Supplementary Information

Super-adsorbent microsphere based on triallyl isocyanurate-maleic anhydride copolymer for removal of organic pollutants from water

Can Xu,[a] Hongyi Shu,[a] Chuxuan Chen,[a] Xi Qi,[a] Pengfei Zhou,[b] YuhongMa,[a,c] Changwen Zhao,*[a] and Wantai Yang *[a,c,d]

[a]State Key Laboratory of Chemical Resource Engineering, Beijing University of Chemical Technology, Beijing, 100029, China

[b]Shandong Dongyue Polymer Material Co., Ltd.

[c]Beijing Engineering Research Center for the Synthesis and Applications of Waterborne Polymers, Beijing University of Chemical Technology, Beijing, 100029, China

[d]Key Laboratory of Carbon Fiber and Functional Polymers, Ministry of Education, Beijing University of Chemical Technology, Beijing, 100029, China

*Corresponding authors: yangwt@mail.buct.edu.cn, zhaocw@mail.buct.edu.cn

After diluted, the standard curve of DS solution was drawn by measuring the corresponding absorbance value.

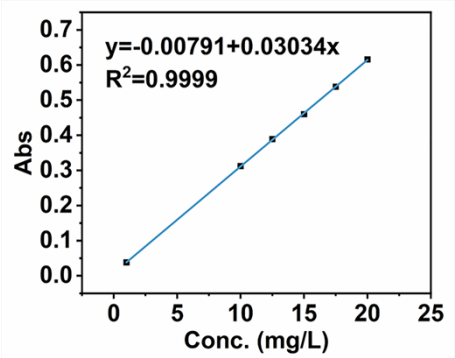

Fig. S1. Standard curve of DS solution

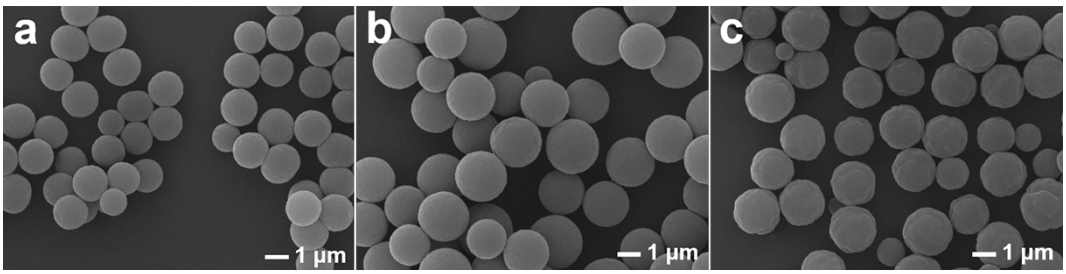

Fig. S2. SEM images of TMs (TAIC/MAH=1/1, 1/2, 1/3, respectively), polymerization solvents: IPA/CH=5/5.

Table S1. Elemental Content and composition of TAIC-MAH Copolymer Synthesized at Different Feeding Ratio Measured by EA.

Entry	Elemental content (wt %)		
	C	H	N
1	53.37	4.95	10.18
2	52.57	4.79	9.12
3	51.74	4.80	8.43

Table S2. Specific surface area and pore size distribution of TMs before and after

cationic modification

Sample	S_{BET} (m^2/g)	S_{micro} (m^2/g)	Pore Diameter (nm)	V_{total} (cm^3/g)	V_{micro} (cm^3/g)	V_{micro}/V_{total}
TMs1	182.39	5.68	3.818	0.147	0.001	0.007
TMs2	71.63	15.25	3.396	0.151	0.007	0.046
TMs3	51.60	2.088	3.391	0.073	0	0
Cat-TMs1	14.91	0	3.806	0.485	0	0
Cat-TMs2	8.65	0	3.796	0.061	0	0
Cat-TMs3	4.24	0	3.797	0.029	0	0

Determination of the density of ammonium cation.

