

Design of a Semi-Continuous Selective Layer Based on Deposition of UiO-66 Nanoparticles for Nanofiltration

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TGA profiles

The plateau in the range of 250–400 °C and the final residual at 600 °C corresponded to the chemical formula of $\text{ZrO}(\text{CO}_2)_2(\text{C}_6\text{H}_4)$ and ZrO_2 , respectively. The organic content was reported based on the weight loss in the range of 300–600 °C relative to ZrO_2 as a final residual.

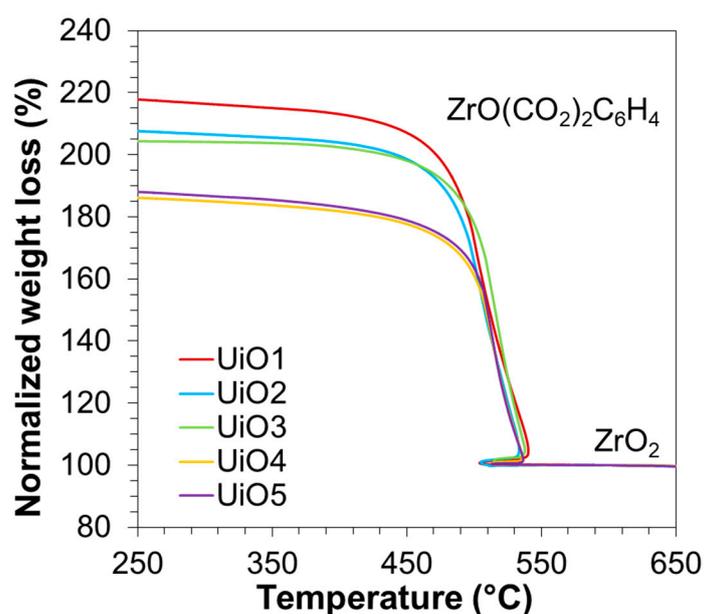


Figure S1. TGA profiles of UiO-66 nanoparticles.

N₂ adsorption/desorption measurement

N₂ adsorption and desorption isotherms of UiO1 and UiO5 were acquired at 77 K using a BELSORP-max instrument (BEL JAPAN, Inc.). 20–30 mg of a sample was charged into a sample cell and sealed with a brass filler and a rubber cap. The sample was outgassed at 150 °C for 24 h *in vacuo* prior to the measurement. The BET surface areas of UiO1 and UiO5 were determined as 804 m²/g and 1119 m²/g, respectively. The micropore size distribution was calculated using the grand canonical Monte Carlo method using BELMaster7™ software.

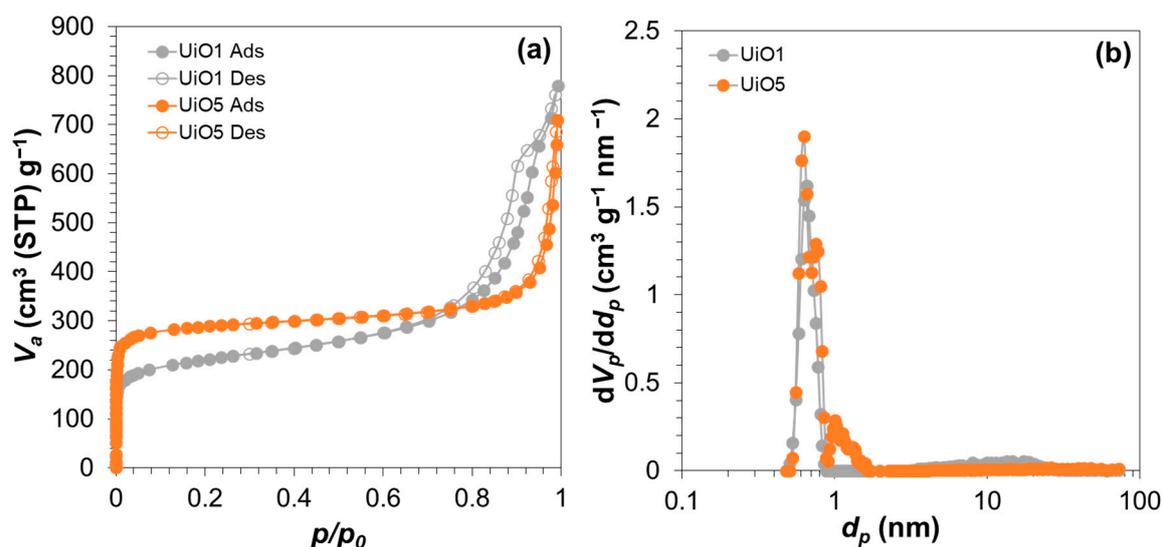


Figure S2. N₂ adsorption/desorption results for UiO1 and UiO5 nanoparticles: (a) Isotherms; (b) micropore size distribution.

Performance in elongated filtration

The performance of the composite membranes was investigated for a longer time of period, where an aqueous solution of MB of an appropriate concentration was continuously filtered during the filtration in order to maintain the MB concentration of the feed solution at 1.0 μM. The result of the filtration is shown in Figure S3. It was found that nearly 100% rejection was maintained up to 2500 mL of the permeate and the duration over 400 min.

