

Supplementary Material (ESI) for Journal of Materials Chemistry

Synthesis and characterization of polychloromethylstyrene coated superparamagnetic surface molecularly imprinted core-shell nanoparticles for bisphenol A

Jizhong Liu, Yanyan Huang, Yunfeng Xie, Weizhi Wang, Yongliang Liu, Xiangjun Liu, Rui Zhao*, Guoquan Liu and Yi Chen

Beijing National Laboratory for Molecular Sciences, Key Laboratory of Analytical Chemistry for Living Biosystems, Institute of Chemistry, Chinese Academy of Sciences, Zhongguancun North First Street 2, 100190 Beijing, PR China. Tel: 86 10 62557910; Fax: 86 10 62559373; E-mail: zhaorui@iccas.ac.cn

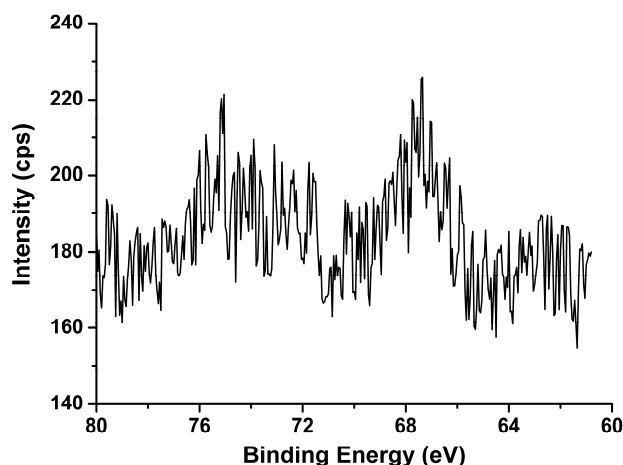


Fig. S1 High-resolution XPS spectrum of Br3d signal

FT-IR spectra

The successful graft of MIP on the magnetic nanoparticles was confirmed by FT-IR spectra. $\text{Fe}_3\text{O}_4@\text{PCMS}$, $\text{Fe}_3\text{O}_4@\text{PS@Br}$ and $\text{Fe}_3\text{O}_4@\text{MIP}$ were characterized by FT-IR spectrometry (Fig. S1). The characteristic band of Fe–O stretching appeared at $\sim 580\text{ cm}^{-1}$ in each spectrum. Peaks at 1605 and 3020 cm^{-1} in spectrum of $\text{Fe}_3\text{O}_4@\text{PCMS}$ were attributed to C=C stretching vibration and C–H stretching vibration, respectively. These indicated that PCMS was coated on the surface of Fe_3O_4 nanoparticles. In spectrum of $\text{Fe}_3\text{O}_4@\text{PS@Br}$, peak of O–C=O group appeared at 1732 cm^{-1} , indicating the successful immobilization of the initiator. In spectrum of $\text{Fe}_3\text{O}_4@\text{MIP}$, peaks at 1726 , 1634 cm^{-1} were observed, corresponding to C=O bonds, -C=N, respectively. Compared with $\text{Fe}_3\text{O}_4@\text{PS@Br}$, the intensity of the O–C=O adsorption band of $\text{Fe}_3\text{O}_4@\text{MIP}$ at 1726 cm^{-1} was clearly enhanced in spectrum of $\text{Fe}_3\text{O}_4@\text{MIP}$.

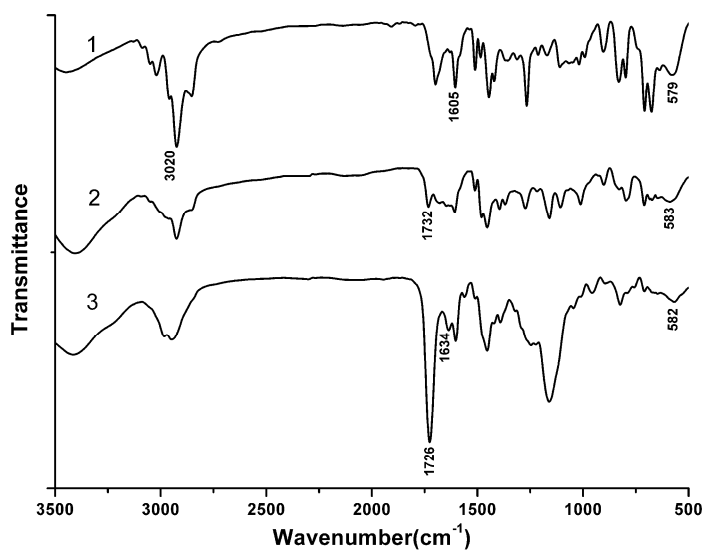


Fig. S2 FT-IR spectra for (a) Fe₃O₄@PCMS, (b) Fe₃O₄@PS@Br and (c) Fe₃O₄@MIP.

