Electronic Supplementary Material (ESI) for Materials Chemistry Frontiers.
This journal is © the Partner Organisations 2016

Electronic Supplementary Information

Cross-Linked Perforated Honeycomb Membranes with Improved Mechanical and Chemical Properties

Qi-Zhi Zhong,[†a] Li-Wei Zhang,[†a] Yang Ou,[a] Bai-Heng Wu,[a] Ling-Shu Wan[*a, b] and Zhi-Kang Xu[a, b]

[a]MOE Key Laboratory of Macromolecular Synthesis and Functionalization, Department of Polymer Science and Engineering, Zhejiang University, Hangzhou 310027, China

[b]Key Laboratory of Adsorption and Separation Materials & Technologies of Zhejiang Province, Zhejiang University, Hangzhou 310027, China

[†]Both authors contributed equally to the present work.

[*]Corresponding Author. E-mail: lswan@zju.edu.cn

Table S1. Statistical analysis of perforated honeycomb membranes prepared from different PS-*b*-PDMAEMA/SIS ratios. The concentration of PS-*b*-PDMAEMA was fixed at 1 mg mL^{-1}. d_t: Pore diameter of top surface, d_b: pore diameter of bottom surface, l_t: pore center-to-center distance of top surface, and l_b: pore center-to-center distance of bottom surface.

PS-*b*-PDMAEMA/SIS	d_t(μm)	d_b(μm)	l_t(μm)	l_b(μm)	d_t/d_b	l_t/l_b
1:1	5.3±0.2	4.0±0.2	7.4±0.3	7.5±0.3	1.3	1.0
1:2	4.2±0.2	3.9±0.2	5.7±0.3	5.8±0.3	1.1	1.0
1:3	3.3±0.2	3.4±0.2	4.3±0.2	4.3±0.3	1.0	1.0
1:4	7.0±1.3	9.0±2.4	8.7±1.7	16.8±3.1	0.8	0.5

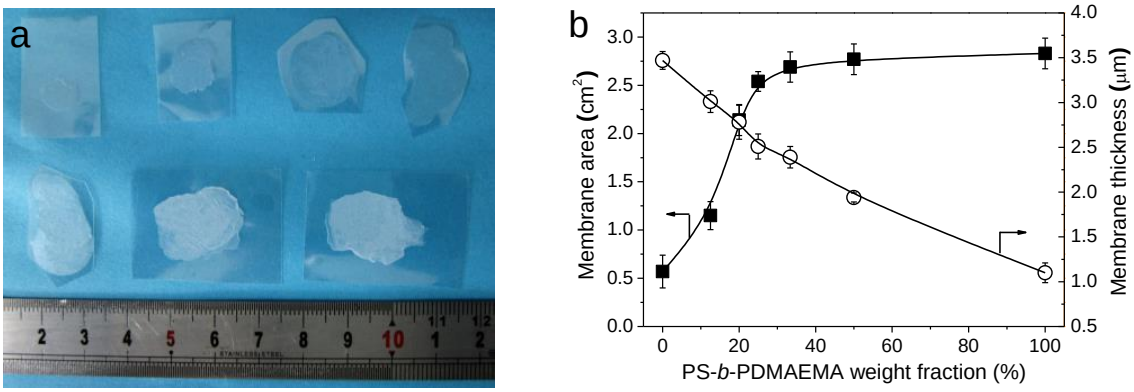

Fig. S1 (a) Digital photographs of the prepared honeycomb membranes with different PS-*b*-PDMAEMA weight fractions. (b) Effects of PS-*b*-PDMAEMA weight fractions (from 0% to 100%) in PS-*b*-PDMAEMA/SIS blends on the membrane area and membrane thickness.

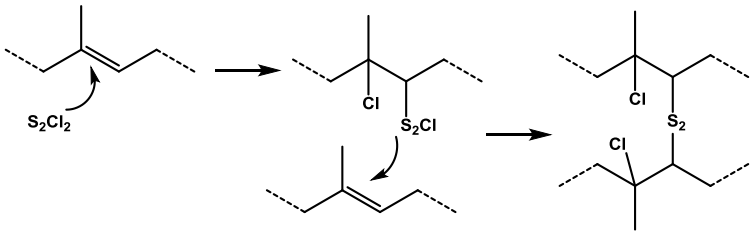

Fig. S2. Vulcanization mechanism of SIS chains reacting with S_2Cl_2.