Assuming the presence of one chloride counter ion per ammonium cation, the accurate density of cation in Cat-TMs was determined by titration of chloride with $AgNO_3$. The titration process was as follows: Cat-TMs (50.0 mg) were dispersed in a standard aqueous NaOH solution (0.2 M, 20.00 mL) in an Erlenmeyer flask. The mixture was dispersed with ultrasonic vibration for 30 min and then was stirred with a magnetic stirrer for 12 h at room temperature and then centrifuged. The supernatant was diluted to a constant volume of 40 mL with distilled water. 20 mL of the supernatant solution was taken out, and the pH value of the solution was adjusted to 6.5-8.0 with 0.01 mol/L HNO_3. The content of Cl^- was determined by titration with a 0.1 mol/L $AgNO_3$ solution using K_2CrO_4 as the indicator. The molar concentration of ammonium cation is equal to that of Cl^-, and the density of cation in Cat-TMs can be calculated using the following equation:

$$d = 2 \times \frac{V_{Ag} \times C_{Ag}}{W} \quad (1)$$

where C_{Ag} (mol/L) was the concentration of the aqueous $AgNO_3$ solution. V_{Ag} (mL) was the volume of $AgNO_3$ used in the titration. W was the weight of the Cat-TMs (g).

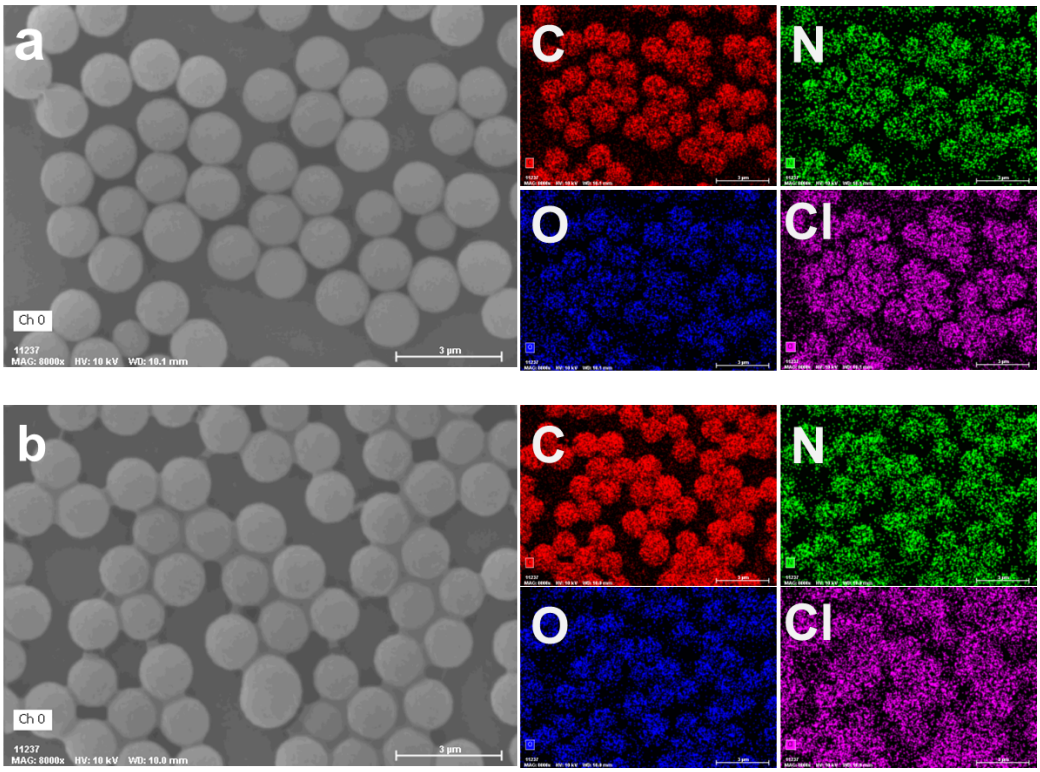

Fig. S3. EDS mapping of Cat-TMs before (a) and after adsorption (b).

Table S3. Elemental content f Cat-TMs before and after adsorption.

