Carbon-supported Ni and MoO_2 nanoparticles with Fe_3O_4 cores as Protein Adsorbent

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Synthesis of Fe_3O_4@PDA.

0.5g of the Fe_3O_4 precursor was re-dispersed into 30 mL anhydrous ethanol and 20 mL deionized water. Then 0.2g of Tris and 5 mL of deionized water were dissolved in above-mentioned solution under magnetic stirring evenly, followed with the addition of 15 mg dopamine hydrochloride, 2 mL of anhydrous ethanol and 1 mL of deionized under constant magnetic stirring for 20h . After reaction for 20 h, the Fe_3O_4@PDA composites were collected and dried at 80 °C.

Synthesis of Fe_3O_4@C∩MoO_2-Ni.

The above-mentioned Fe_3O_4@PDA composites and 20 mL deionized water were added into 50 mL beaker under ultrasonic for 3 min. Then 1 mmol $NiCl_2 \cdot 6H_2O$ and 0.25 g urea were dissolved in above-mentioned solution under magnetic stirring for 15 min, followed with the addition of 1 mmol $Na_2MoO_4 \cdot 2H_2O$ under constant magnetic stirring for 15 min and ultrasonic for 3 min. Finally the mixture was transferred to a 50 mL Teflon-lined stainless steel autoclave, which was sealed and kept at 110 °C for 12 h. After cooling down to room temperature naturally, the product was washed with deionized water and absolute ethanol for several times and dried in air at 60 °C for 12h. Subsequently, the resulting product was annealed at 500°C in nitrogen for 2 h with a heating rate of 2 °C min^{-1} obtain the desired Fe_3O_4@C∩MoO_2-Ni composites.

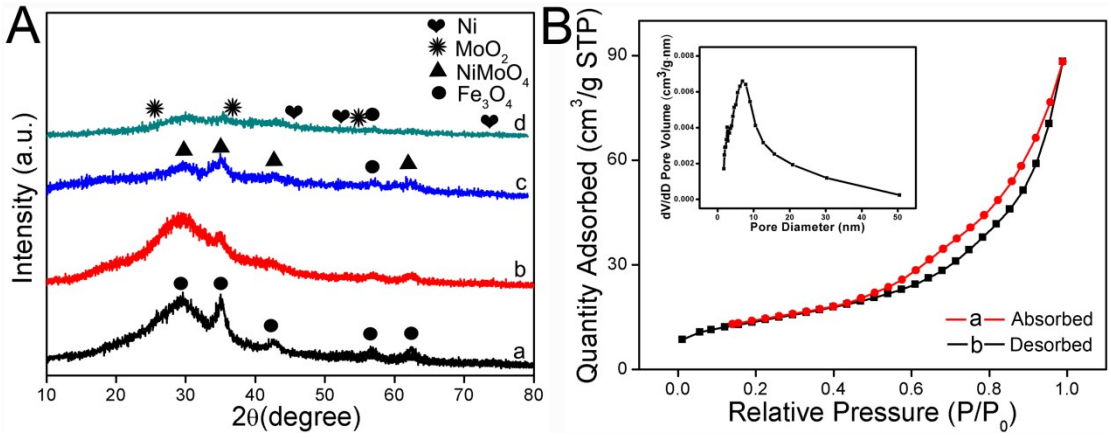

Figure S1. A: X-Ray diffraction patterns of Fe_3O_4 (a), Fe_3O_4@PDA(b), Fe_3O_4@PDA@$NiMoO_4$@ (c) and Fe_3O_4@C∩MoO_2-Ni(d); B：N_2 adsorption-desorption isotherm curve of porous Fe_3O_4@C∩MoO_2-Ni;

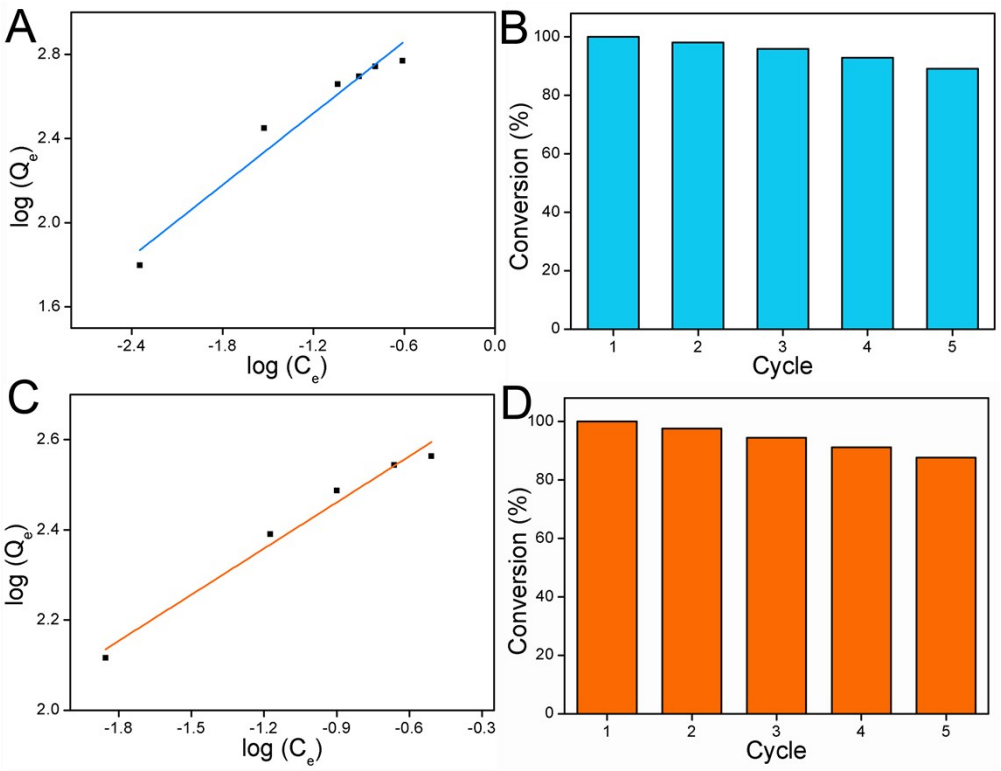

Fig. S2 The linear regression by fitting the equilibrium adsorption data with the Freundich Adsorption Model for Fe_3O_4@MoO_2∩C-Ni composites(A), cyclic testing of Fe_3O_4@MoO_2∩C-Ni composites(B); the linear regression of equilibrium adsorption data fitted by Freundich Adsorption Model for Fe_3O_4@C∩MoO_2-Ni composites(C); cyclic testing of Fe_3O_4@C∩MoO_2-Ni composites (D).