Electronic supplementary information

Simultaneously Covalent and Ionic Bridging towards Antifouling of GO-imbedded Nanocomposite Hollow Fiber Membranes

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1. Molecular structure of sPPSU

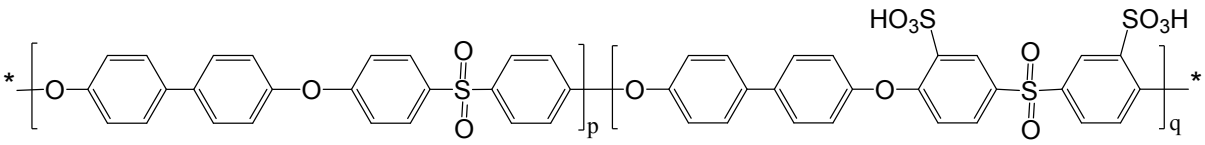

Figure S1. Molecular structure of 1.5sPPSU, where p:q = 98.5:1.5.

2. Polymer dope preparation

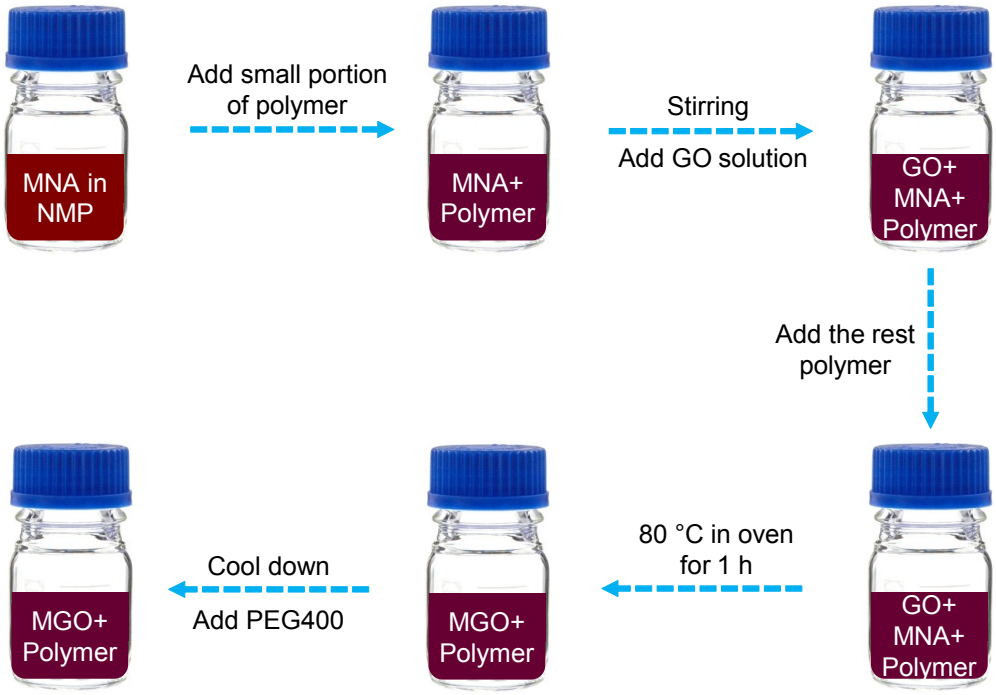

Figure S2. Preparation of MGO-sPPSU dope solutions.

3. Characterizations of the sPPSU hollow fiber membranes

Figure S3 summarizes the membrane morphology. It is observed that decreasing the NMP content in the bore fluid results in a thicker wall and a larger outer diameter. Additionally, increasing the bore flow rate induces a more severe die swell, slightly expands the hollow fiber but significantly narrows the wall thickness. All membranes are outer-selective and macrovoid-free with high porosity in their cross-sections. The inner surfaces of sPPSU-A2 and sPPSU-A3 membranes appear to be more porous than those of sPPSU-B2 and sPPSU-B3

ones because the former uses a weaker bore coagulant (90 wt% NMP) which induces a slower phase inversion and creates a more porous inner surface than the latter.

