

Fig. S1 TEM images of (a)  $\text{CeO}_2/\alpha\text{-Fe}_2\text{O}_3$ , (b)  $\text{mSiO}_2/\text{Pt}/\text{TiO}_2/\alpha\text{-Fe}_2\text{O}_3$ , (c)  $\text{mSiO}_2/\text{Pt}/\text{CeO}_2/\alpha\text{-Fe}_2\text{O}_3$  and (d)  $\text{mSiO}_2/\text{Pt}/\text{TiO}_2/\alpha\text{-Fe}_2\text{O}_3$ .

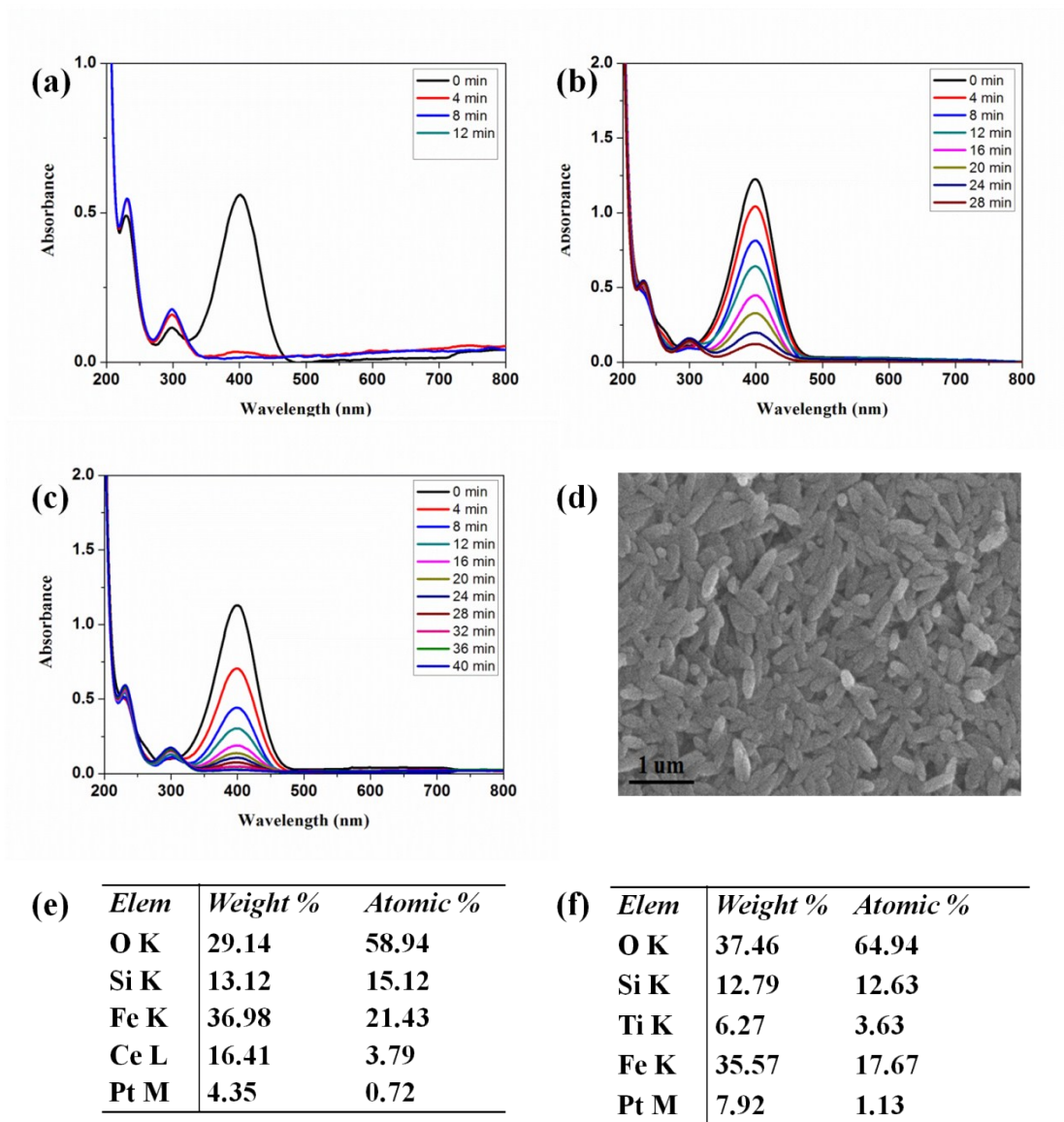


Fig. S2 (a,b,c) Successive UV-visible absorption spectra of 4-NP solution reduced by NaBH<sub>4</sub> in the presence of Ce-500, Ce-700, Ti-700 respectively; (d) SEM image of TiO<sub>2</sub>/α-Fe<sub>2</sub>O<sub>3</sub>; and (e,f) The EDX analysis of mSiO<sub>2</sub>/Pt/CeO<sub>2</sub>/Fe and mSiO<sub>2</sub>/Pt/TiO<sub>2</sub>/Fe respectively.

