Supporting Information

Macroporous Polymer Monoliths Fabricated by Using Metal-Organic Coordination Gel Template

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Preparation of M-BTC coordination gels. To prepare M-BTC coordination gels, 0.6 mmol iron nitrate nonahydrate (0.25 g) or cobaltous nitrate (0.18 g) and 0.4 mmol H_3BTC were each dissolved in each 4 ml solvent (typically ethanol) containing 20 μL triethylamine (which is catalyst to deprotonate H_3BTC without binding to metal ions). The metal and ligand solution were mixed together, then yellow-brown gels for Fe^{III}-BTC coordination and mauve gels for Co^{III}-BTC coordination were rapidly obtained in 2-5 min.

The M-BTC gel could also be constructed in the presence of organic polymer precursors. Either mixing this gel (in ethanol) with ethylene dimethacrylate (EDMA) and glycidylmethacrylate (GMA) (2:1:1, v/v) or directly conducting it in the mixture of ethanol, EDMA and GMA (2:1:1, v/v) could get the M-BTC gel in similar appearances (Fig. 1S). The obtained gel was relatively stable in such organic polymer precursors mixture if sealed and stored in a 4 ^{0}C refrigerator. But the polymerization would be occurred when this gel-polymer precursors mixture was UV irradiated (365nm) or thermally initiated in the presence of ca. 1 wt % azoisobutyronitrile (AIBN) initiator (with respect to the monomers).

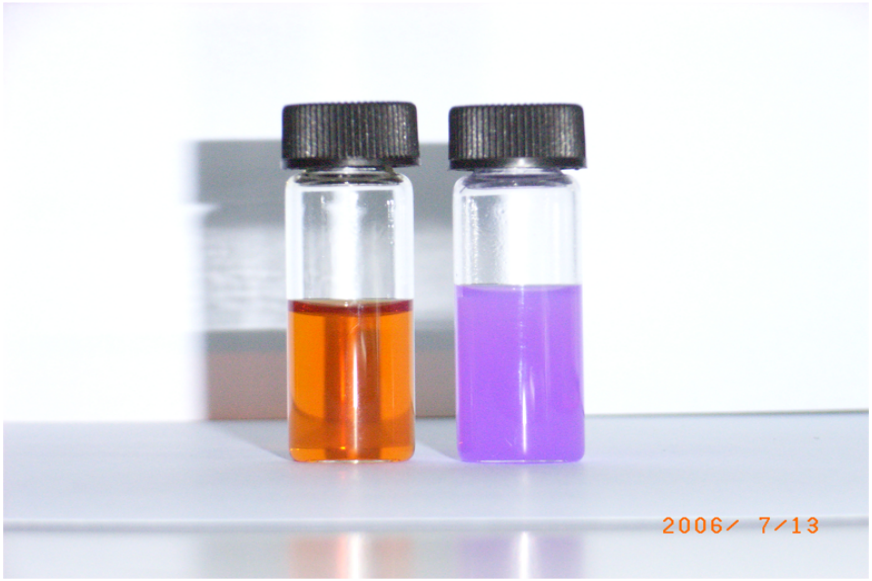

Fig. 1S Fe-BTC and Co-BTC gels produced in organic polymer precursors

Preparation of rigid macroporous polymer monoliths, macroporous membrane and the reference monolith. The rigid macroporous polymer monolith was prepared by a facile molding protocol using M-BTC gel template. The polymer precursors consisted of 3.0 ml of coordination gel, 1.0 ml EDMA, 2.0 ml GMA and 25 mg AIBN. The mold, a stainless steel column (4.6 mm i.d.× 100 mm), was sealed at one end, filled with the pre-polymerization mixture and then sealed the other end. The polymerization was then triggered by heating in a water bath at a temperature of 60 ^{0}C. After polymerization, the seals were removed, the column was provided with fittings, attached to a HPLC pump, and then 0.25 M H_2SO_4 aqueous solution, water, acetone and methanol were pumped through the monolith to remove the templates and any other soluble compounds which remained in the pores.

The macroporous P(GMA-co-EDMA) membrane was prepared by a similar method but using UV-irradiated polymerization. The polymer precursors was filled in a glass plate, and then irradiated by a 40 W UV365 lamp. After polymerization at 10 ^{0}C for 36 h, the Fe-BTC template was removed by washing with 1 M hydrochloric acid, leaving a P(GMA-co-EDMA) membrane with 2-5 um macropores. The porous membrane exhibited both softness and friability.

The reference monolith was prepared by the in-situ polymerization within a stainless-steel tube. A mixture of GMA (1.0 mL), EDMA (0.5 mL), dodecanol (0.5 mL), methanol (2.5 mL) and triethylamine (20 μL) with AIBN (20 mg) was filled into a stainless-steel tube (50 mm × 4.6 mm i.d), sealed at both ends, and then allowed to proceed at 55 °C for 24 h. After the polymerization, the seals were removed and the column was provided with fittings, attached to the HPLC system. Tetrahydrofuran (THF) was pumped through the column at a flow-rate of 0.1 mL/min under 45 °C to remove the porogen and other soluble compounds present in the polymer rod.

Monolithic HIC stationary phase. HIC monolith was prepared by hydrolyzing the GMA epoxide moiety in the macroporous monolith with 0.25 M H_2SO_4 aqueous solution at 70 ^{0}C. Then the HIC monolith was washed with deion water to neutral pH, followed by methanol and finally DI water.

Separation of proteins on the prepared macroporous HIC monolith. Separation of proteins was applied on the resulting HIC monolithic column with a Shimadzu Prominence 20A HPLC system. Mobile phase gradient was set as: (A) 2.5 M $(NH_4)_2SO_4$ aqueous solution and (B) 0.1 M NaCl aqueous solution containing 2% 2-propanol (volume proportion), linear gradient from 100% A to 100% B within 5 min, flow-rate 3.0 mL/min. The proteins were detected at a UV wavelength 280 nm.