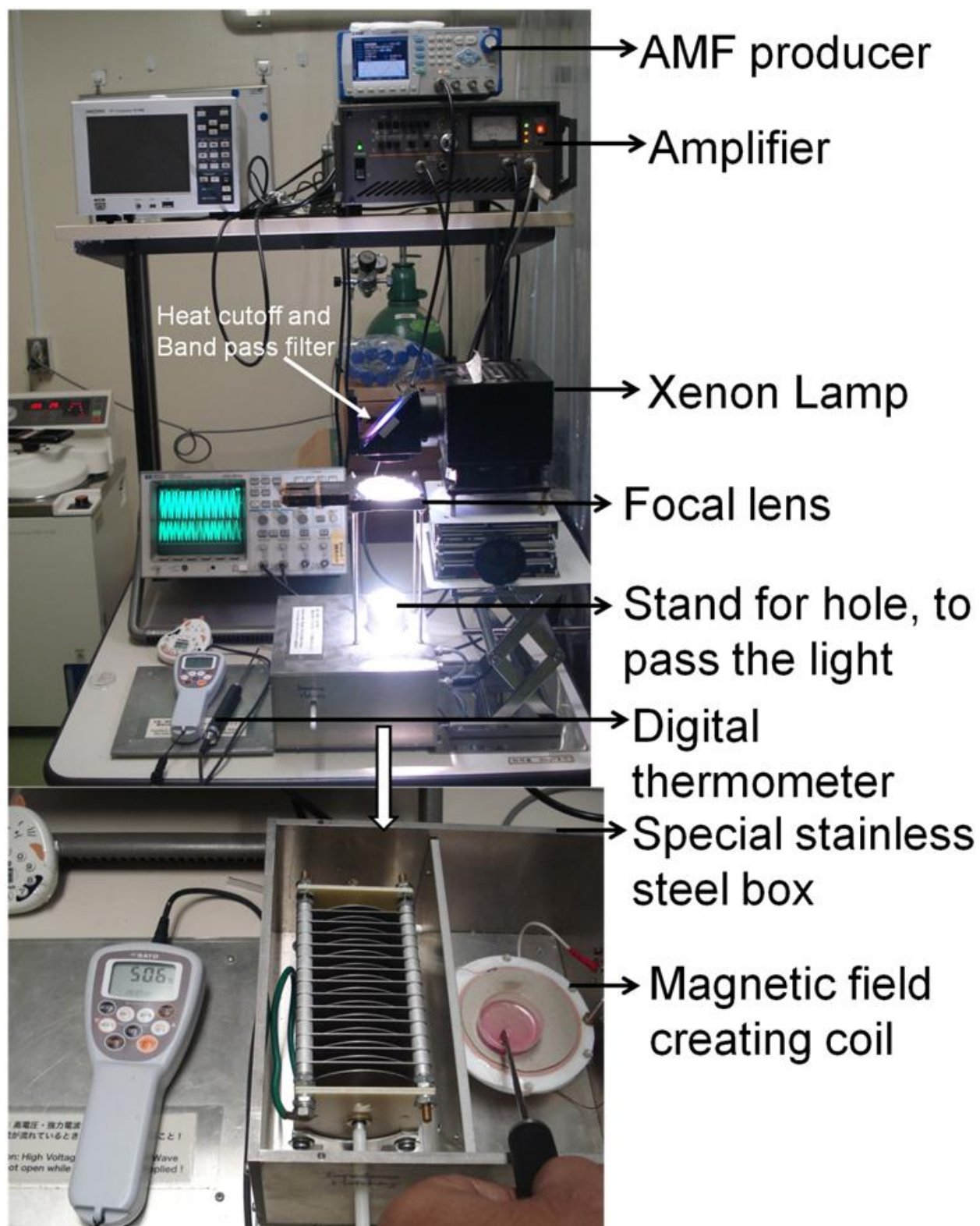
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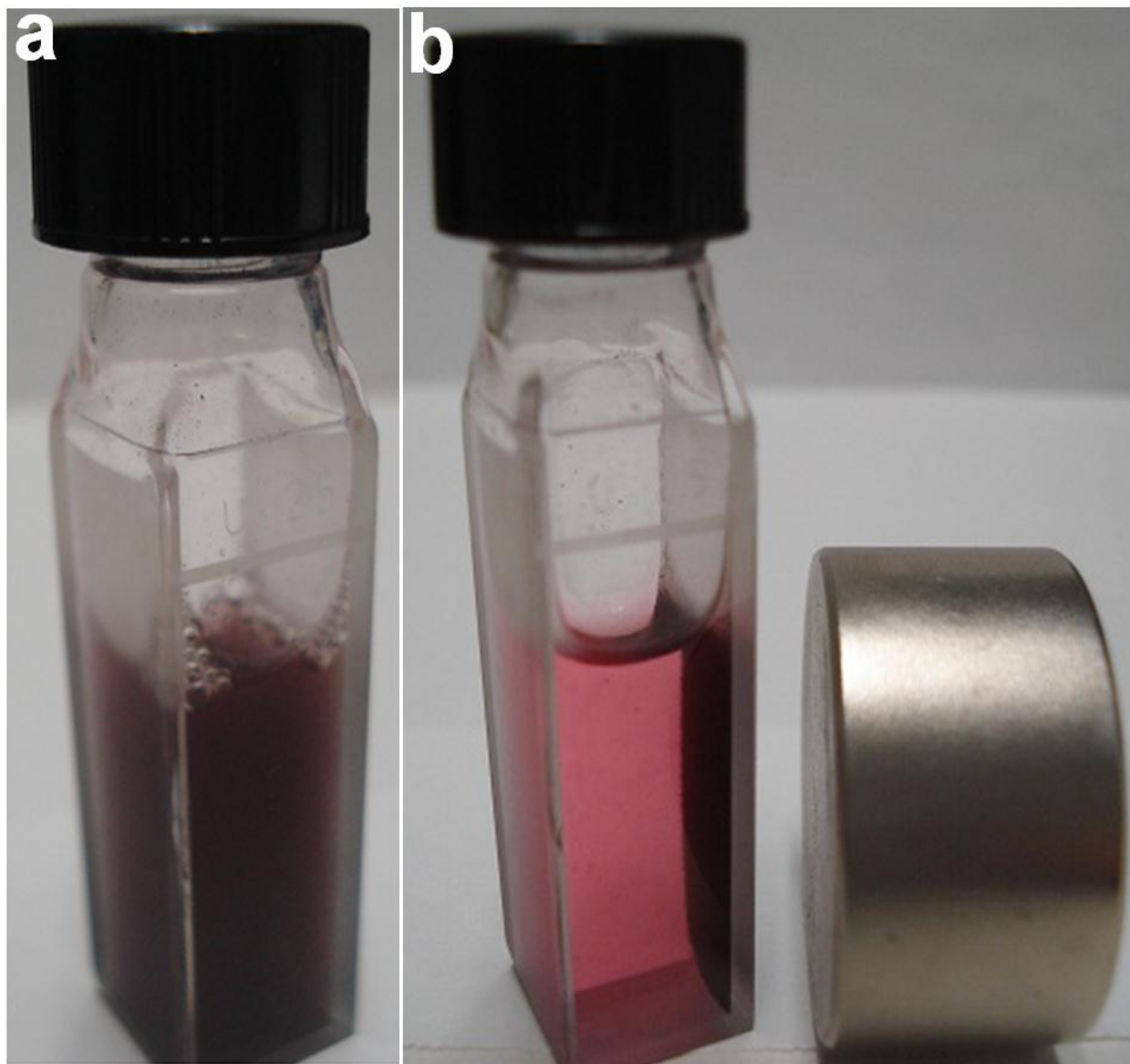
<sup>b</sup> Department of Leather Engineering, Faculty of Mechanical Engineering, Khulna