Supporting information

Facile preparation of porous magnetic polydopamine microspheres through an inverse replication strategy for efficient enzyme immobilization

Pingping Han [a,b], Zhongyi Jiang [a,b], Xiaoli Wang [a,b], Xueyan Wang [a,b], Shaohua Zhang [a,b], Jiafu Shi [b,c*], Hong Wu [a,b,d*]

([a]Key Laboratory for Green Chemical Technology of Ministry of Education, School of Chemical Engineering and Technology, Tianjin University, Tianjin 300072, China

[b]Collaborative Innovation Center of Chemical Science and Engineering (Tianjin),Tianjin 300072, China

[c]School of Environment Science and Engineering, Tianjin University, Tianjin 300072, China

[d]Tianjin Key Laboratory of Membrane Science and Desalination Technology, Tianjin University, Tianjin 300072, China)

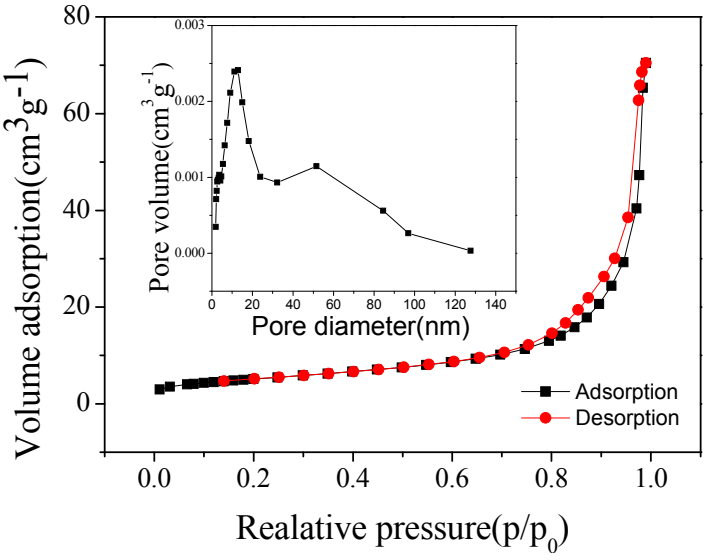

Fig.S1. Pore size distribution curve by the BJH method and nitrogen adsorption-desorption isotherm of Fe_3O_4@$CaCO_3$ microspheres with different diameters of 4.5 μm.

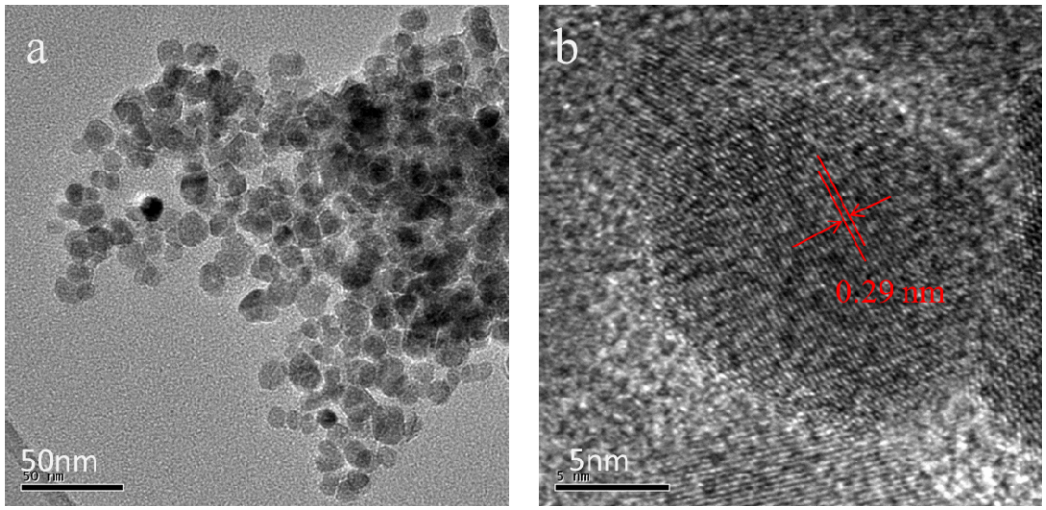

Fig.S2. HRTEM images of Fe_3O_4 nanoparticles. (Diameter: 10~20 nm.)

