Electronic Supplementary Material (ESI) for RSC Advances.

Supporting Information

Recyclable Functionalized Polymer Film for Efficient Removal of Hexavalent Chromium from Aqueous Solution

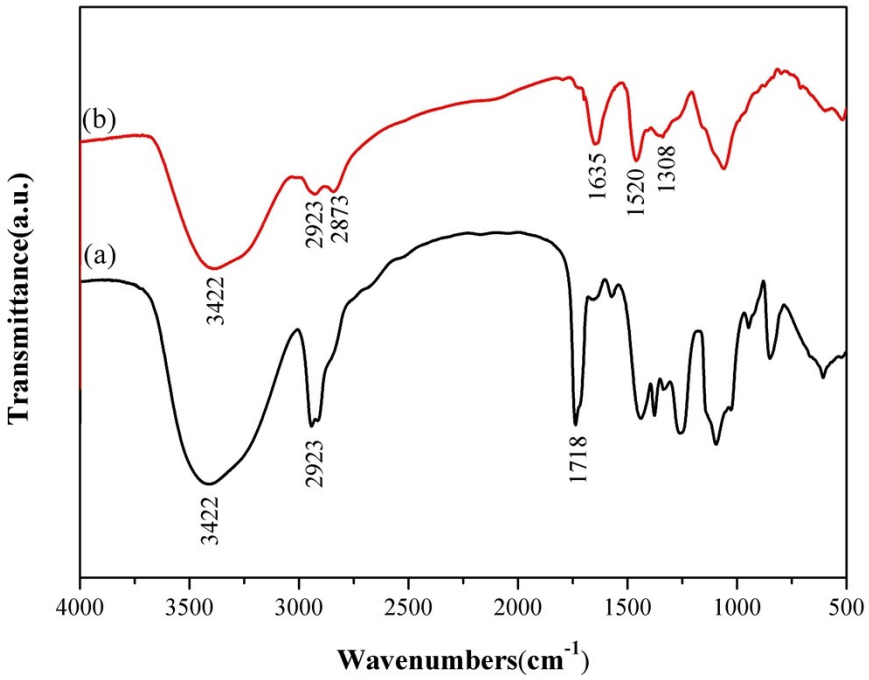


Figure S1. FT-IR spectra of the (a) PVA powder and (b) PEI-PVA microspheres.

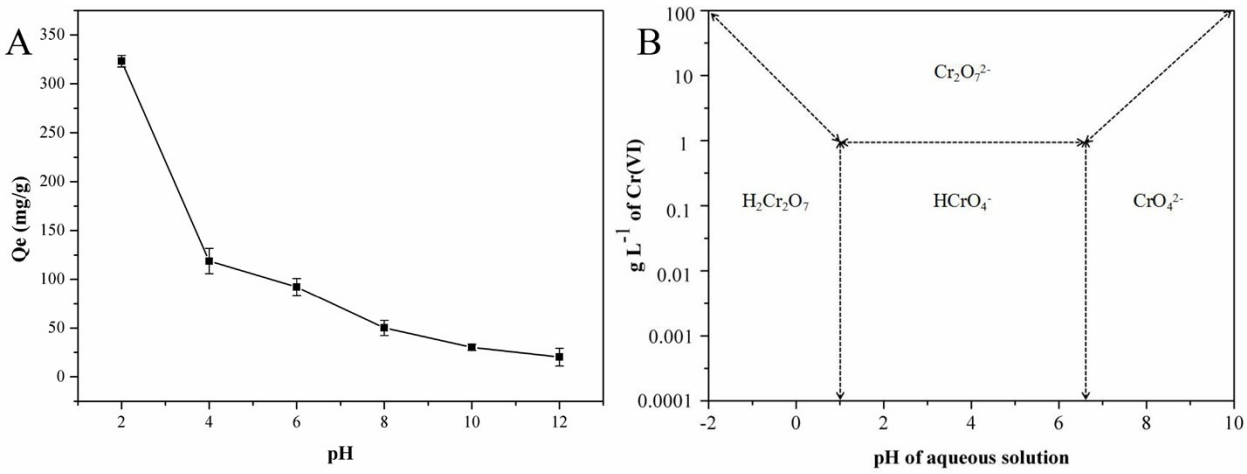


Figure S2. (A) Effect of the pH on the Cr(VI) adsorption and (B) Relative distribution of Cr(VI) species in water as a function of pH and Cr(VI) concentration.

