Electronic Supplementary Material (ESI) for Soft Matter.

Reversible switch between the nanoporous and nonporous state of amphiphilic block copolymer films regulated by selective swelling

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Estimation on the porosity by comparing the change of thickness after ethanol swelling. The increased volume of the film by swelling is solely due to the presence of pores, therefore, the porosity is equal to the increase of the volume of the film after swelling. As the lateral area of the film deposited on the substrate remains unchanged before and after swelling, the porosity (φ), that is, the volume increase, can be described as the increase in thickness, which can be estimated by Equation S1:

$$\varphi=(h_2-h_1)/h_2 \qquad \text{(S1)}$$

where h_1 and h_2 are the thickness of the films before and after swelling, respectively. Therefore, the porosity of the film subjected to ethanol swelling at 70 ºC for 1 h was estimated to be 59.3% as its thickness increased from 94 nm to 231 nm after swelling.

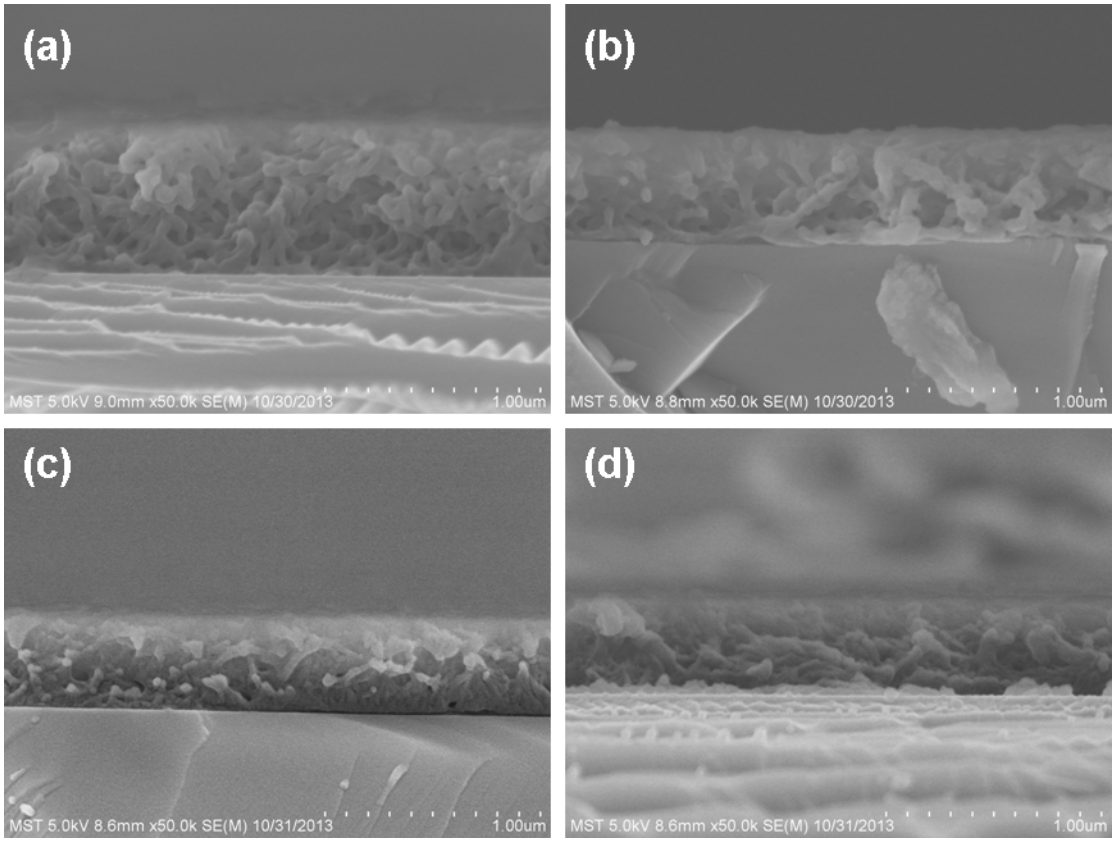

Figure S1. The cross-sectional SEM images of the porous S2VP films exposed in *n*PT for 0.5 h (a), 3 h (b), 8 h (c), and 12 h (d).