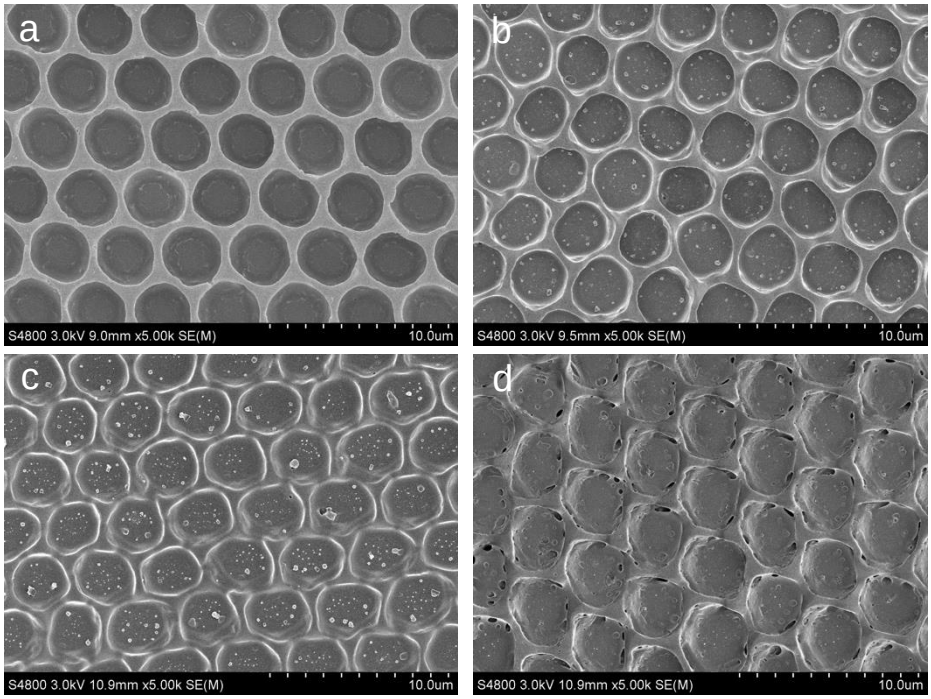

Fig. S3 Top-down SEM images of perforated honeycomb membranes with different vulcanization time. (a) 5 min, (b) 10 min, (c) 20 min, (d) 40 min.

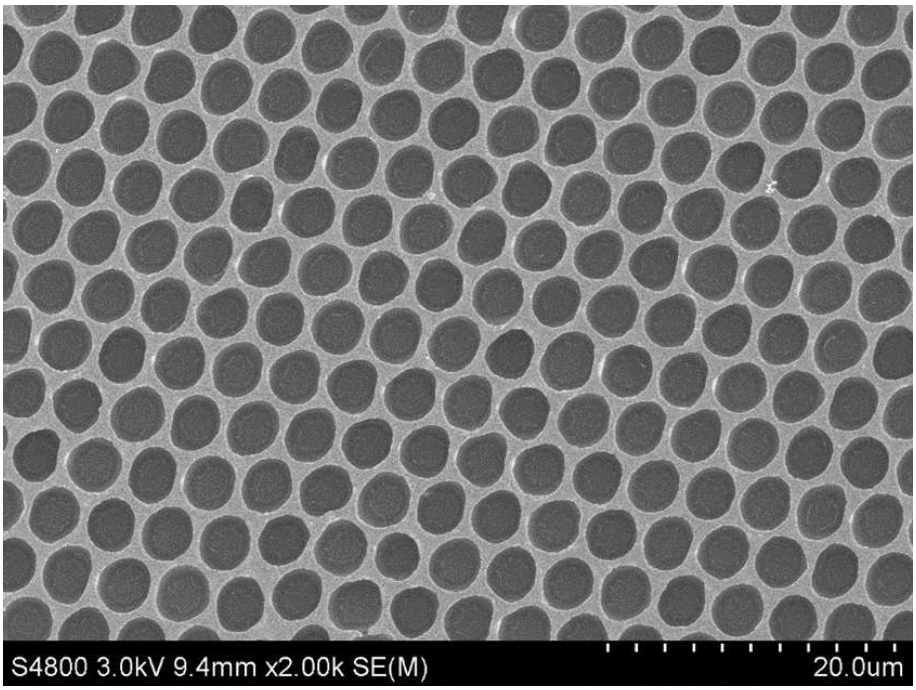

Fig. S4 SEM image of a cross-linked perforated honeycomb membrane after immersed in liquid nitrogen for 2 h.