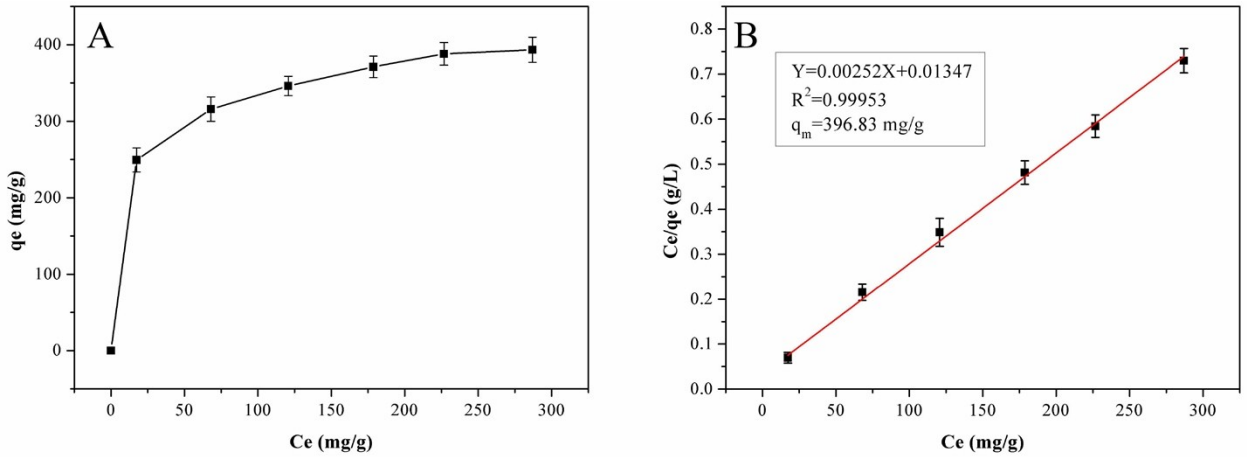


Figure S3. (A) Adsorption isotherm of Cr(VI) onto the PEI-PVA microspheres (adsorbent does, 10 mg; volume of the medium, 20 mL; pH, 2.0; contact time, 36 h and temperature, 25℃); (B) Fit of equilibrium data to Langmuir isotherm model.