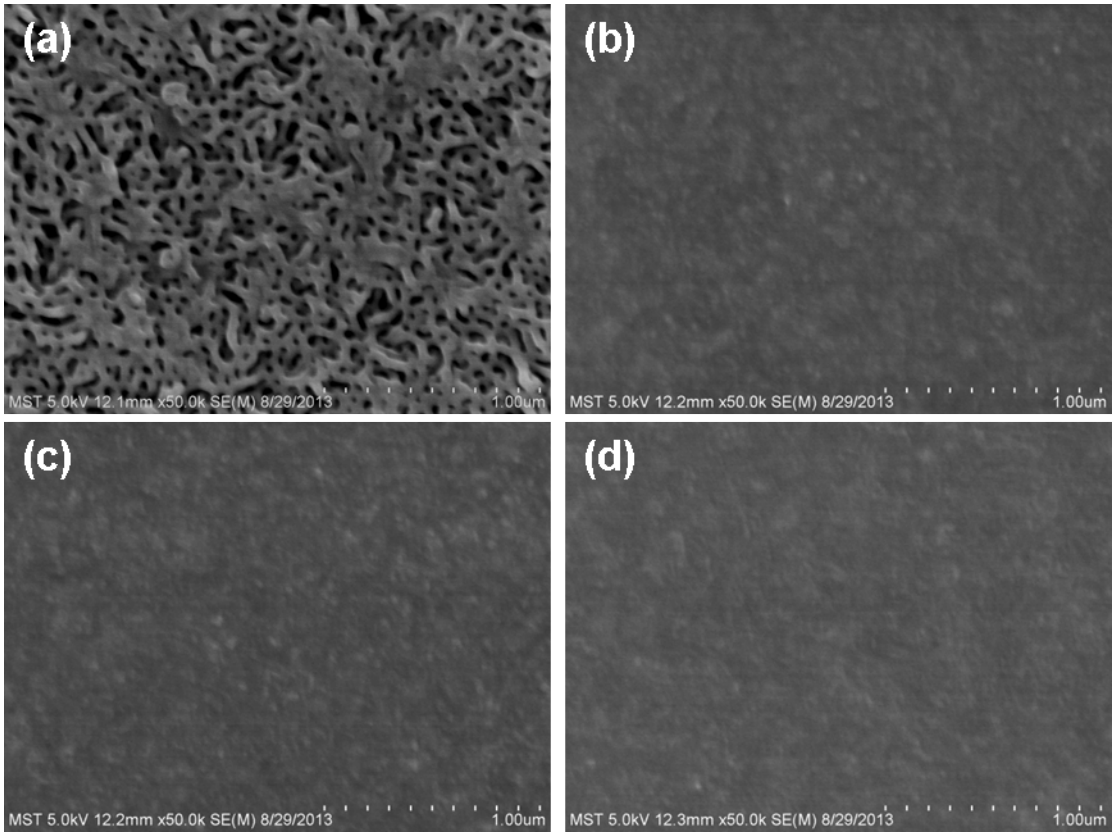

Figure S2. The surface SEM images of the PS-*b*-P2VP membrane exposed to CH at 30 ºC for 5 s (a), 10 s (b), 30 s (c), and 3 min (d).

