Electronic Supplementary Material (ESI) for Polymer Chemistry.
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Supporting Information

Zwitterionic Polymer Brush Grafting on Anodic Aluminum Oxide Membranes by Surface-Initiated Atom Transfer Radical Polymerization

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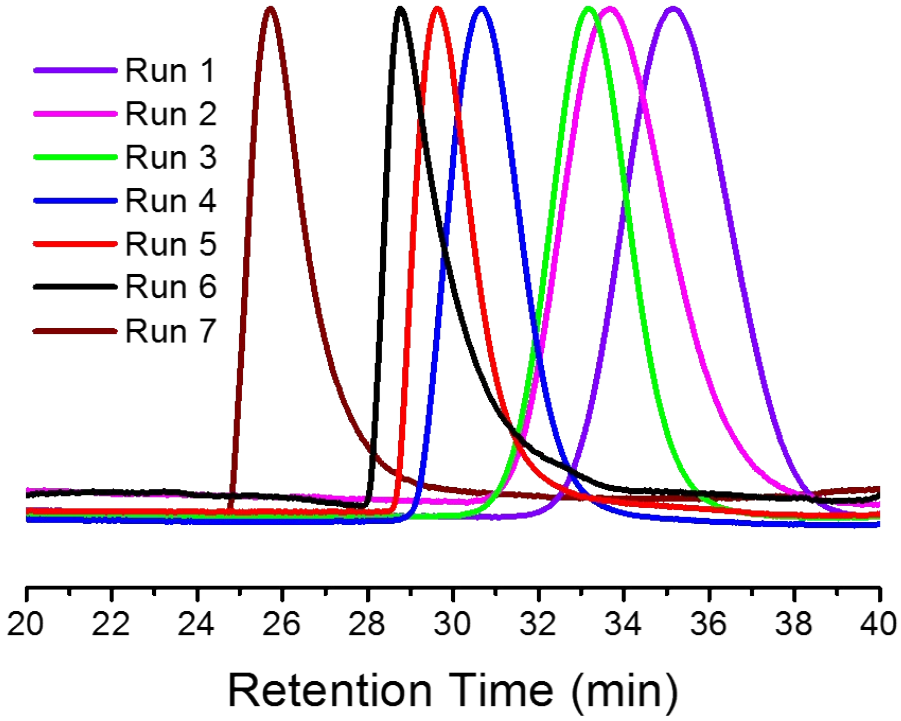

Figure S1. SEC data of unbound PMAPS polymers synthesized according to various experimental conditions (see Table 1).

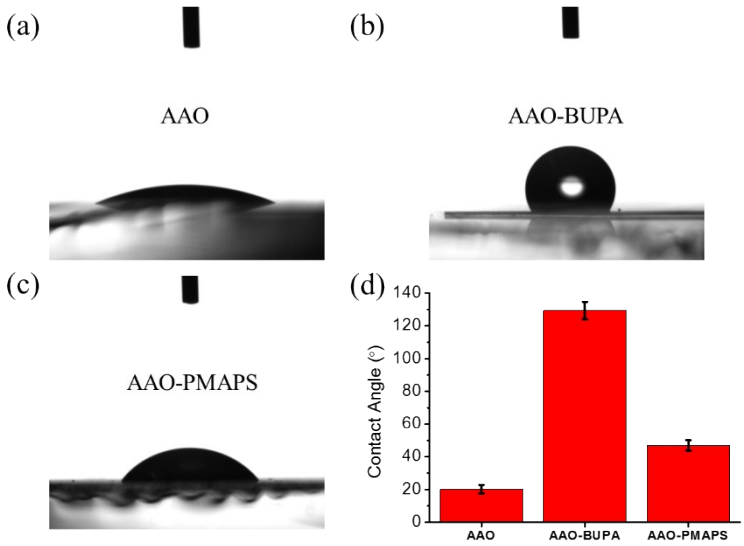

Figure S2. (a-c) Water droplets on different surfaces: (a) VUV-treated, (b) BUPA-immobilized, and (c) PMAPS-grafted AAO membranes. (d) Water contact angles on different surfaces.