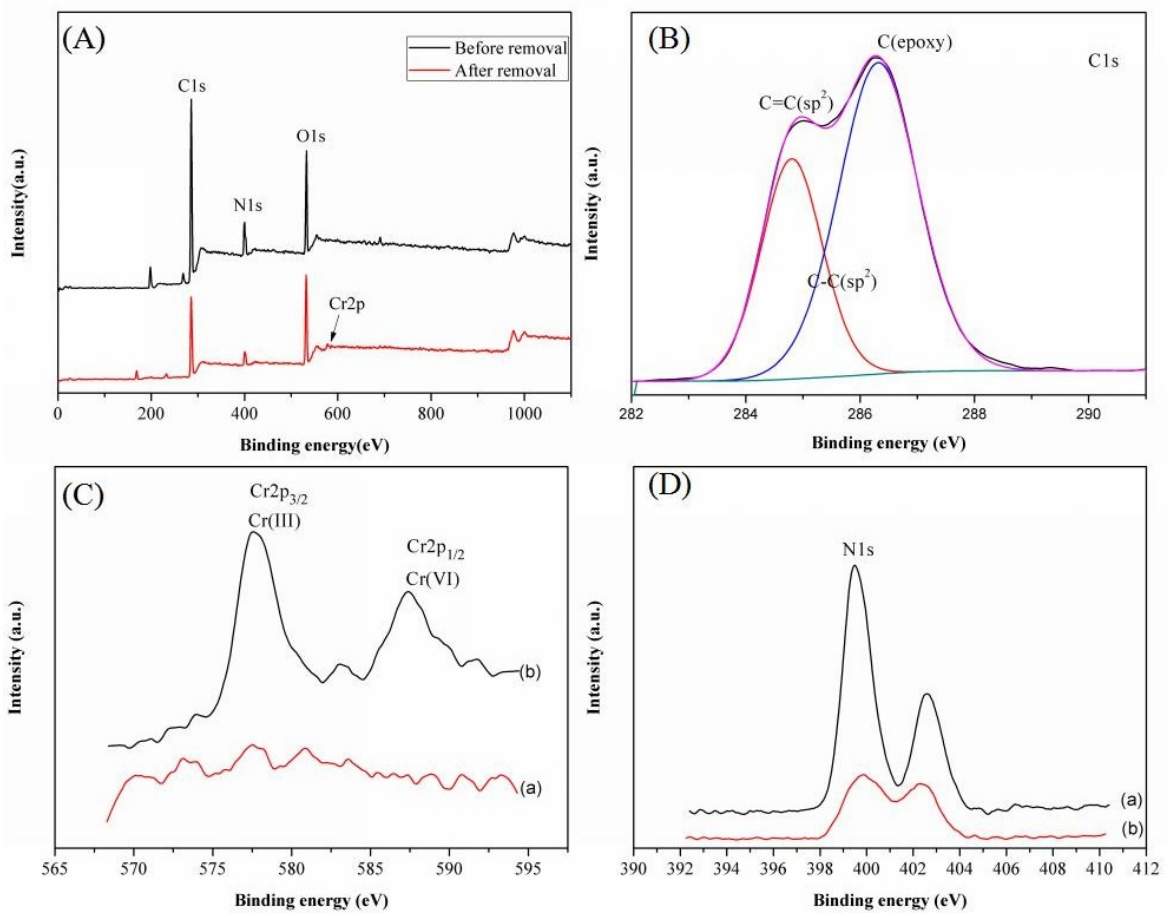
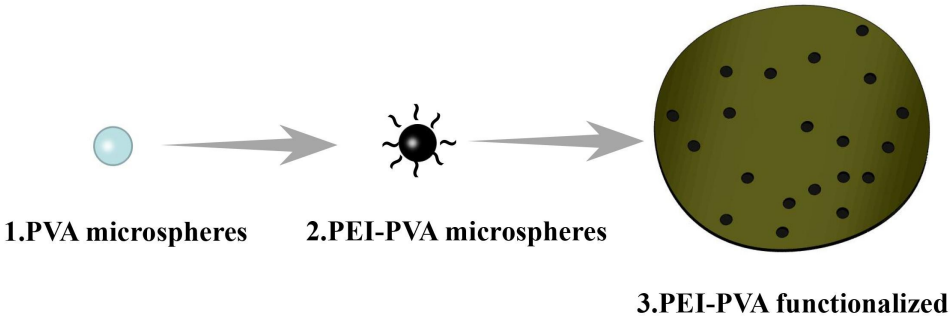
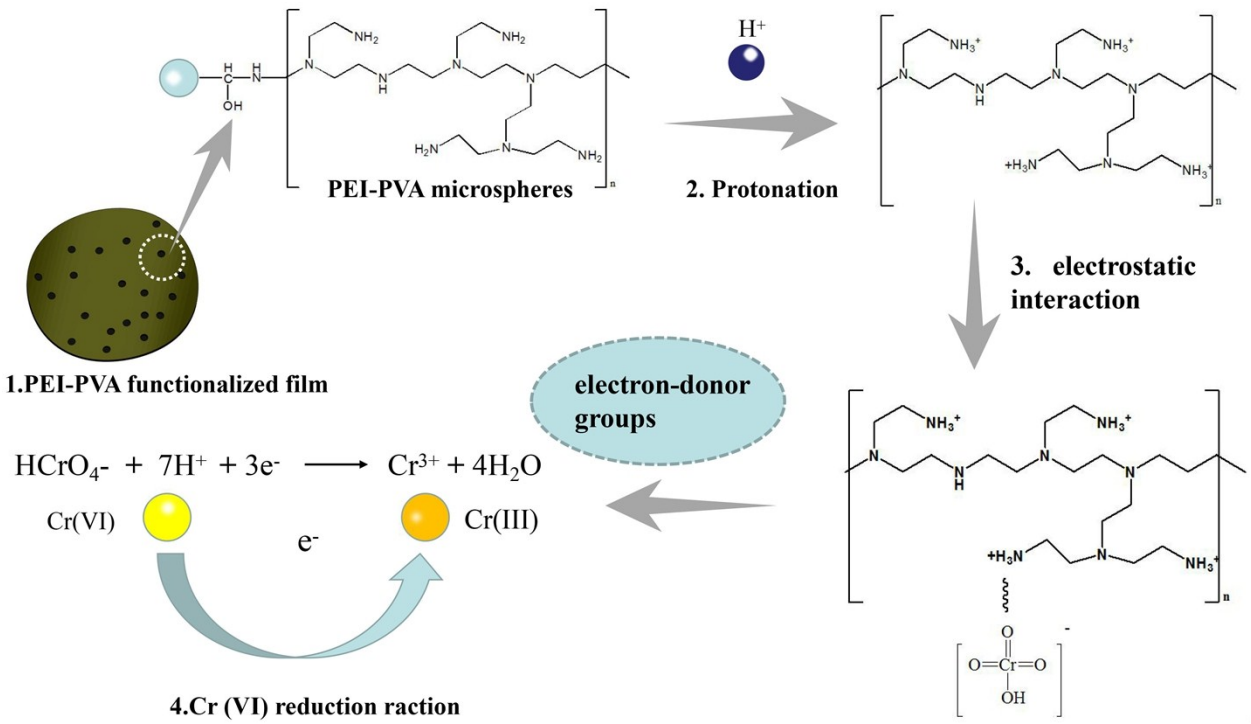


