Formation of Fe_3O_4@C/Ni microtubes for efficient catalysis and protein adsorption

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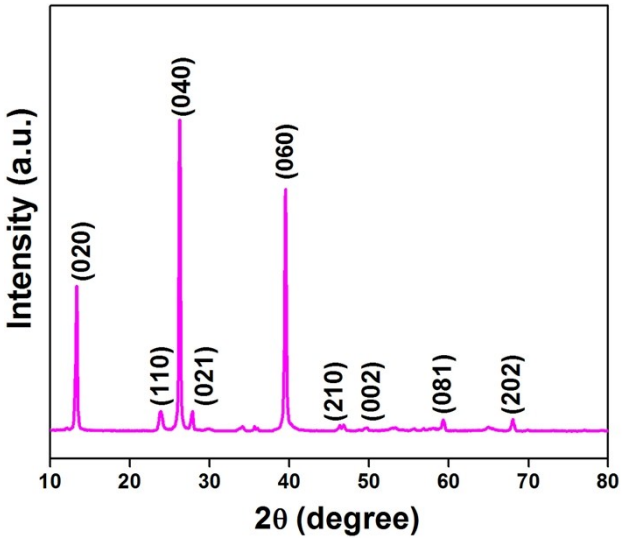

Figure S1. X-Ray diffraction patterns of MoO_3.

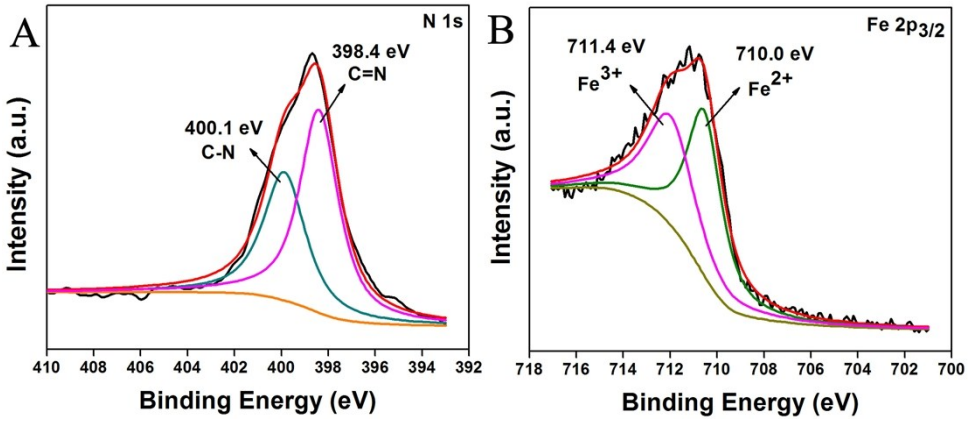

Figure S2. XPS spectra of Fe_3O_4@C/Ni microtubes (b): (A) N1s, (B) Fe $2p_{3/2}$.

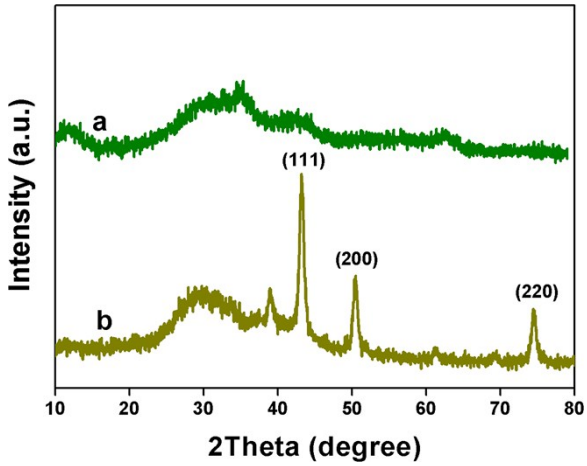

Figure S3. XRD patterns of Fe_3O_4@C/Ni microtubes (a: 350℃, b: 700℃).