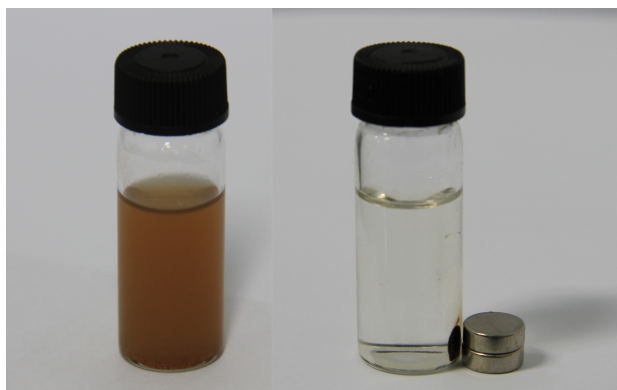


Fig. S3 Magnetic response of Fe₃O₄@MIP to a magnet.

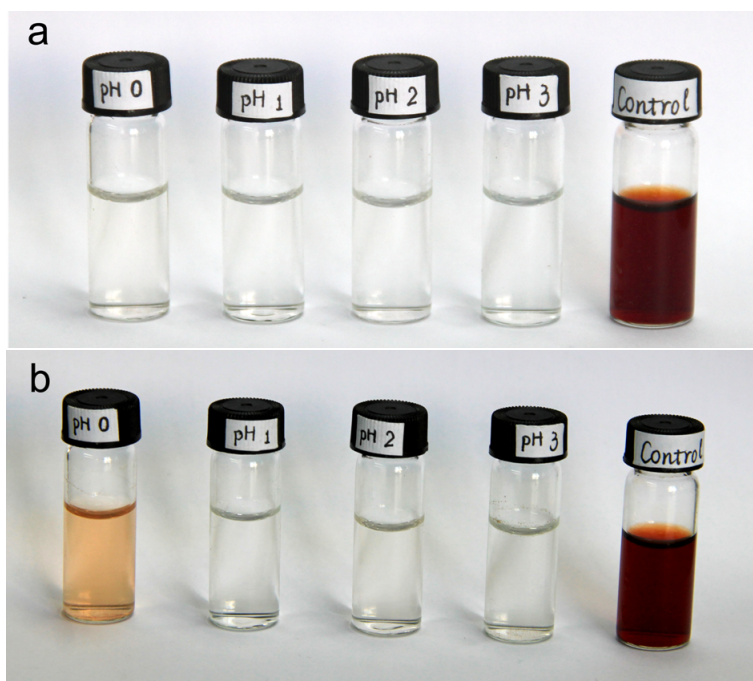


Fig. S4 Chemical stability of magnetic $\text{Fe}_3\text{O}_4\text{@MIP}$ under acidic condition. Supernatants with 0.01 mol L^{-1} KCNS after $\text{Fe}_3\text{O}_4\text{@MIP}$ were treated with different concentrations of HCl from pH 0-3 and Fe_3O_4 control under pH 0 for (a) 12 hours (b) ten days

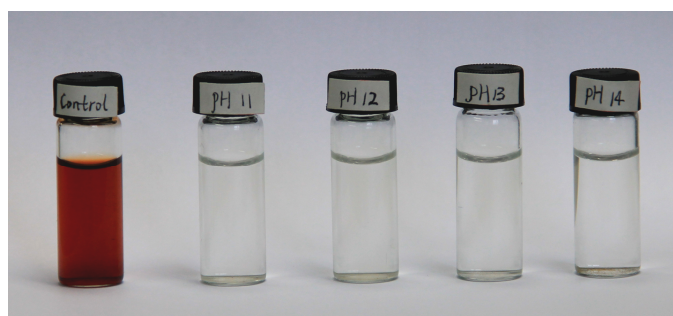


Fig. S5 Chemical stability of magnetic $\text{Fe}_3\text{O}_4\text{@MIP}$ under alkaline condition. Supernatants with 0.01 mol L^{-1} KCNS after $\text{Fe}_3\text{O}_4\text{@MIP}$ were treated with different concentrations of NaOH from pH 11-14 and Fe_3O_4 control under pH 0 for 12 hours.

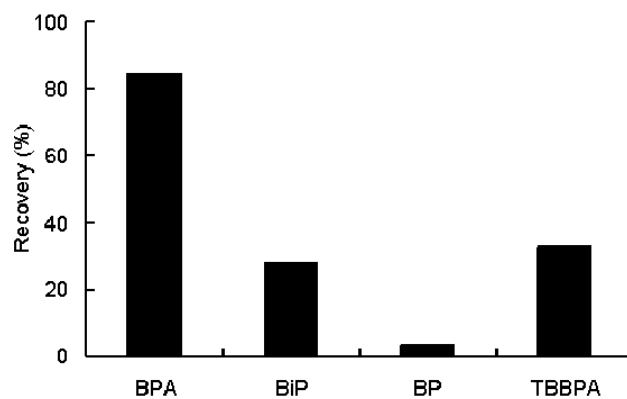


Fig. S6 Recoveries of BPA and its analogues in competitive binding experiments on $\text{Fe}_3\text{O}_4@\text{MIP}$ nanoparticles. The concentration of each compound was $50 \mu\text{mol L}^{-1}$.