Electronic Supplementary Information

Hyperbranched Multiple Polythioamides Made from Elemental Sulfur for Mercury Adsorption

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Experimental Section

Preparation of SPD-0.33: 0.3539 g (11.06 mmol) of elemental sulfur and 0.3488 g (2.76 mmol) of DEB were added into a 20 mL glass vial equipped with a magnetic stir bar in air. 1.76 mL of pyridine was added into the tube and stirred at 100 °C, sulfur and DEB were dissolved immediately. Then 0.5474 g (0.91 mmol) of PEI dissolved in 1 mL of pyridine was injected with a syringe and kept for 3 h before cooled to room temperature. The rigid solid product was digged out and immersed into 100 mL of methanol and stirred with a magnetic stir bar overnight at room temperature to remove unreacted PEI and DEB. The powders were filtrated and immersed into 20 mL of pyridine and heated to 100 °C. After stirred for 30 min, mixture was filtrated immediately at a high temperature to remove unreacted sulfur and washed with methanol for three times (3 × 20 mL) to remove pyridine. At last, the powder was dried under vacuum at 50 °C overnight and smashed by grinder into particles with 200 meshes sieve before use.

Preparation of S+PEI: 0.8500 g (1.42 mmol) of PEI was added into a 20 mL glass vial equipped with a magnetic stir bar in air and stirred at 100 °C. As soon as the 0.2015 g (6.30 mmol) of elemental sulfur was added into the glass vial, light yellow PEI turned into homogeneous deep red, the fluid was too viscous to be stirred by magnetic in 5 minutes. When cooled to room temperature after 3 h, glass like red solid was obtained and smashed by grinder into powders with 200 meshes sieve before use.

Preparation of S+DEB: 0.2179 g (6.81 mmol) of elemental sulfur and 0.2148 g (1.70 mmol) of DEB were added into a 20 mL glass vial equipped with a magnetic stir bar in air. 1.70 mL of pyridine was added into the tube and stirred at 100 °C, sulfur and DEB were dissolved

immediately. There were precipitate produced after 2 h, the mixture was immersed into 100 mL of methanol after 3 h and stirred overnight at room temperature to remove unreacted DEB. The precipitate were filtrated and immersed into 20 mL of pyridine and heated to 100 °C. After stirred for 30 min, mixture was filtrated immediately at a high temperature to remove unreacted sulfur and washed with methanol for three times (3 × 20 mL) to remove pyridine. At last, the powder was dried under vacuum at 50 °C overnight and smashed by grinder into particles with 200 meshes sieve before use.

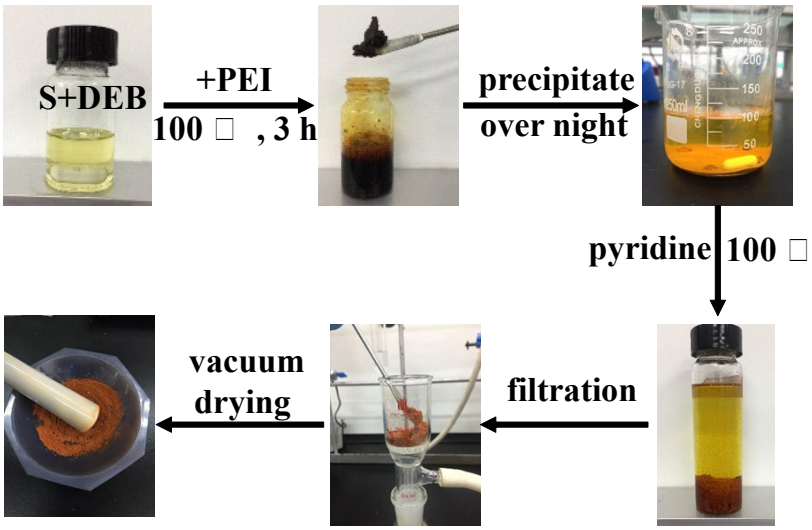

Figure S1. Preparation processes of SPDs.

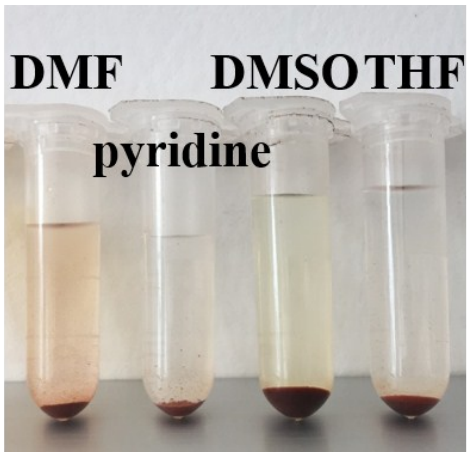

Figure S2. Insolubility of SPDs in solvents.