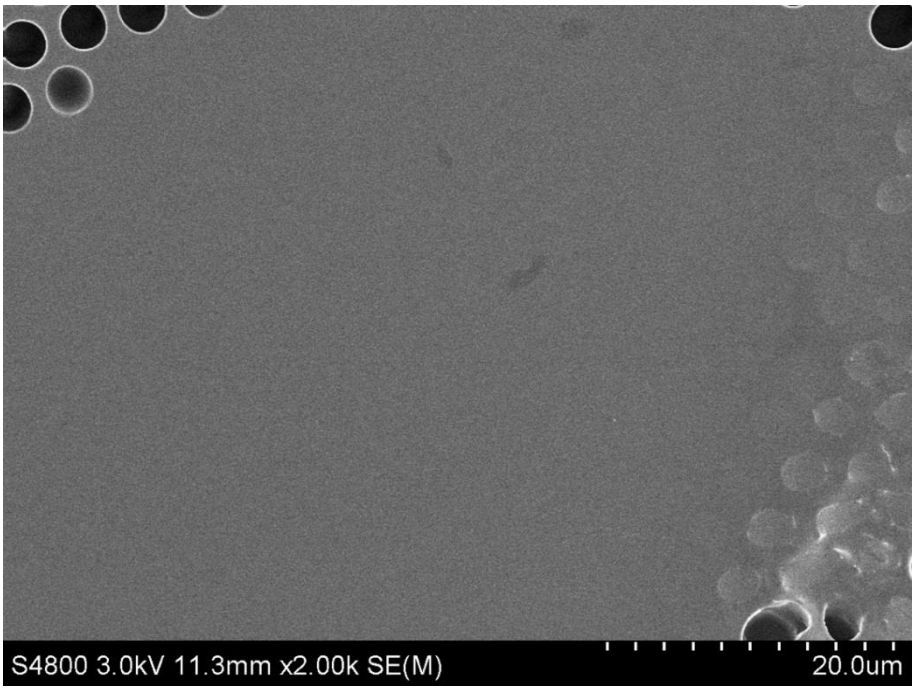

Fig. S5 SEM image of a perforated honeycomb membrane after thiol-ene cross-linking with TRIM at a concentration of 40 mg/mL.

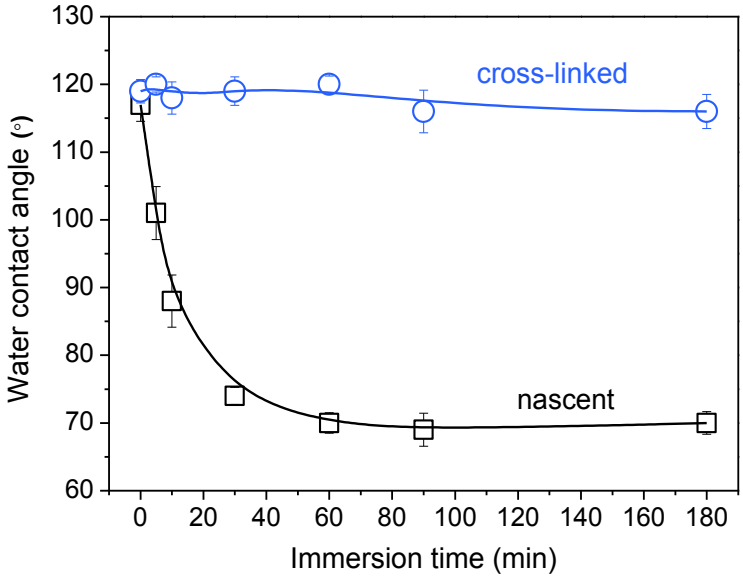

Fig. S6 Water contact angles of the nascent and cross-linked perforated honeycomb membranes after being immersed in toluene for different time.

