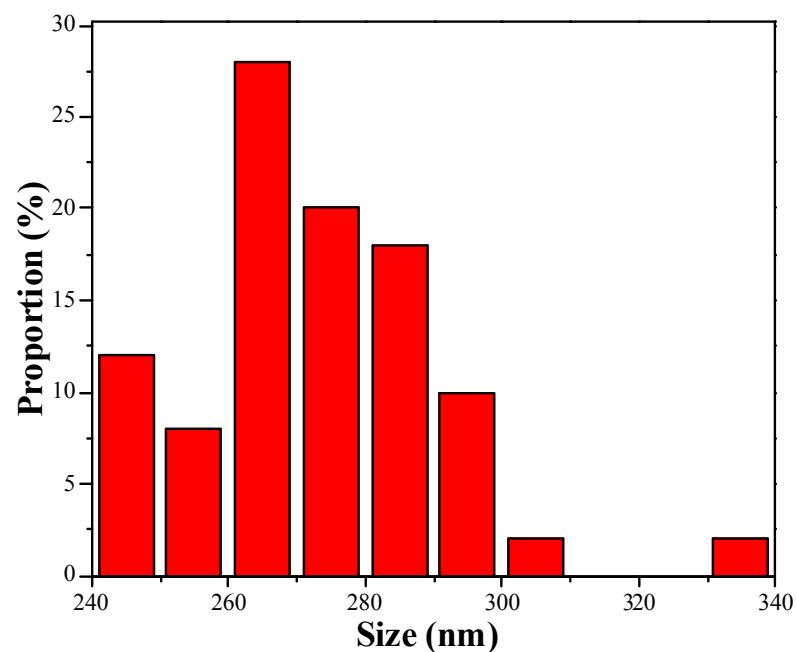
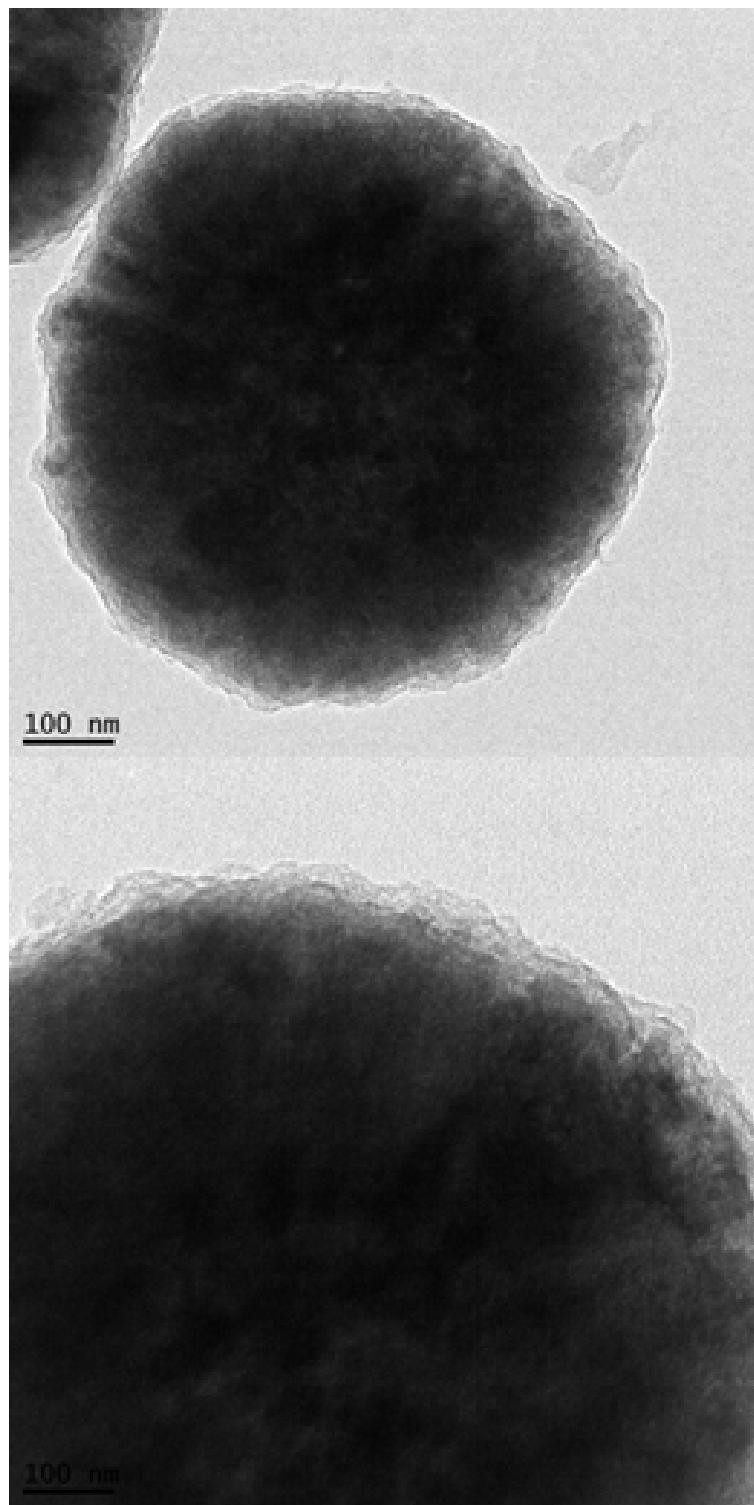