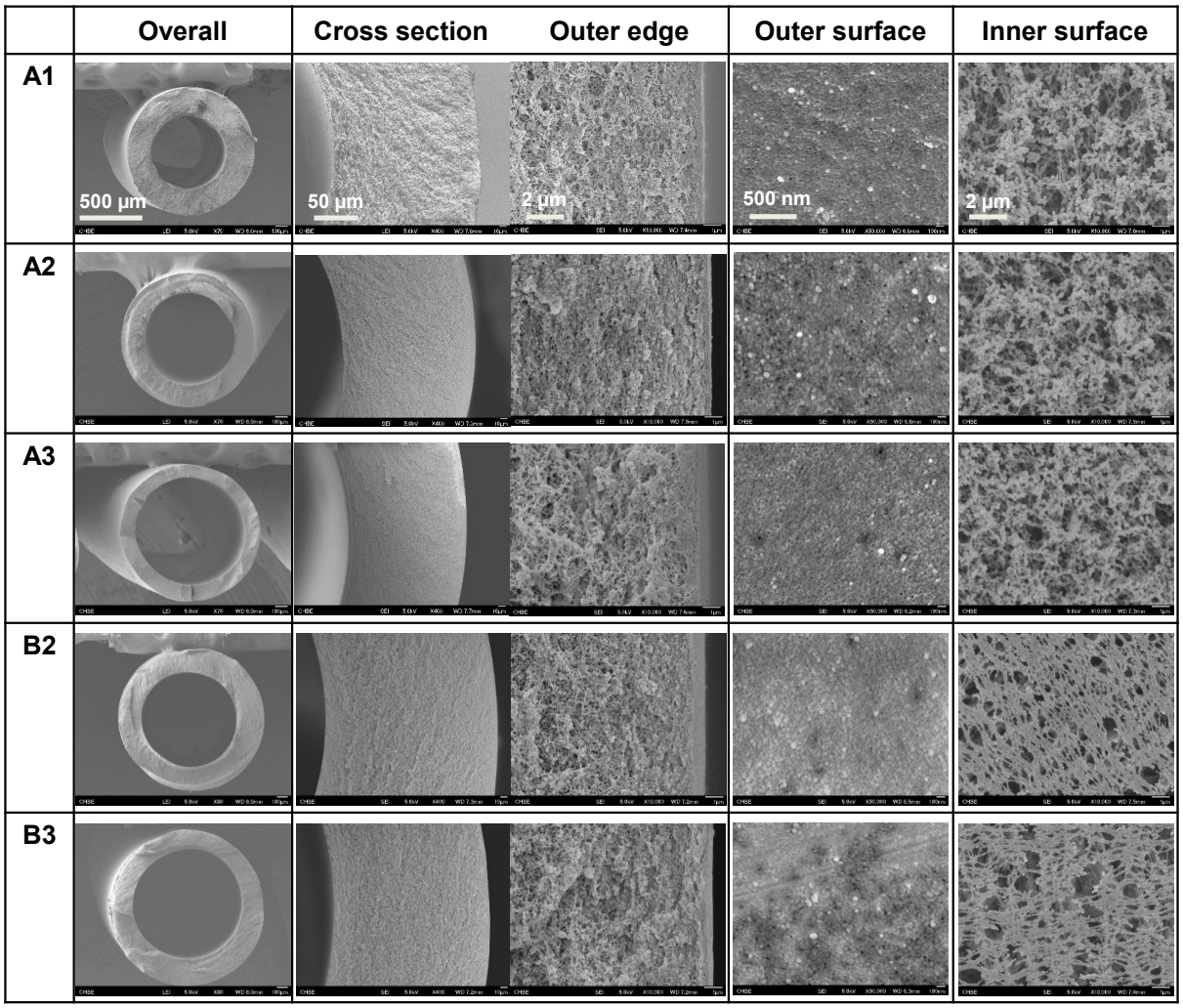

Figure S3. Morphology of the sPPSU hollow fiber membranes.

Figure S4 compares the PWP and PEO rejection of the sPPSU hollow fiber membranes as functions of bore fluid flow rate and chemistry. The PEO rejection shows an up-and-down trend from sPPSU-A1 to sPPSU-A3 with an increase in bore fluid rate. The rejection increases from sPPSU-A1 to sPPSU-A2 is possibly due to a greater bi-axial orientation induced on the outer skin by a higher bore flow rate. However, when the bore flow rate is further increased, additional surface defects may be created, which results in a higher PWP but a lower rejection. The sPPSU-B2 and sPPSU-B3 membranes exhibit somewhat lower PWP and PEO rejections compared to sPPSU-A2 and sPPSU-A3 possibly because the former

has a faster phase inversion than the latter. As a consequence, the former fibers have a tighter substructure than the latter ones.

