Supplementary Material

# Carbon dots functionalized macroporous adsorption resin for bifunctional ultra-sensitive detection and fast removal of iron(III) ions

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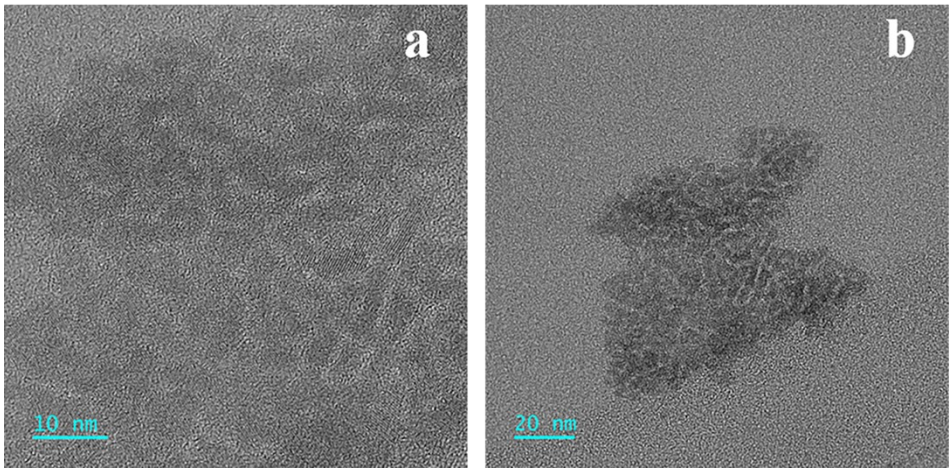


**Fig. S1.** TEM images of CDs with different magnification.

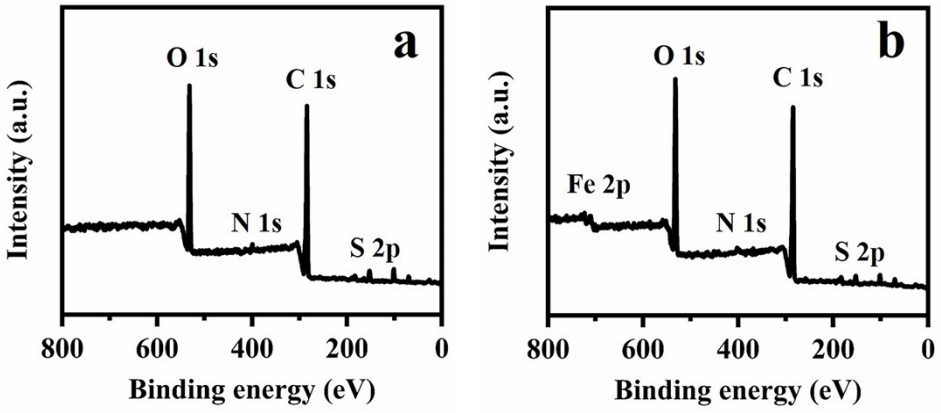


**Fig. S2.** XPS full spectra of MAR@poly(PA)@CD (a) before and (b) after adsorption of $Fe^{3+}$.

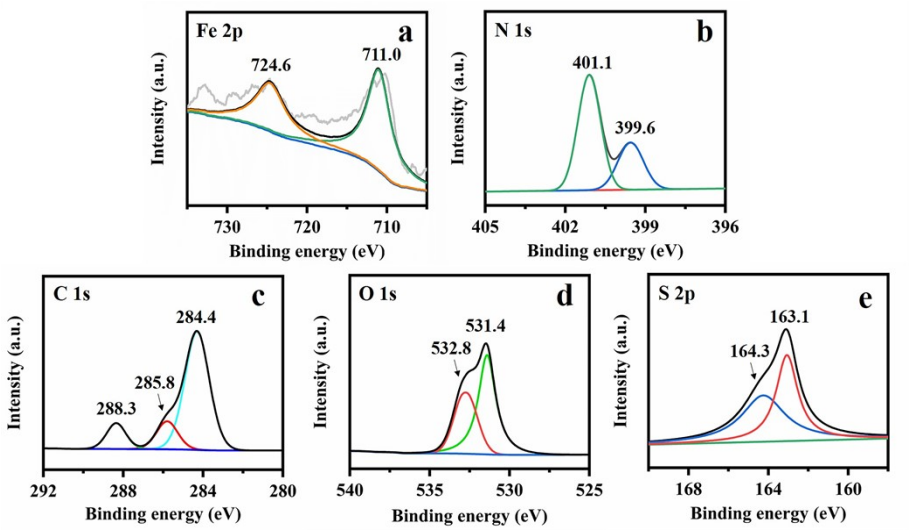


**Fig. S3.** High resolution XPS spectra of (a) Fe 2p, (b) N 1s, (c) C 1s, (d) O 1s and (e) S 2p after adsorption of $Fe^{3+}$ of MAR@poly(PA)@CD.