Figure S4. (A) Full-range XPS spectra of PPF before and after adsorption of Cr (VI) ions, (B) XPS spectra of C1s of PPF, (C) XPS spectra of Cr2p of PPF before (a) and after (b) adsorption of Cr (VI) ions, (D) XPS spectra of N1s (a) and after (b) adsorption of Cr (VI) ions.



Scheme S1. Schematic illustration of the fabrication process of PEI-PVA functionalized film.



Scheme S2. Schematic illustration of the PPF and its mechanism for the Cr (VI) removal.

Table S1. Fit of equilibrium data to Langmuir isotherm model.

Metal ion	K	q_m	R^2
Cr (VI)	0.18701	396.825	0.99953

Table S2. Comparison of Maximum Adsorption Capacity of Cr(VI) on PEI-PVA microspheres with Other Adsorbents.

Materials	Experiment condition	q_{max}	Ref
GO	pH=2	65.2	[27]
GO-MnO_2-Fe_3O_4	pH=5	193.1	[28]
MWCNTs (HNO_3)	pH=2	9.5	[29]
MnO_2-Fe_3O_4-o-MWCNTs	pH=2	186.9	[30]
Polyaniline nanowires	pH=5	86.84	[31]
PPy-PANI	pH=2	227.27	[32]
Fe_3O_4-PPy	pH=2	209.2	[33]
PANI	pH=3	198.67	[34]
glycine doped polypyrrole	pH=2	217	[35]
PEI-GO-Fe_3O_4	pH=2	266.6	[36]
PEI-PVA microspheres	pH=2	396.825	This study

Table S3. Kinetics parameters for Cr(VI) adsorption onto PEI-PVA microspheres with different concentrations

Concentration of Cr (VI) ions (mg/L)	q_e (mg/g)	k_2 (g mg^{-1} min^{-1})	R^2
160	218.34	0.000196	0.9958
200	318.47	0.000119	0.9950
250	363.64	0.000080	0.9959