University of Engineering and Technology, Khulna-9203, Bangladesh

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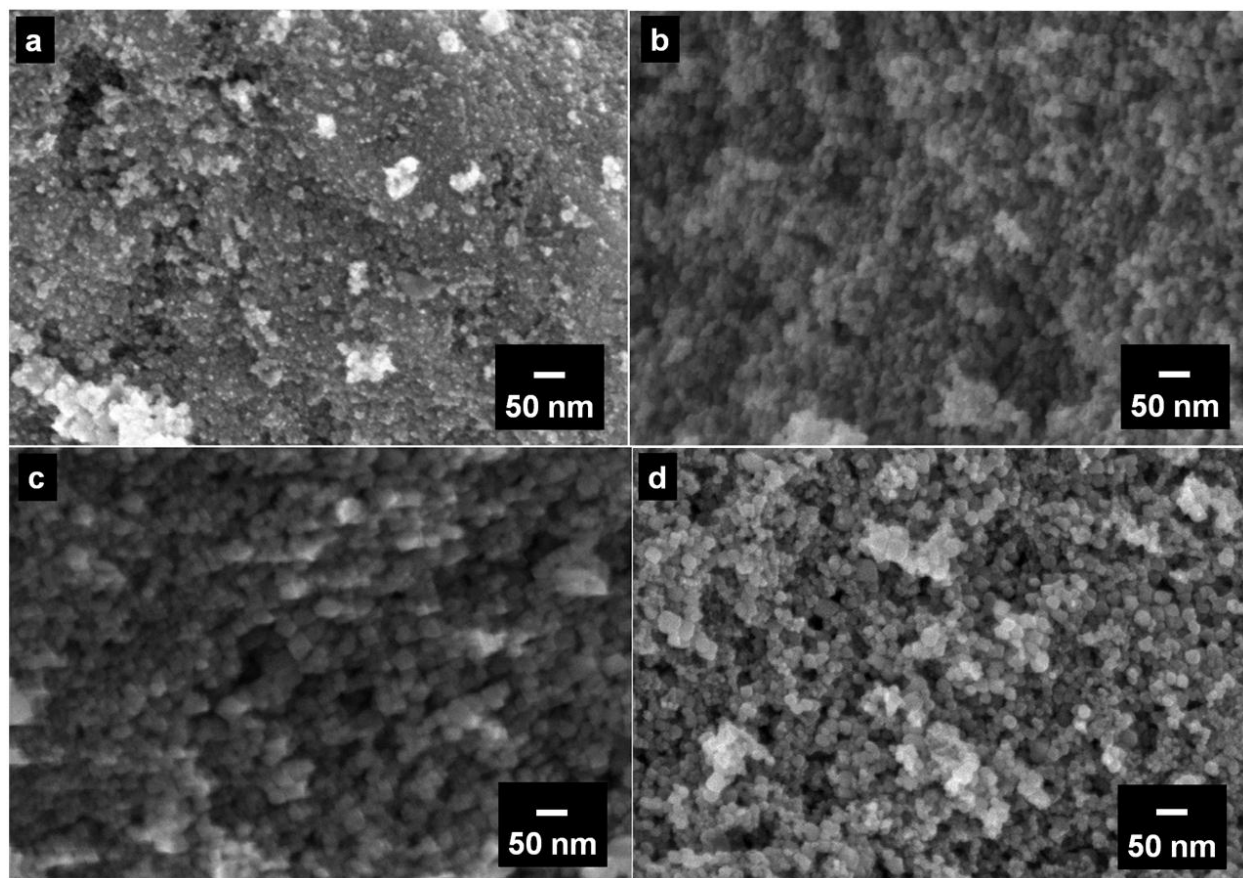
\*E-mail: [kusumoto@sci.kagoshima-u.ac.jp](mailto:kusumoto@sci.kagoshima-u.ac.jp), [k0790803@kadai.jp](mailto:k0790803@kadai.jp)



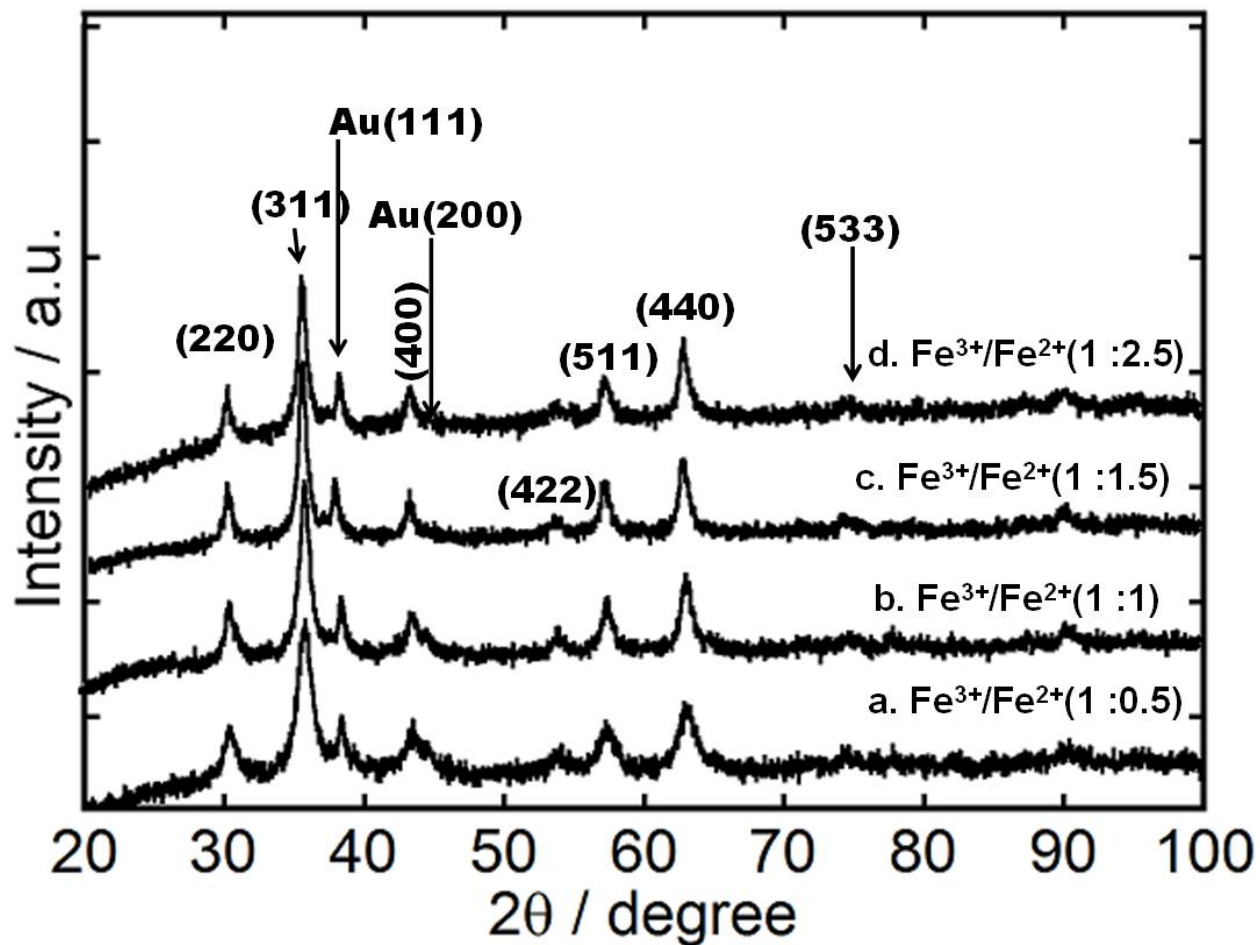
**Fig. S1.** Experimental arrangement of alternating current (AC) magnetic field and photoradiation induced hyperthermia-photothermal cancer cell killing.



**Fig. S2.** Photographs of MEM media containing  $\text{Fe}_3\text{O}_4@Au$  nanocubes dispersed in a vial in the (a) absence and (b) presence of a magnetic field.