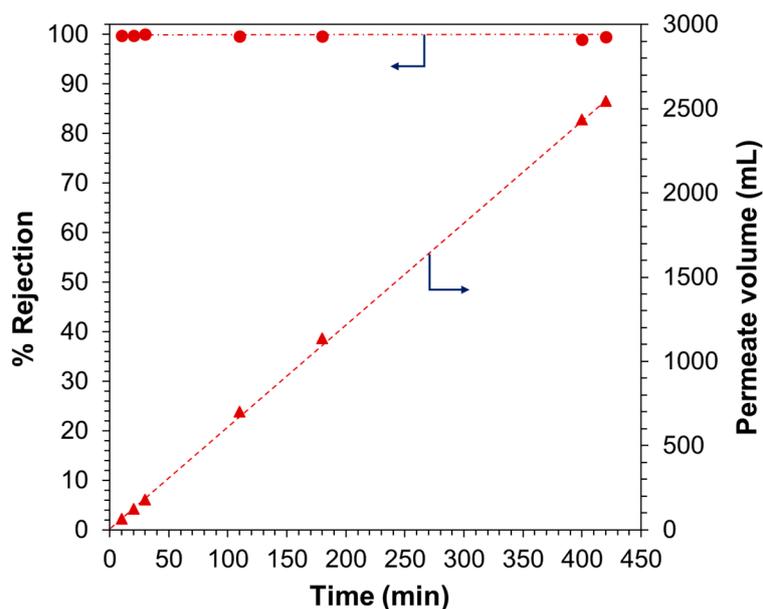


Figure S3. Performance of the UiO1 composite membrane in an elongated filtration.

Cross-sectional SEM images for UiO5 composite membranes at different loadings

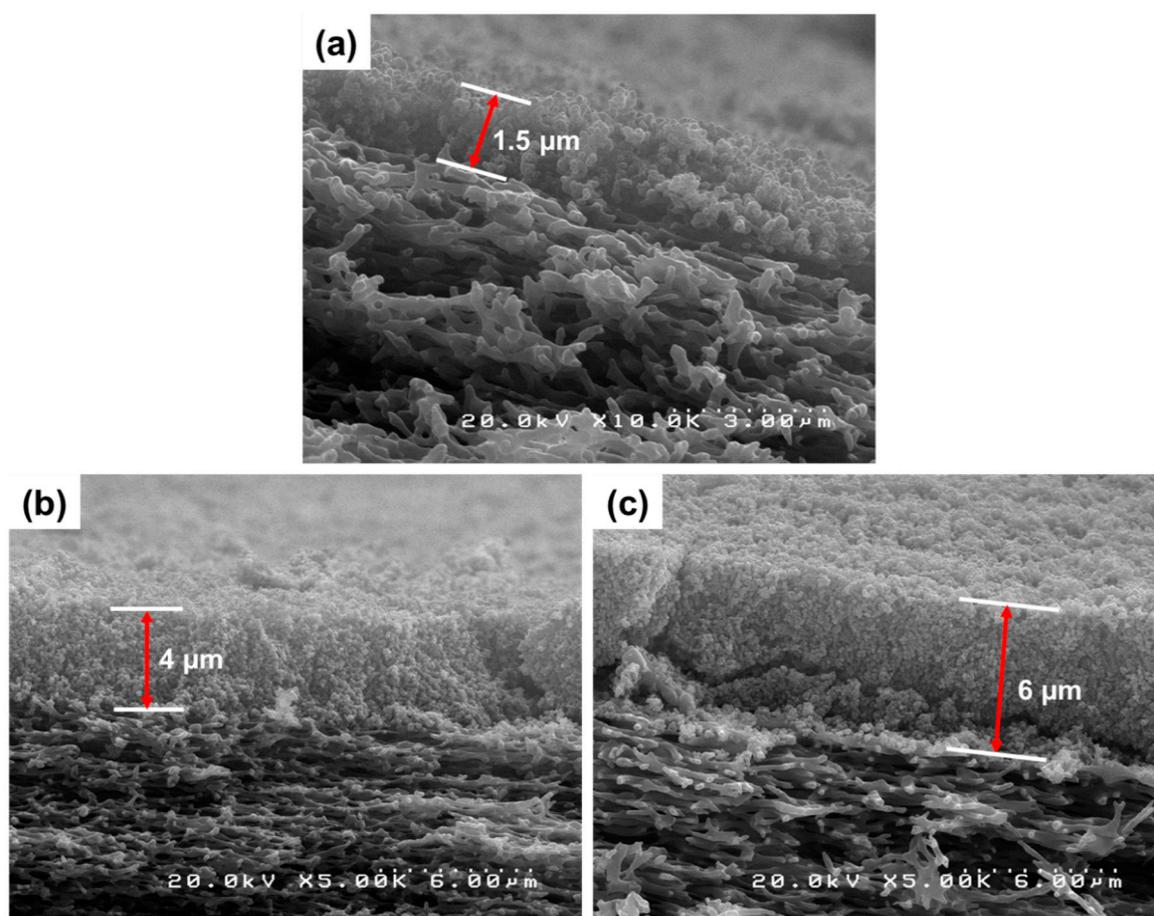


Figure S4. Cross-sectional SEM images of the UiO5 composite membranes at different loadings: (a) 1.0 mg; (b) 3.0 mg; (c) 4.0 mg.



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