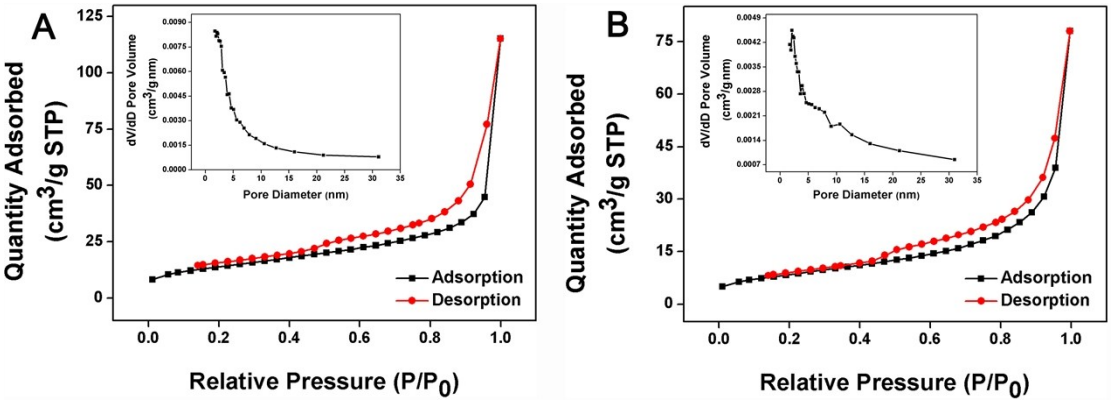

Figure S4. Nitrogen adsorption-desorption isotherms of Fe_3O_4@C/Ni-350 (A) and Fe_3O_4@C/Ni-700 (B).

Table. S1 BET data of different samples from Nitrogen adsorption-desorption isotherms.

Samples	Special Surface (m^2/g)	Pore Size (nm)	Pore Volume (cm^3/g)
Fe_3O_4@C/Ni-500	77.05	10.9	0.17
Fe_3O_4@C/Ni-350	49.9	9.6	0.114
Fe_3O_4@C/Ni-700	30.8	8.6	0.0728

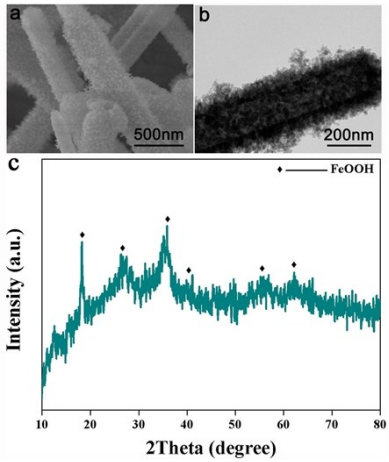

Figure S5. SEM(a), TEM images(b) and XRD(c) of FeOOH@SiO_2 adding 50 μL TEOS.

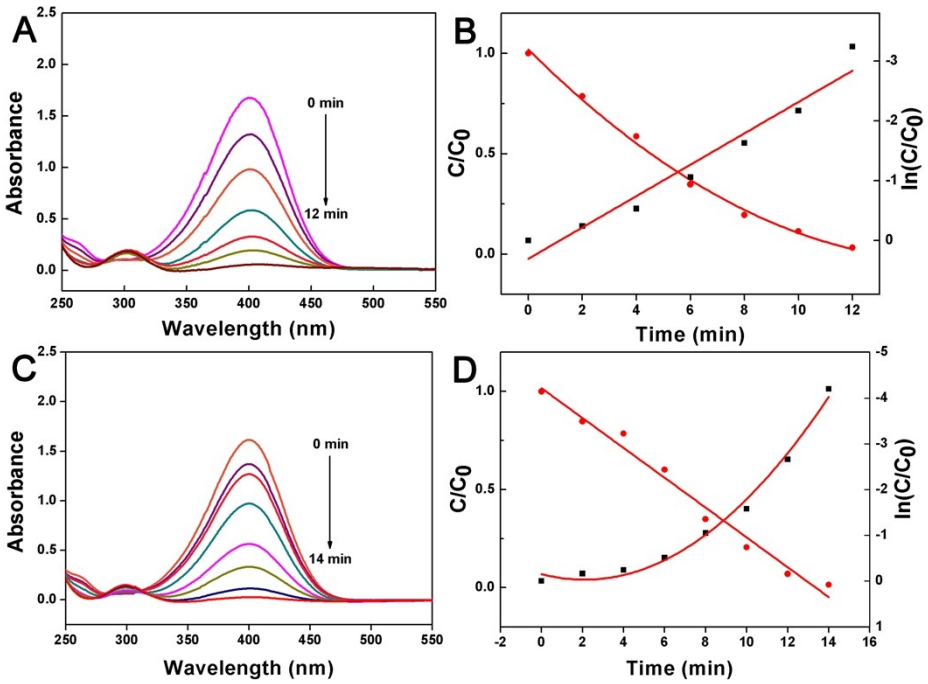

Figure S6. UV-vis spectra of Fe_3O_4@C/Ni-350 (A) and Fe_3O_4@C/Ni-700 (C) catalyzed 4-NP to 4-AP developed at different reaction times and corresponding C/C_0 and $\ln(C/C_0)$ versus time for the reduction of 4-NP over 1.0 mg catalysts