## Supplementary Materials

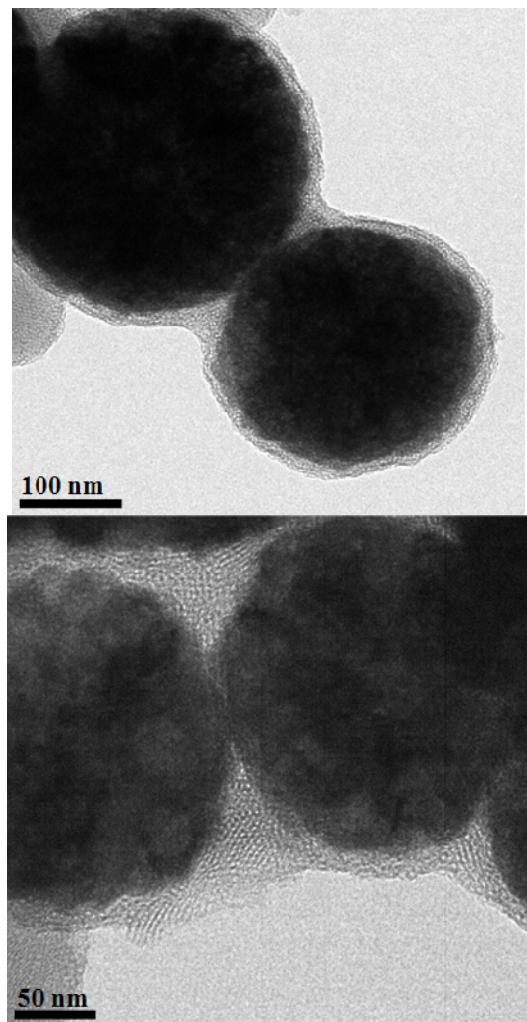
**Figure S1.** The size distribution of  $\text{Fe}_3\text{O}_4$  spheres. The average particle size is 273 nm.



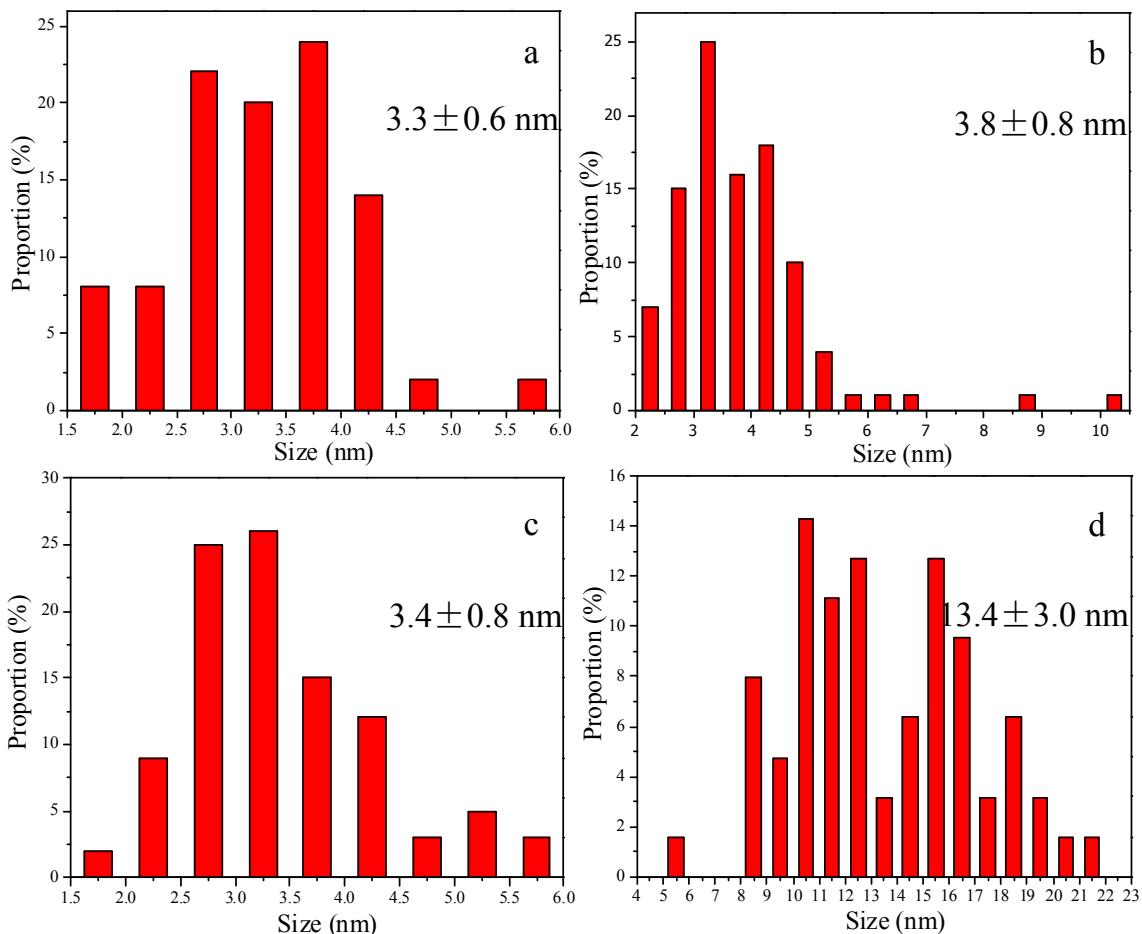
**Figure S2.** TEM images of  $\text{Fe}_3\text{O}_4$  spheres coated by a thin layer of  $\text{SiO}_2$ .