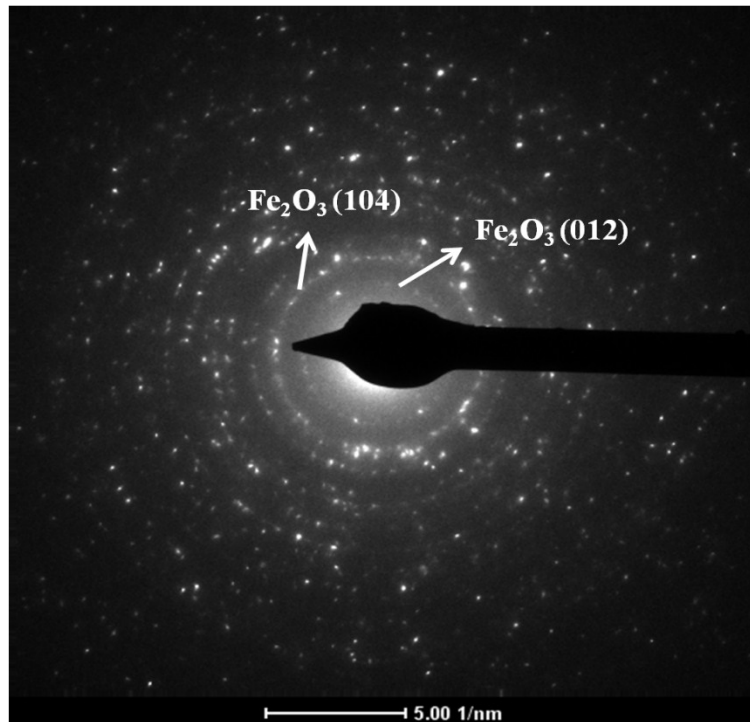


Fig. S3 The SAED pattern obtained from Fe<sub>2</sub>O<sub>3</sub> sample.

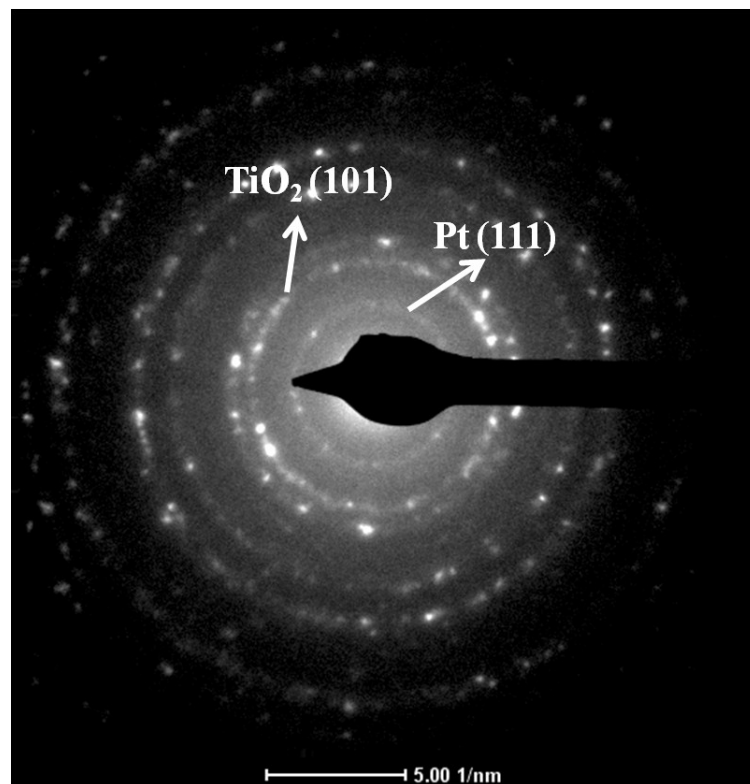


Fig. S4 The SAED pattern obtained from Pt/TiO<sub>2</sub>/α-Fe<sub>2</sub>O<sub>3</sub> sample.