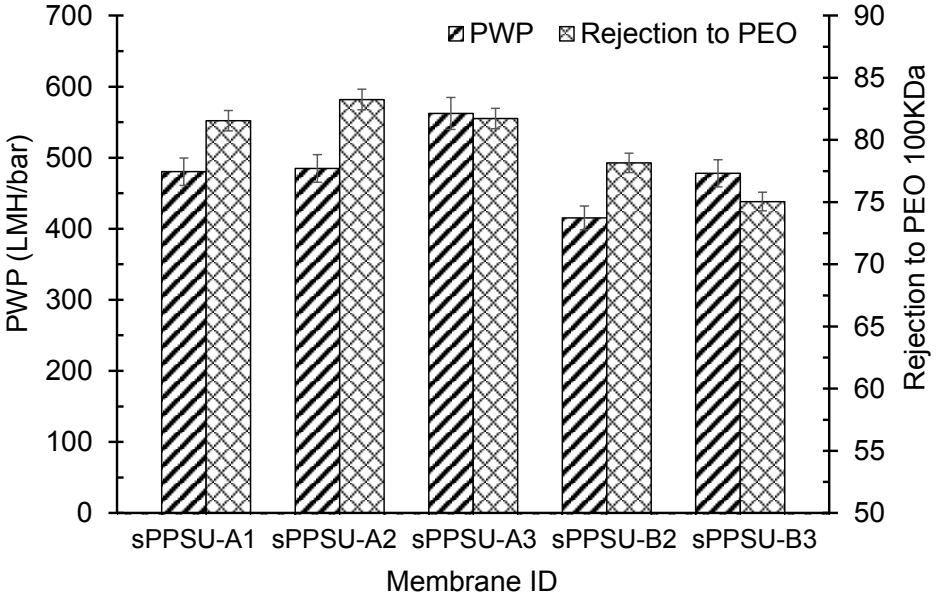

Figure S4. PWP and PEO rejection of the sPPSU hollow fiber membranes.

4. ATR-FTIR spectra

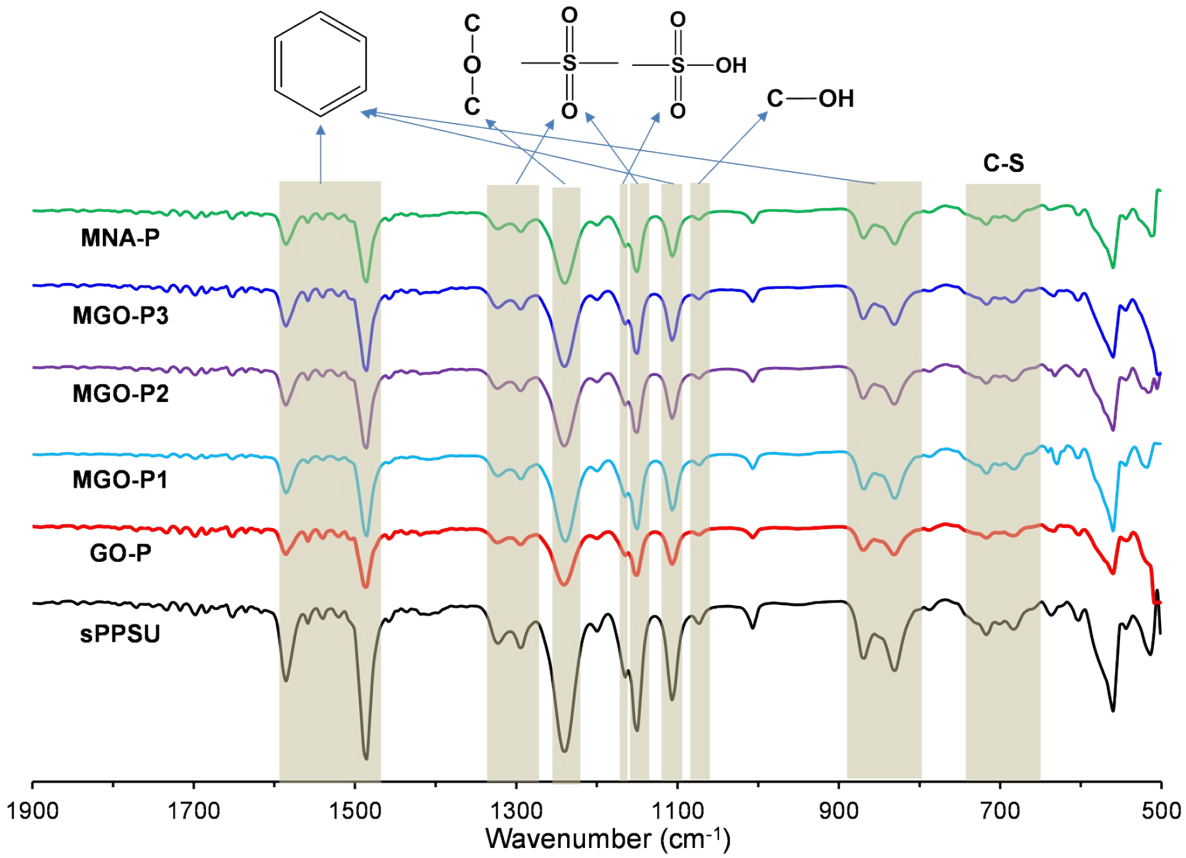

Figure S5. FTIR spectra of sPPSU, GO-sPPSU, MGO-sPPSU and MNA-sPPSU flat-sheet membranes.