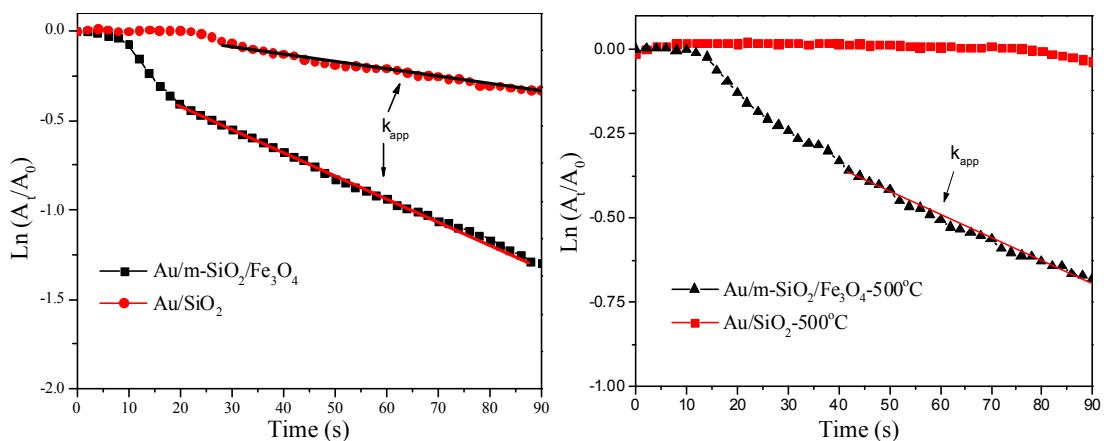
**Figure S3.** Additional TEM images of m-SiO<sub>2</sub>/Fe<sub>3</sub>O<sub>4</sub>.



**Figure S4.** Gold particle size distributions of as-synthesized Au/m-SiO<sub>2</sub>/Fe<sub>3</sub>O<sub>4</sub> (**a**), Au/m-SiO<sub>2</sub>/Fe<sub>3</sub>O<sub>4</sub> calcined at 500 °C (**b**), as-synthesized Au/SiO<sub>2</sub> (**c**) and Au/SiO<sub>2</sub> calcined at 500 °C (**d**).



**Figure S5.** Plots of the  $\ln(C_t/C_0)$  versus time for Au/m-SiO<sub>2</sub>/Fe<sub>3</sub>O<sub>4</sub> and as-synthesized Au/SiO<sub>2</sub> (**a**); Plots of  $\ln(C_t/C_0)$  versus time for Au/m-SiO<sub>2</sub>/Fe<sub>3</sub>O<sub>4</sub> calcined at 500 °C and Au/SiO<sub>2</sub> calcined at 500 °C (**b**).



**Table S1.** Gold loading and catalytic activity of catalysts.

Sample	Au Loading (wt%) <sup>a</sup>	Conversion (%) <sup>b</sup>	K <sub>app</sub> (s <sup>-1</sup> )
Au/m-SiO <sub>2</sub> /Fe <sub>3</sub> O <sub>4</sub>	0.28	72.5	1.26 × 10 <sup>-2</sup>
Au/SiO <sub>2</sub>	0.30	28.2	0.46 × 10 <sup>-2</sup>
Au/m-SiO <sub>2</sub> /Fe <sub>3</sub> O <sub>4</sub> -500°C	0.28	49.4	0.67 × 10 <sup>-2</sup>
Au/SiO <sub>2</sub> -500°C	0.30	4.5	0

<sup>a</sup> Gold loading measured by ICP; <sup>b</sup> Conversion at 90 s of reaction.