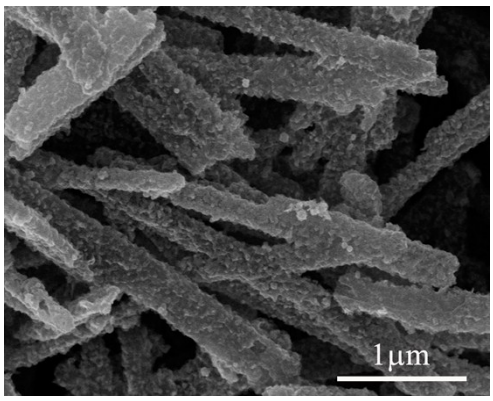

Figure S7. SEM image of Fe_3O_4@C/Ni-500 after reducing 4-NP for five times.

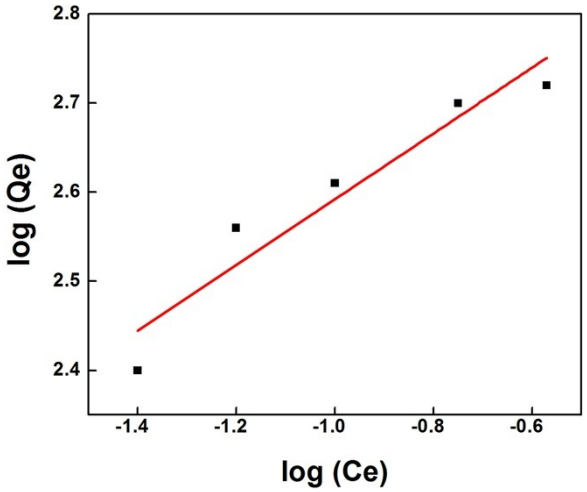

Figure S8. Linear fitting of adsorption isotherms plots based on Freundlich model.

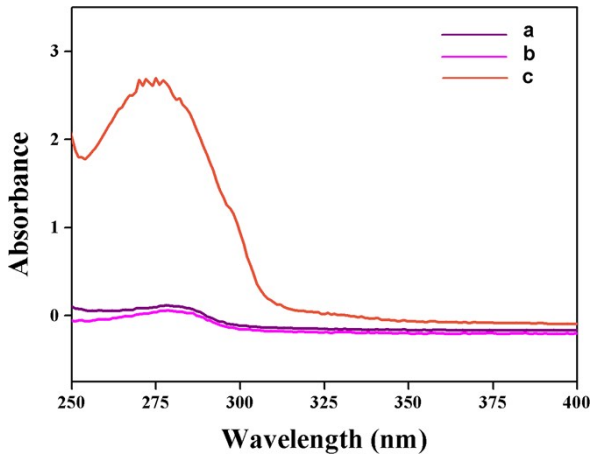

Figure S9. Curve a is the UV-vis spectrum of 0.4 mg·mL^{-1} of the BSA solution before adsorption by Fe_3O_4@C/Ni. Curve b is the UV-vis spectrum of supernatant of BSA after adsorbed by Fe_3O_4@C/Ni. Curve c is the UV-vis spectrum of desorption solution of the adsorbed protein by Fe_3O_4@C/Ni in BSA solution using concentration of 0.2 g·mL^{-1} of 2-methylimidazole solution as the eluent.

Catalytic activity of Fe_3O_4@C/Ni-500

Typically, 10 mg $NaBH_4$ was mixed with the freshly prepared 4-nitrophenol aqueous solution (0.1 mM, 5 mL). Afterwards, the as-prepared Fe_3O_4@C/Ni-500 nanocatalysts (1 mg) were added into the reaction mixture. The reaction process was monitored by UV–vis spectroscopy.