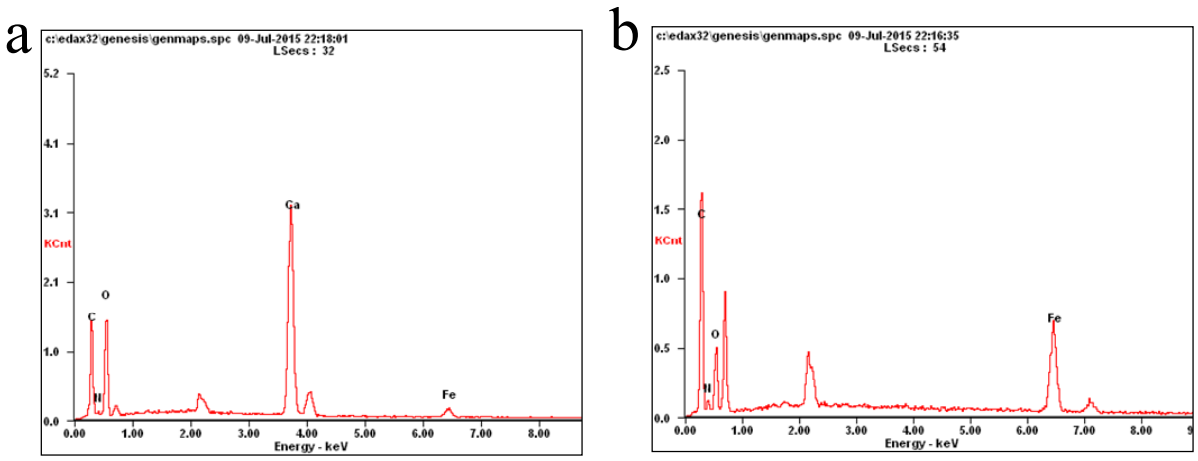

Fig. S3. EDS analysis of PMMSs (a) before and (b) after the template removal.

Table S1. The performance comparison for Fe_3O_4@$CaCO_3$ microspheres and PMMSs

	Fe_3O_4@$CaCO_3$ microspheres	4.5 μm PMMSs
Immobilization efficiency (%)	2.1±0.1	74.9±2.5
Loading capability（mg/g)	9±0.5	274.5±3.4
Specific activity（U·mg^{-1} enzyme）	163.2±5.9	162.3±5.2

In detail, the immobilization efficiency, loading capacity and specific activity for Fe_3O_4@$CaCO_3$ microspheres were 2.1%, 9 mg/g and 163.2 U·mg^{-1} enzyme, respectively. In comparison, the immobilization efficiency and loading capacity of Fe_3O_4@$CaCO_3$ microspheres were lower than those of PMMSs. This was probably owing to the rather weak interaction (physical adsorption) between YADH and Fe_3O_4@$CaCO_3$ microspheres. Once conducting the reaction with an equal amount of enzyme, the specific activity of Fe_3O_4@$CaCO_3$ microspheres (163.2 U·mg^{-1} enzyme) was nearly equal to that of PMMSs (162.3 U·mg^{-1} enzyme).

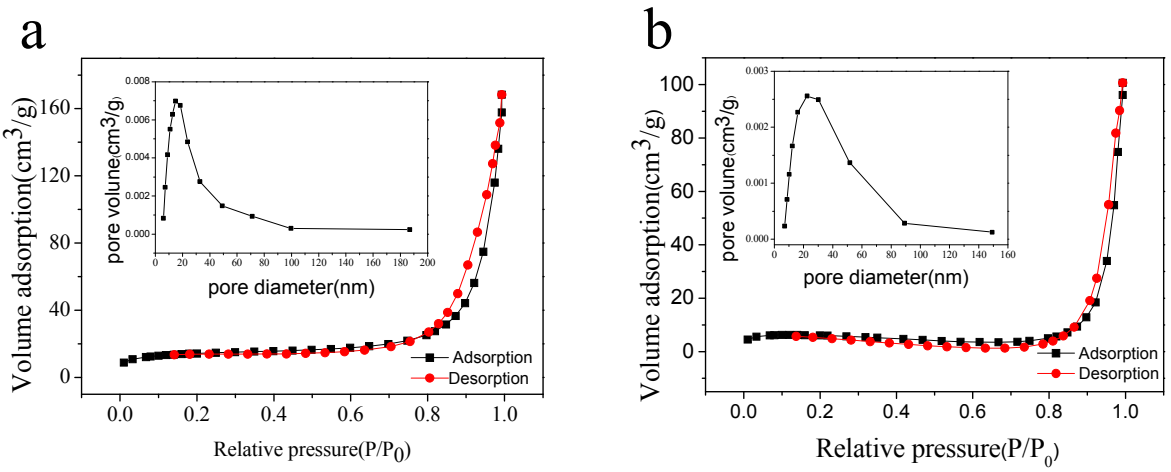

Fig. S4. Pore size distribution curve by the BJH method and nitrogen adsorption-desorption isotherm of PMMSs with different diameters a) 4.5 μm and b) 3.0 μm.