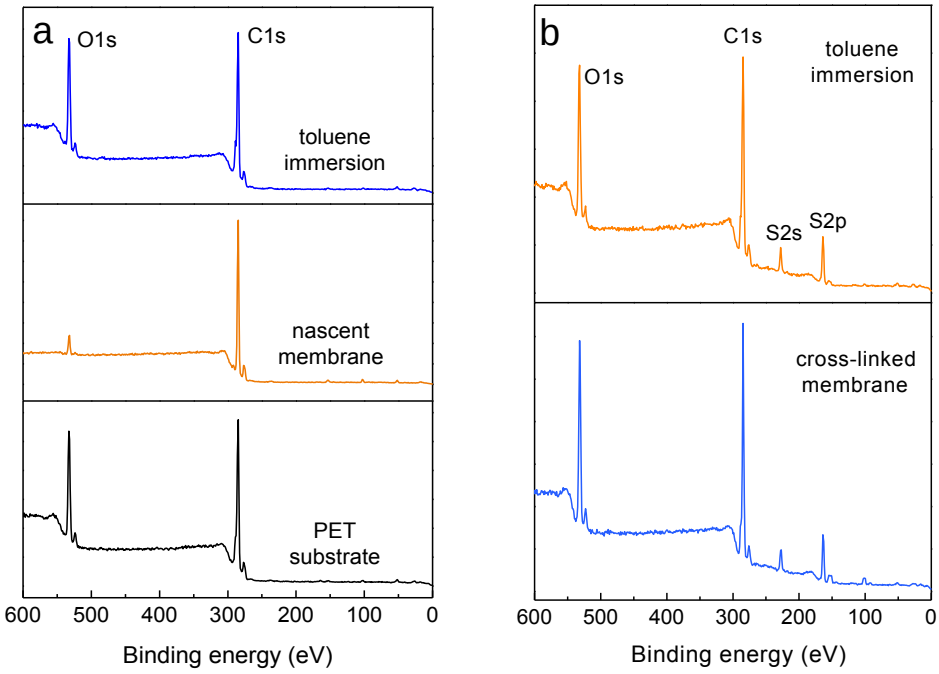

Fig. S7 XPS spectra of nascent (a) and cross-linked (b) perforated honeycomb membranes before and after being immersed in toluene for 180 min.

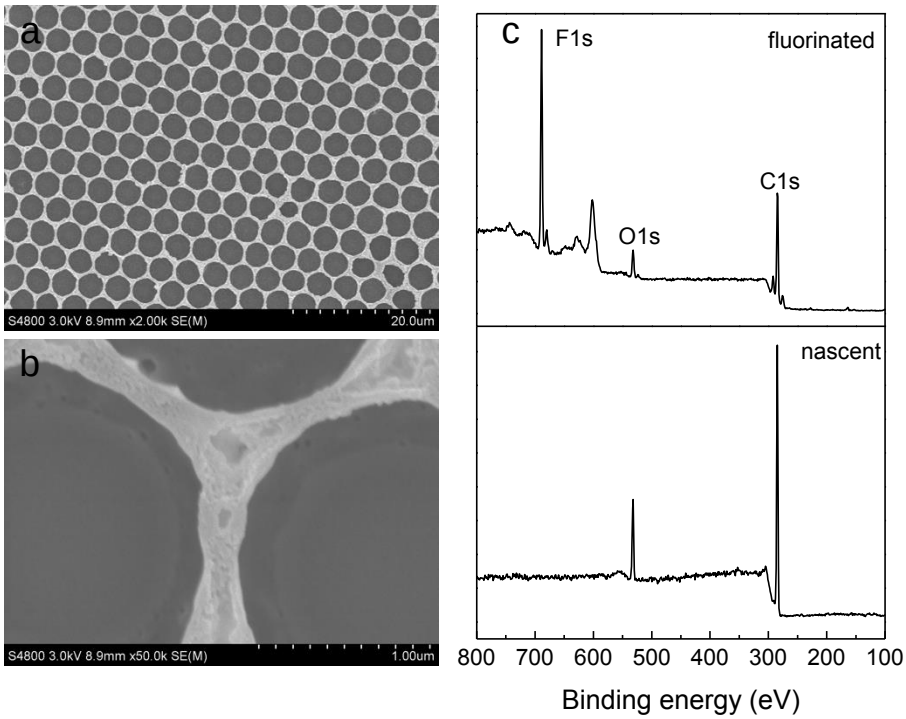

Fig. S8 (a,b) SEM images of fluorinated perforated honeycomb membranes. (c) XPS spectra of the nascent and fluorinated perforated honeycomb membranes. The concentration of PFDT was 40 mg mL^{-1} and the thiol-ene click reaction time was 2.5 h.

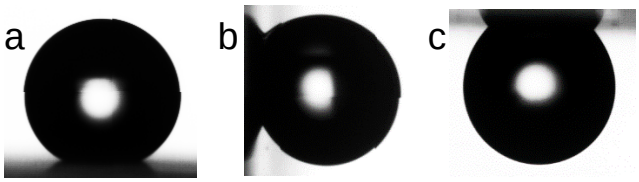

Fig. S9 Optical photographs of water droplets on fluorinated honeycomb membranes with different tilted angles.