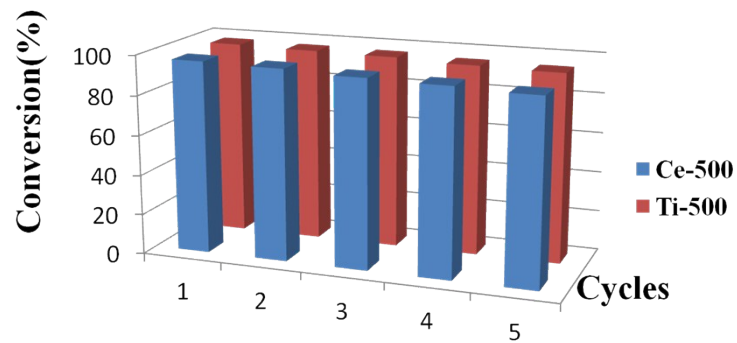


Fig. S5 Comparison of the conversion of Ce-500 and Ti-500.

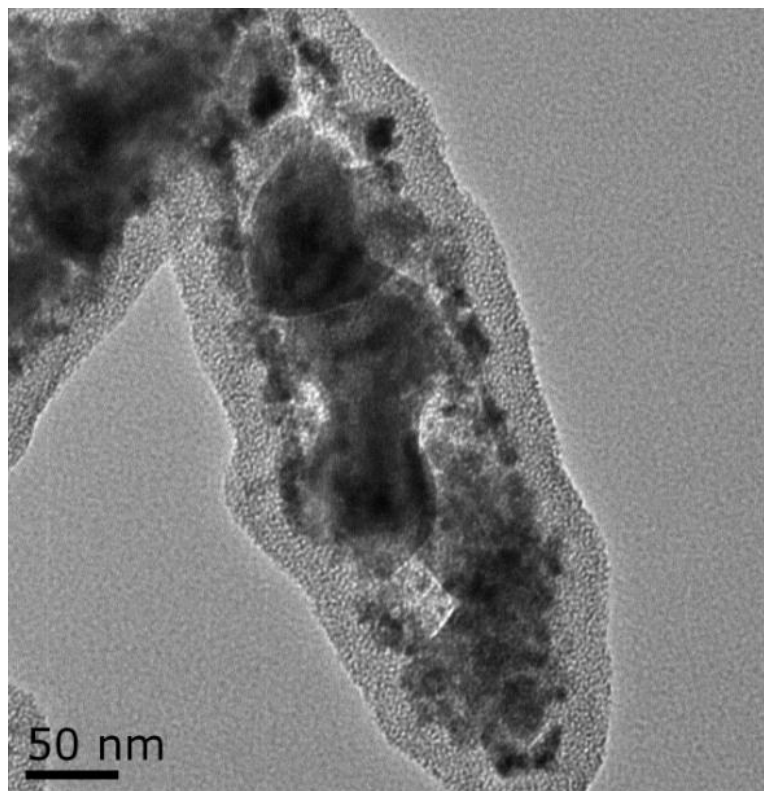


Fig. S6 TEM image of Ce-500 after 5 cycles.

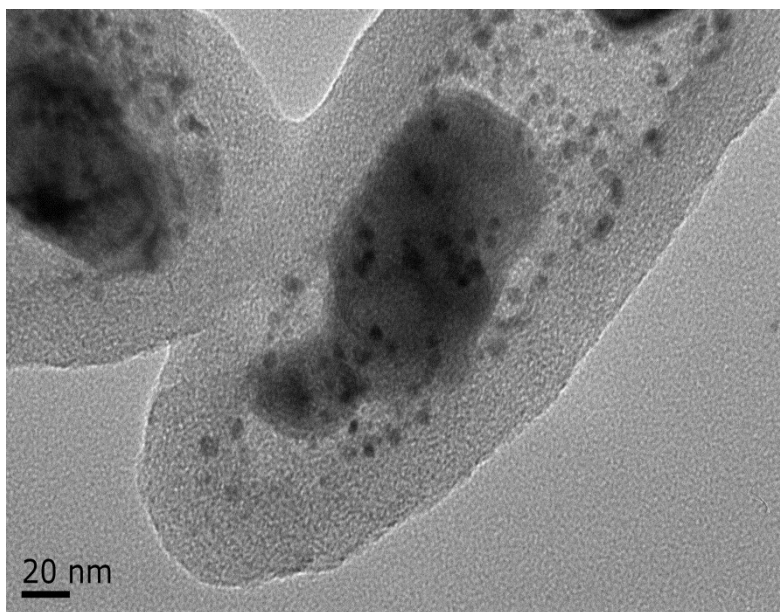


Fig. S7 TEM image of Ti-500 after 5 cycles.