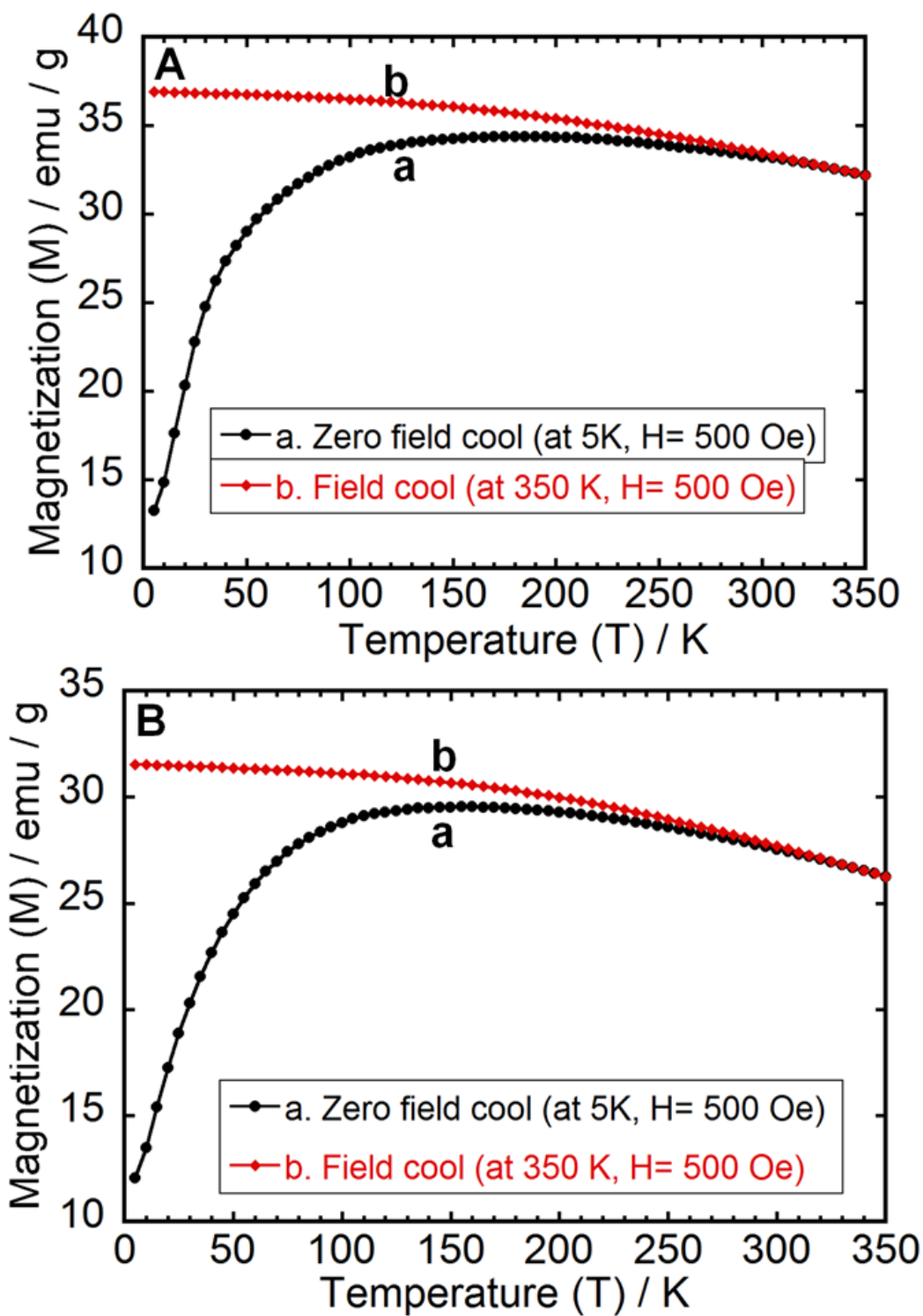


**Fig. S3.** Morphological evolution of the Fe<sub>3</sub>O<sub>4</sub>@Au nanocubes synthesized with different molar ratios as revealed by SEM images of the products prepared at Fe<sup>3+</sup> : Fe<sup>2+</sup> molar ratios of (a) 1: 0.5, (b) 1: 1, (c) 1: 1.5, and (d) 1: 2.5.