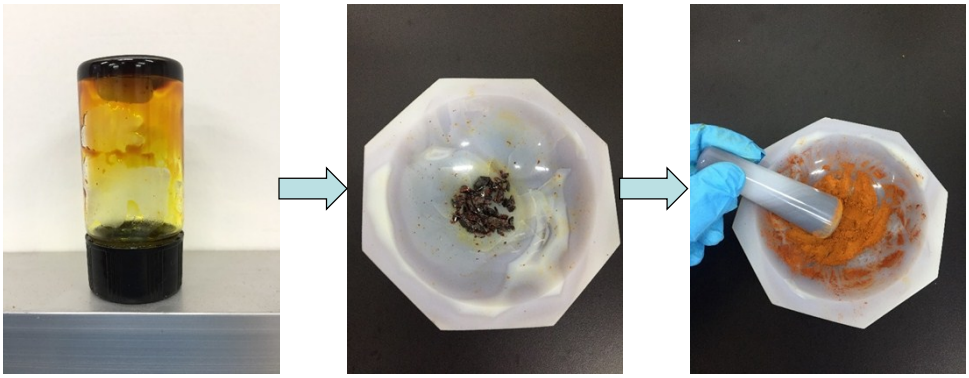

Figure S3. Preparation of sulfur and PEI reacted matrix (S+PEI).

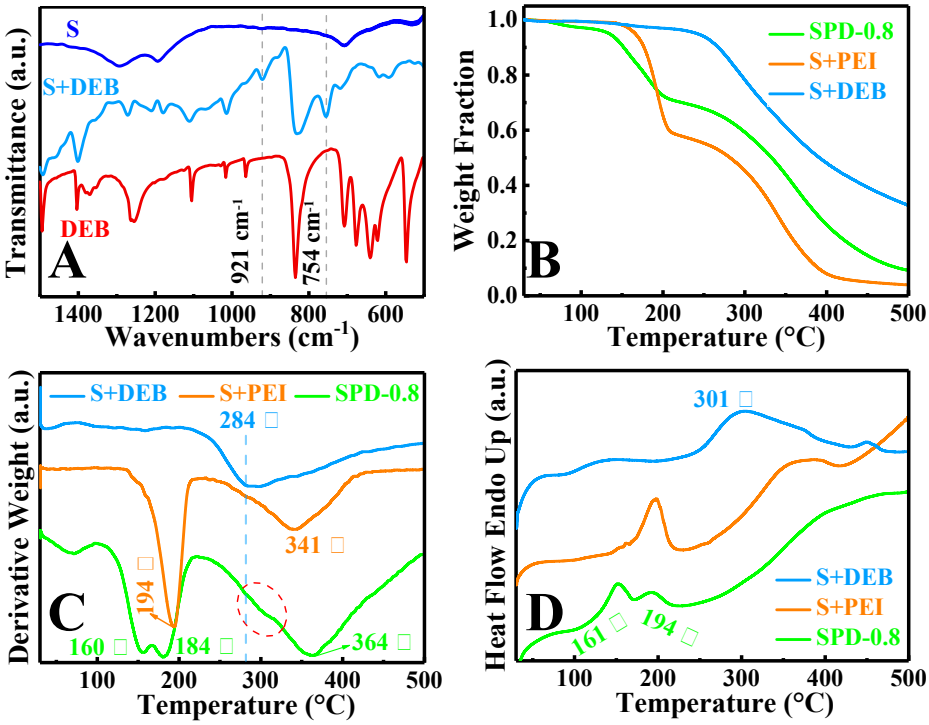

Figure S4. (A) FT-IR spectra (B) TG, (C) DTG, and (D) DSC curves of S+DEB, S+PEI and SPD-0.8 copolymers.

Table S1 Elemental analysis of S+DEB

Material	Elemental analysis			
	C (%)	S (%)	N (%)	H (%)
S+DEB	50.62	39.42	0.36	3.13

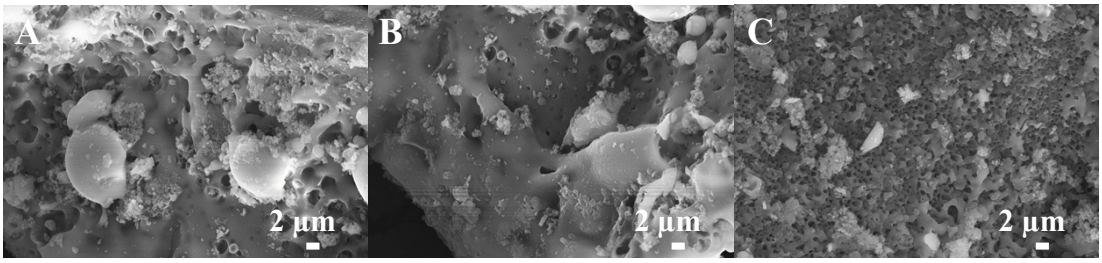

Figure S5. SEM images of particles of SPD-0.33 before immersed into [Hg2+] solution.