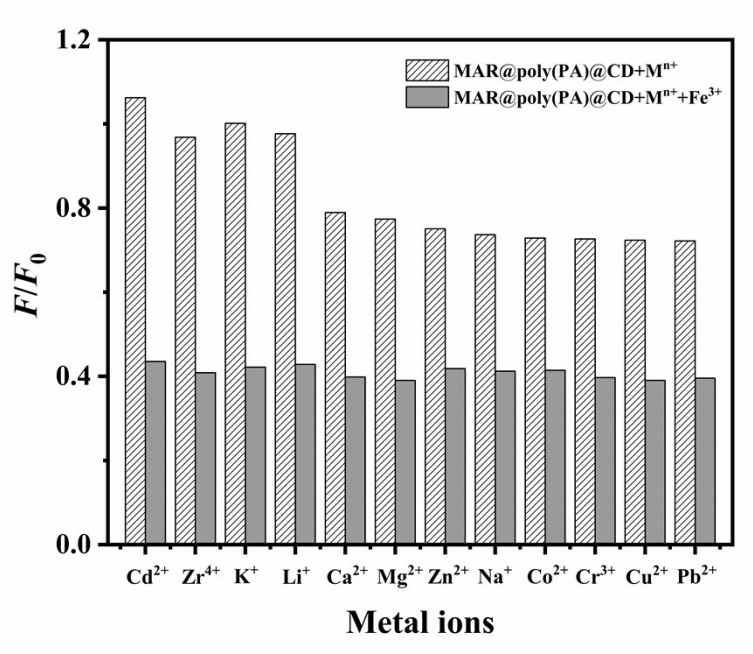


**Fig. S4.** Fluorescence responses of MAR@poly(PA)@CD toward 12 kinds of metal ions in the absence and presence of $Fe^{3+}$.

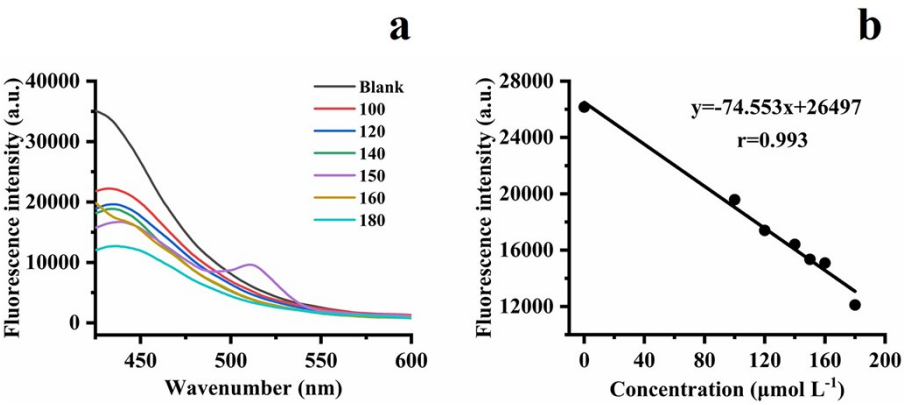


**Fig. S5.** (a) Fluorescence emission spectrum containing different concentrations of $Fe^{3+}$. (b) Linear response curve for detection of $Fe^{3+}$ by CDs.

**Table S1** Comparison of specific surface area, pore volume and average pore diameter of poly(GMA-*co*-EDMA) and MAR@poly(PA)@CD.

| Materials | Specific surface area ($m^2\ g^{-1}$) | Pore volume ($cm^3\ g^{-1}$) | Average pore diameter (nm) |
|---|---|---|---|
| Poly(GMA-*co*-EDMA) | 33.4 | 0.160 | 20.3 |
| MAR@poly(PA)@CD | 13.6 | 0.090 | 23.6 |

**Table S2** Isothermal adsorption fitting parameters of MAR@poly(PA)@CD to $Fe^{3+}$ by Langmuir and Freundlich models.

| **Langmuir isotherm model** | | | **Freundlich isotherm model** | | |
|---|---|---|---|---|---|
| $Q_{max}$ (mg $g^{-1}$) | $K_L$ (L $g^{-1}$) | $r_L$ | $K_F$ (mg $g^{-1}$) | 1/*n* | $r_F$ |
| 24.15 | 3.451 | 0.9992 | 15.71 | 0.2549 | 0.9398 |

**Table S3** Kinetic adsorption fitting parameters of MAR@poly(PA)@CD to $Fe^{3+}$ by pseudo-first-order and pseudo-second-order models.

| $C_0$ (μmol $L^{-1}$) | $Q_e$ (mg $g^{-1}$) | **pseudo-first-order** | | | **pseudo-second-order** | | |
|---|---|---|---|---|---|---|---|
| | | $k_1$ ($min^{-1}$) | $Q_{1\,cal}$ (mg $g^{-1}$) | $r_1$ | $k_2$ (g $mg^{-1}$ $min^{-1}$) | $Q_{2\,cal}$ (mg $g^{-1}$) | $r_2$ |
| 200.0 | 20.20 | 0.0382 | 8.492 | 0.7628 | 0.003658 | 22.68 | 0.9902 |