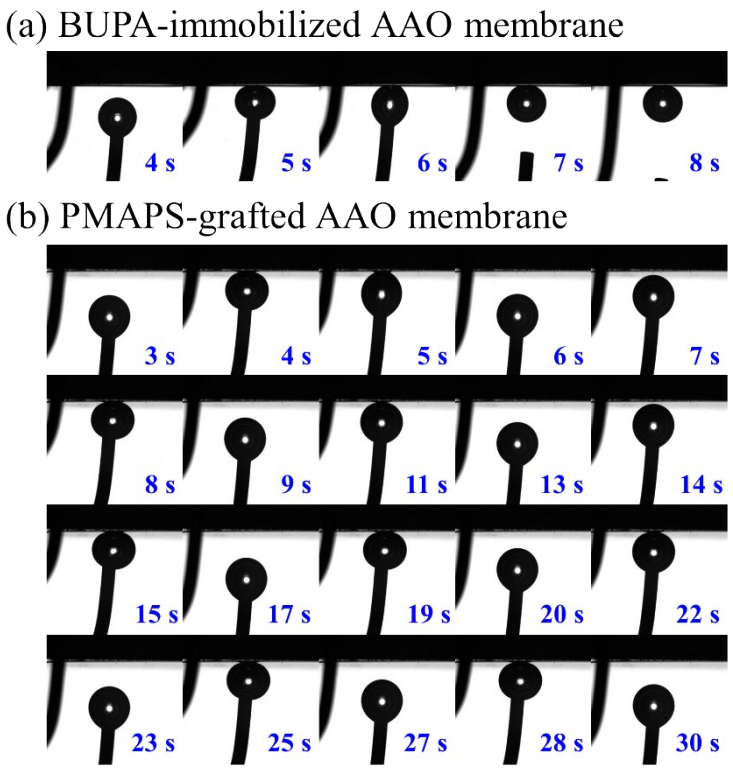

Figure S3. Successive time-lapse imaging of side views in air bubble approaching/separating cycles to (a) the BUPA-immobilized AAO membranes and (b) the PMAPS-grafted AAO membranes (Run 5). The air bubbles showed attachment for the BUPA-immobilized AAO membranes; non-attachment and smooth separation for the PMAPS-grafted AAO membranes. The non-attachment behavior in air bubble in water demonstrates the high hydrophilicity of

PMAPS-grafted AAO membranes under wet condition.

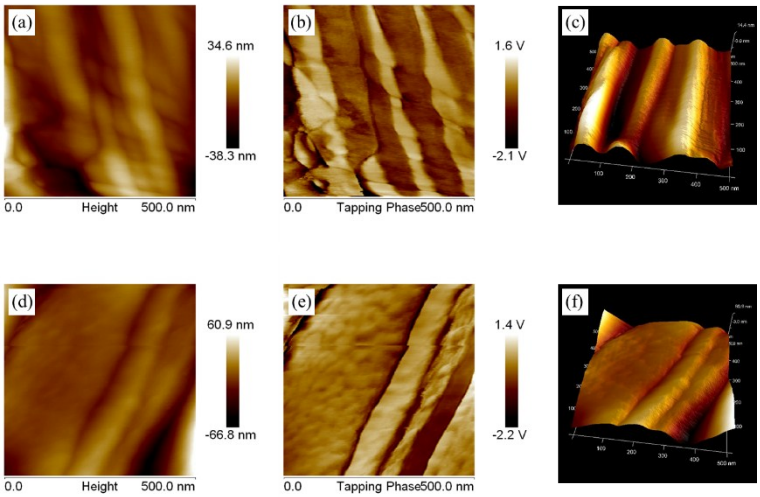

Figure S4. AFM images of the cross-sections of the VUV-treated (upper panels) and the PMAPS-grafted (lower panels) AAO membranes. (a) and (d): height images; (b) and (e): phase images; (c) and (f): 3D height images. The average pore diameter of the AAO membranes calculated from the cross-sectional SEM images using the Image J software is ~ 250 nm.

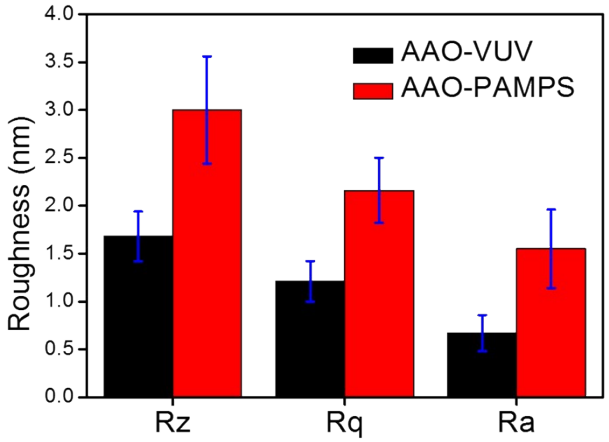

Figure S5. The roughness of the nanopore surfaces of VUV-treated (black columns) and PMAPS-grafted (red columns) AAO membranes, where R_z is the ten-point mean roughness, R_q is the root mean square roughness, and R_a is the arithmetical mean roughness. The roughness (either R_z, R_q, or R_a) of the PMAPS-grafted AAO membranes are higher than the corresponding roughness of the VUV-treated AAO membranes, which is consistent with the results of the cross-sectional SEM images. The inner walls of the AAO membranes are substantially flat because the anodic oxidation processes commonly produce well smooth inner walls due to the homogeneous growth of alumina structure. PMAPS brush grafting

causes slight roughening because of the molecular weight distribution and density distribution in the soft charged polymers.