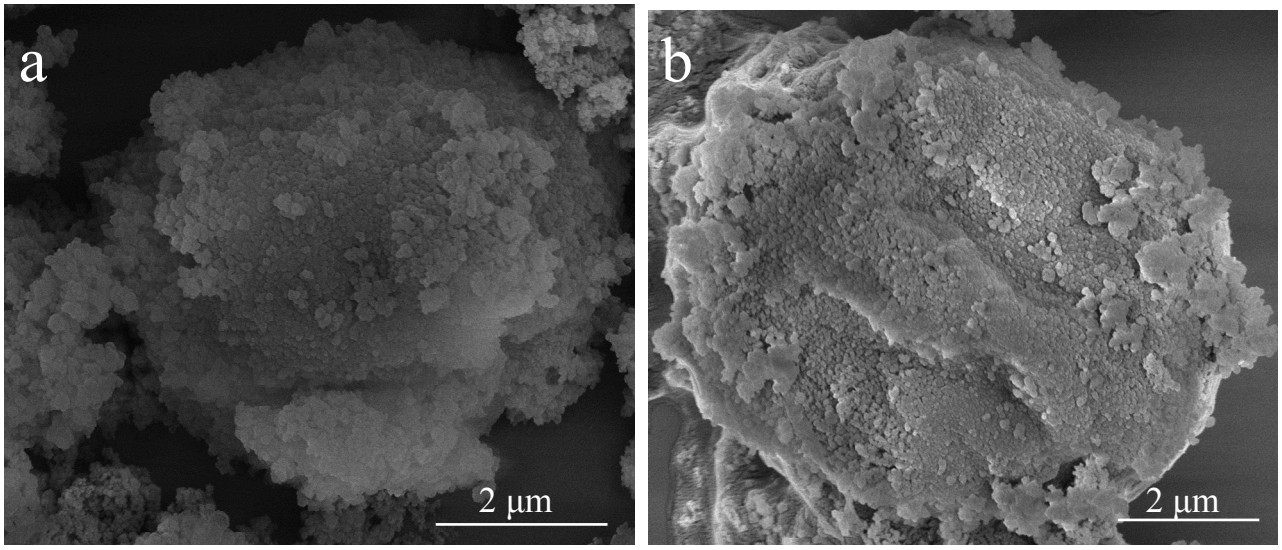

Fig. S5. SEM images of YADH immobilized PMMSs (a) before and (b) after reaction.

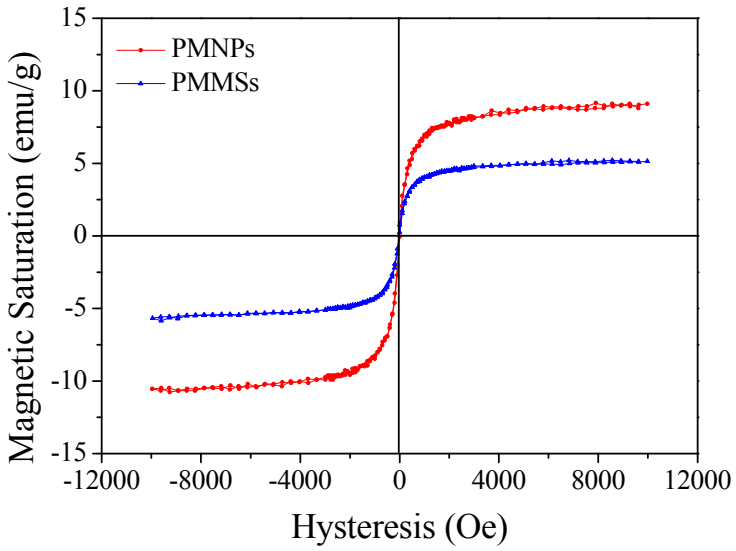

Fig. S6. Magnetic hysteresis loops of PMNPs and PMMSs.