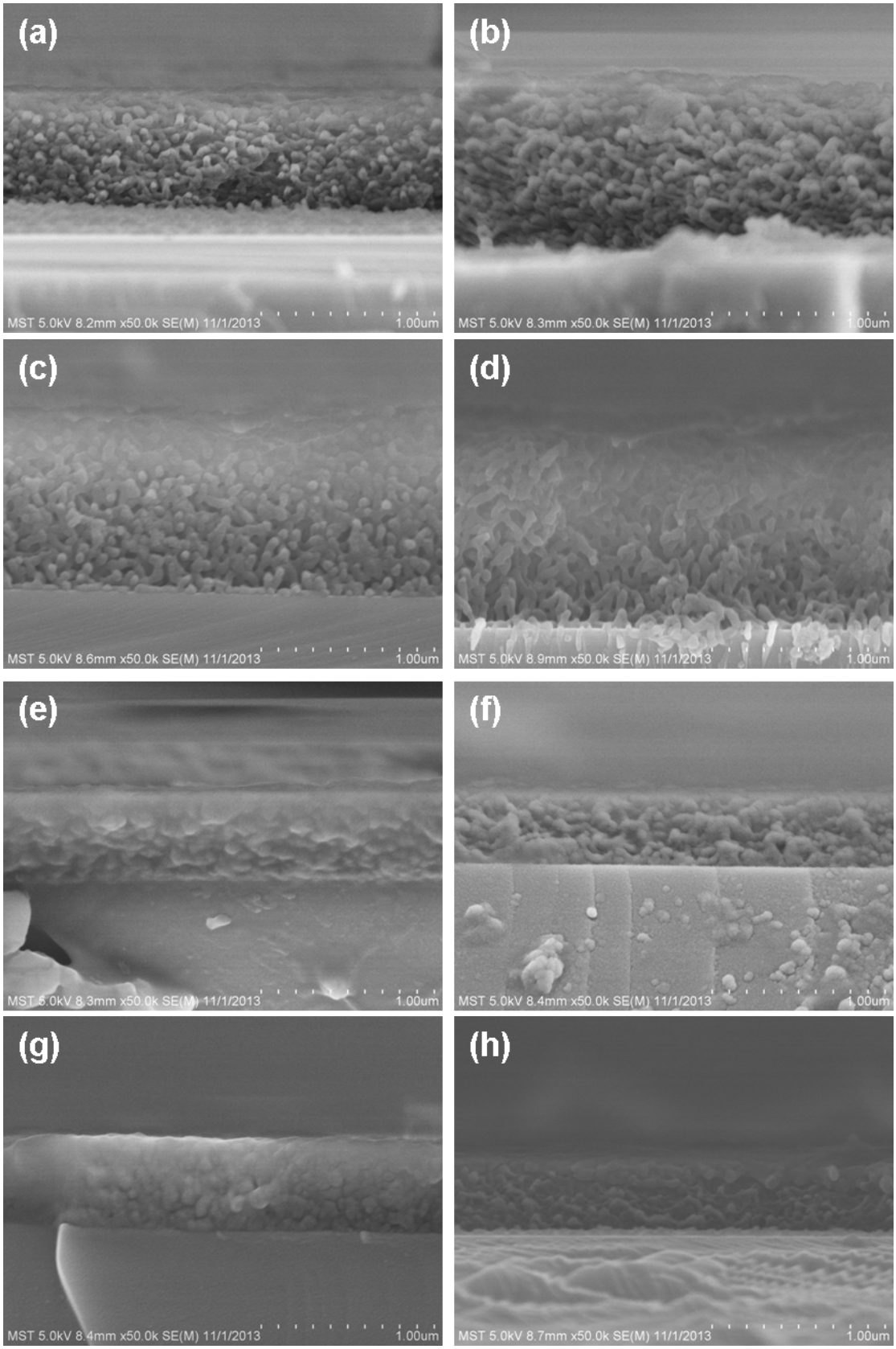

Figure S3. The cross-sectional SEM images of the pore-open (a-d) and pore-closed (e-f) S2VP films at a cycle number of 5 (a, e), 10 (b, f), 15 (c, g), and 20 (d, h).

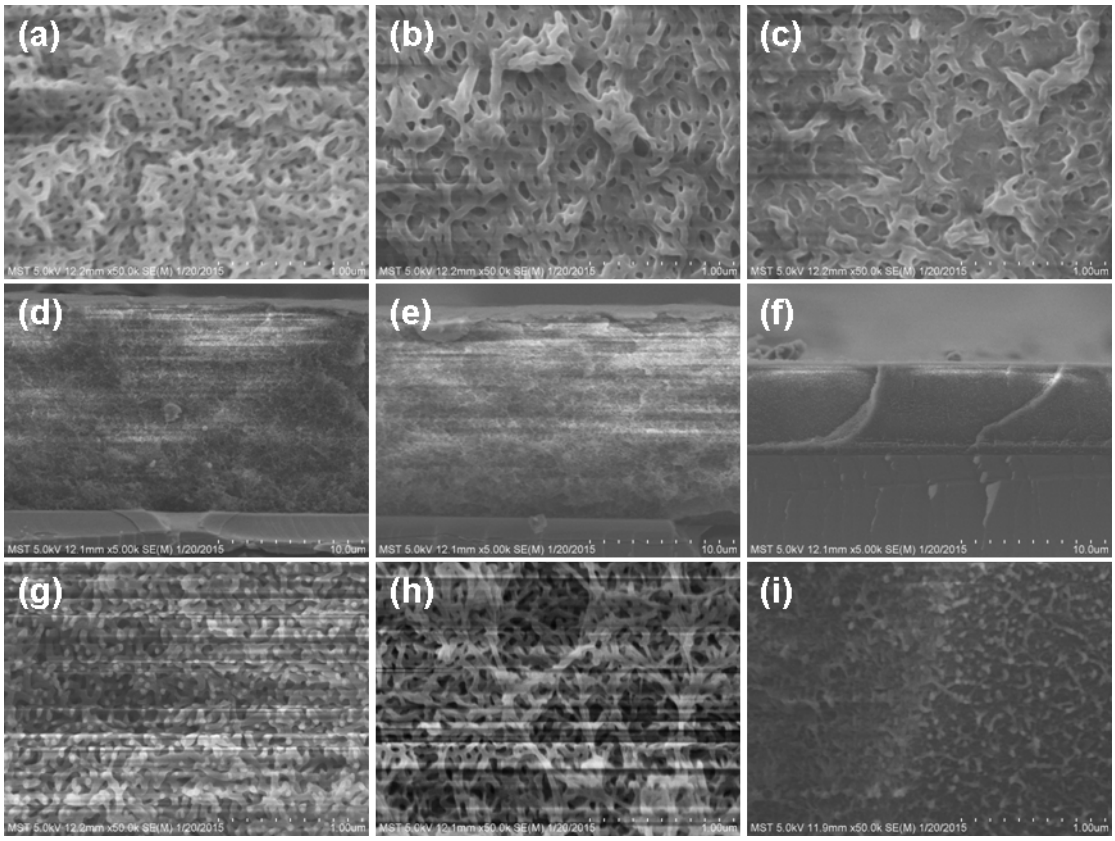

Figure S4. The surface (a-c) and cross-sectional morphologies (d-f) with higher magnitude (g-i) of the loaded S2VP films which are fully opened (a, d, g) or partially closed by immersion in CH at 30 ºC for 30 s (b, e, h) and 30 min (c, f, i).