Sample	Elemental content (wt %)			
	C	N	O	Cl
Cat-TMs before adsorption	51.00	22.98	14.67	11.37
Cat-TMs after adsorption	55.77	22.41	15.93	5.69

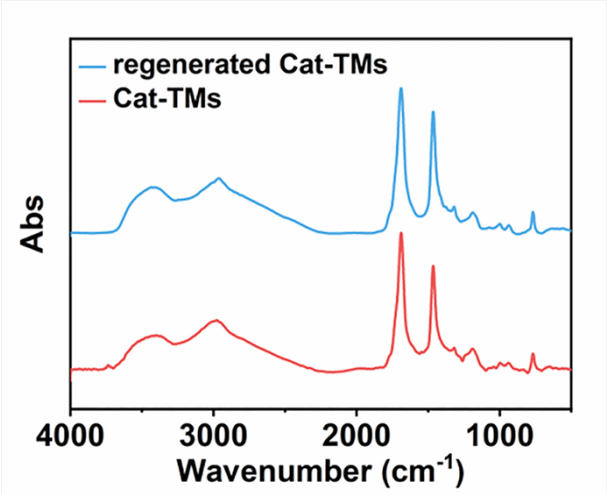

Fig. S4. FT-IR spectra of regenerated Cat-TMs.

The as-prepared adsorbent (Cat-TMs, 0.1 g) was immersed in acidic (pH=2), neutral (pH=7) and alkaline (pH=12) aqueous solution (10 mL) to test the stability in different pH (denoted as sample 1, 2, 3). After 12 hours, samples were centrifuged then dried for FT-IR characterization and DS adsorption experiments. The sample 1, 2, 3 were treated by 1 mol/L HCl to protonate them and dried to test the adsorption capacity.

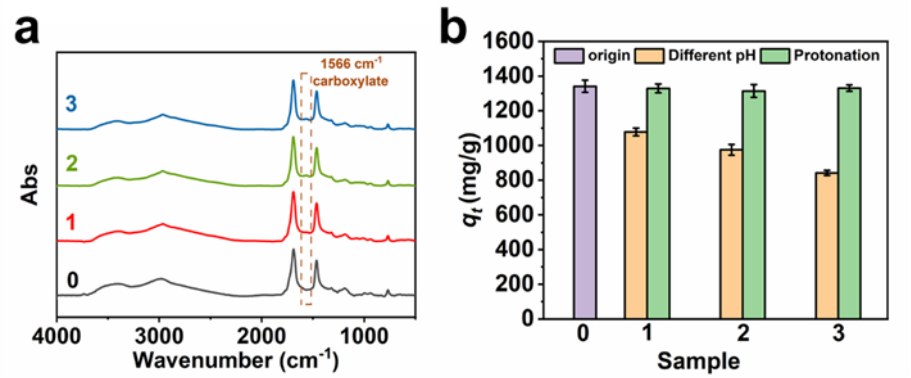

Fig. S5. (a) FT-IR spectra of sample 1, 2, 3, and (b) equilibrium adsorption capacity of sample 1, 2, 3 and retreated sample 1, 2, 3.

Similarly, Cat-TMs were immersed in ethanol, tetrahydrofuran, and xylene,

respectively to check the stability in different solvents (denoted as sample 4, 5, 6).

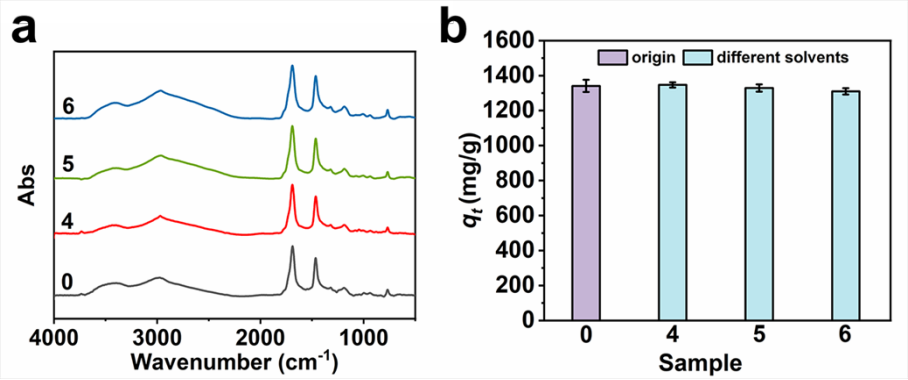

Fig. S6. (a) FT-IR spectra of sample 4, 5, 6, and (b) equilibrium adsorption capacity of sample 4, 5, 6.