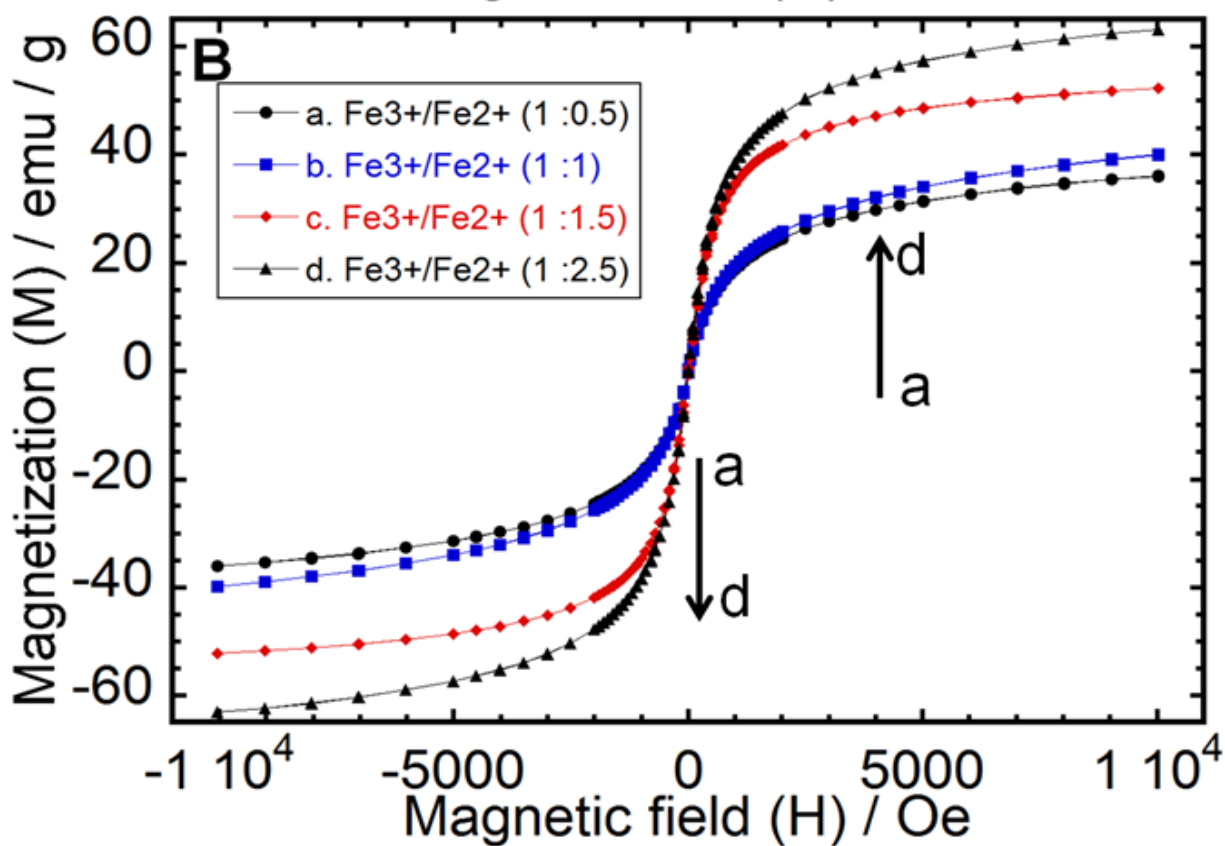
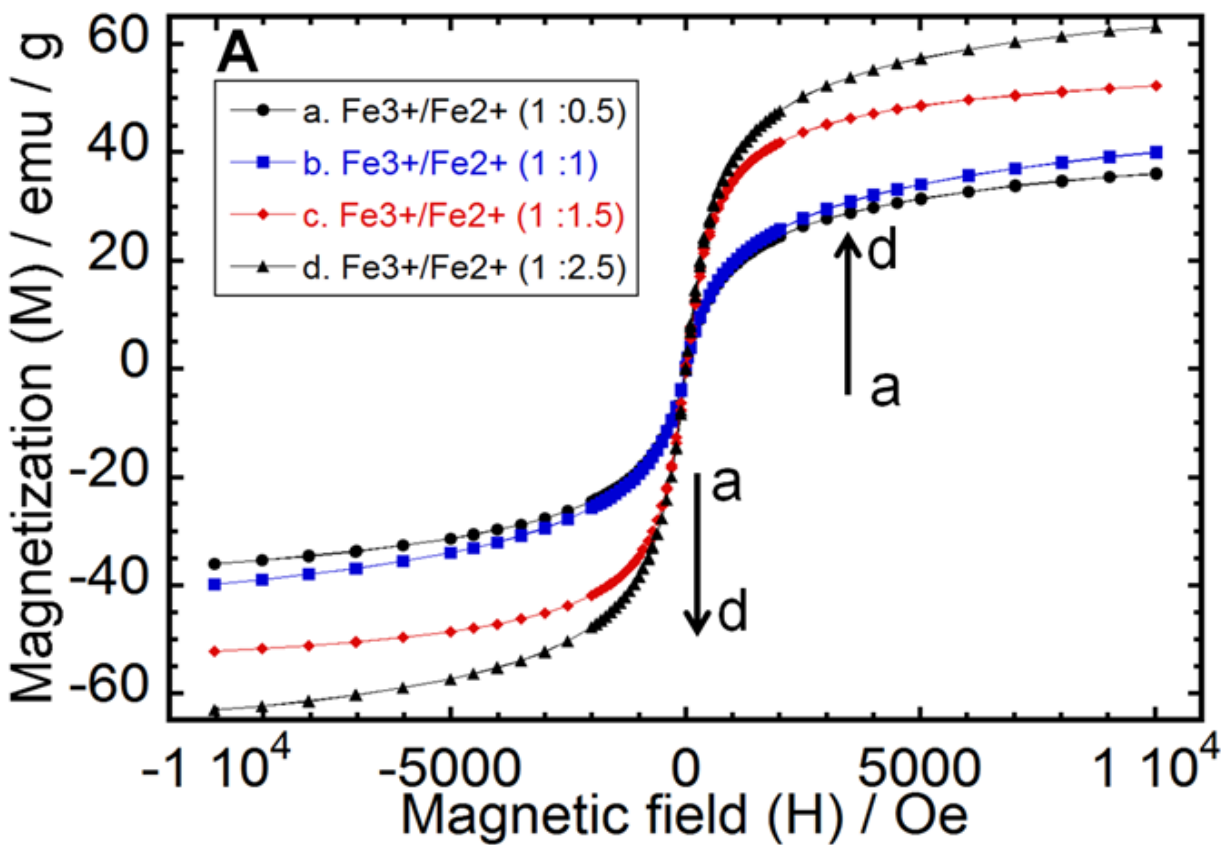


**Fig. S4.** X-ray diffraction patterns of Fe<sub>3</sub>O<sub>4</sub>@Au nanocubes with representative indexes on typical peaks, synthesized with different molar ratios of Fe<sup>3+</sup> : Fe<sup>2+</sup> at (a) 1: 0.5, (b) 1: 1, (c) 1: 1.5, and (d) 1: 2.5.





**Fig. S5.** Curves of magnetization versus temperature of (A) Fe<sub>3</sub>O<sub>4</sub> and (B) Fe<sub>3</sub>O<sub>4</sub>@Au nanocubes, measured under ZFC and FC conditions (in a 500 Oe field), respectively, synthesized by a molar ratio of Fe<sup>3+</sup> / Fe<sup>2+</sup> at 1: 2.



**Fig. S6.** The magnetization hysteresis curves of (A)  $\text{Fe}_3\text{O}_4$  and (B)  $\text{Fe}_3\text{O}_4@Au$  nanocubes with dependences on molar ratios of magnetic nanocubes at room temperature, synthesized at  $\text{Fe}^{3+} : \text{Fe}^{2+}$  molar ratios of (a) 1: 0.5, (b) 1: 1, (c) 1: 1.5, and (d) 1: 2.5.