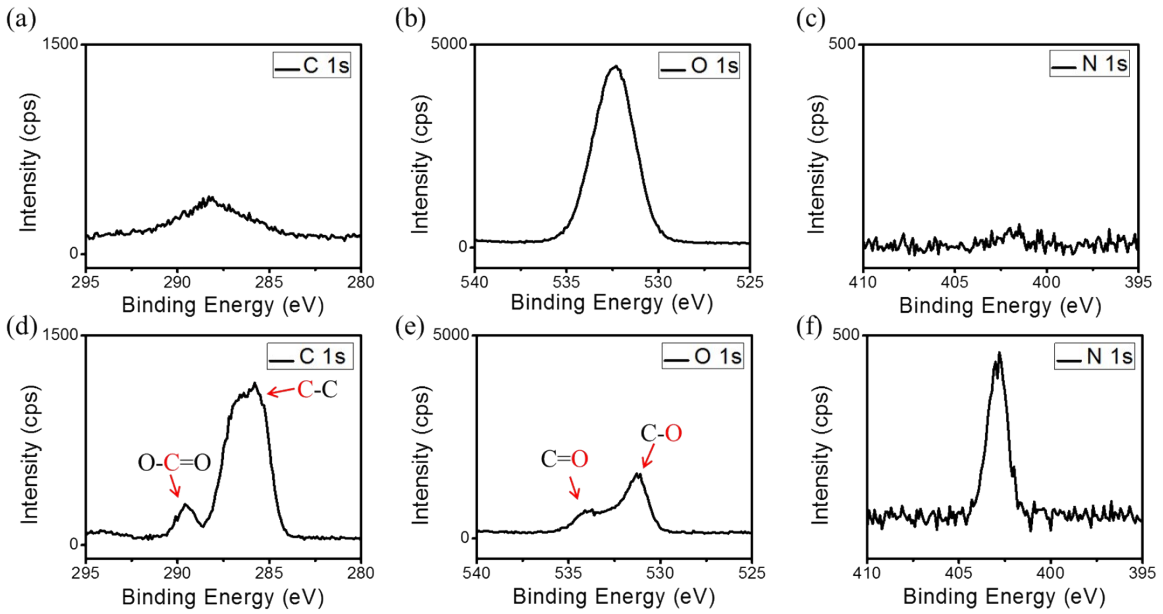

Figure S6. (a-c) High resolution XPS spectra of VUV-treated AAO membranes. (d-f) High resolution XPS spectra of PMAPS-grafted AAO membranes.

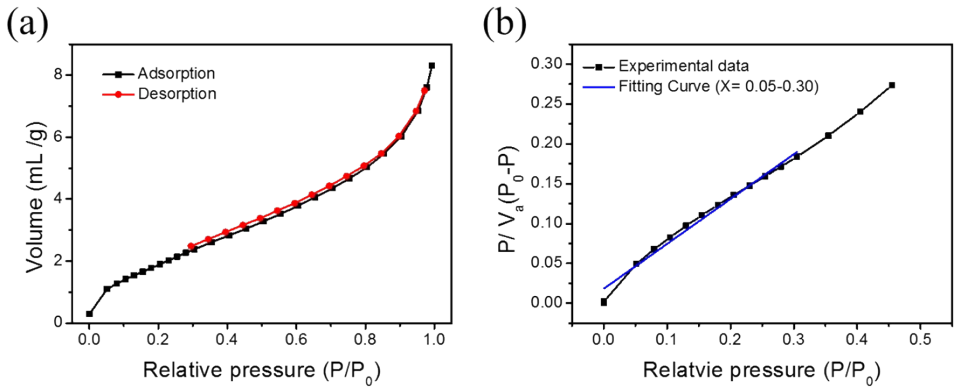

Figure S7. (a) Adsorption/desorption isotherm of VUV-treated AAO membranes. (b) Linear fitting curve from x = 0.05 to 0.30 using the BET theory. From the curve, the specific surface area (SSA) was estimated to be 7.97 $m^2 g^{-1}$.

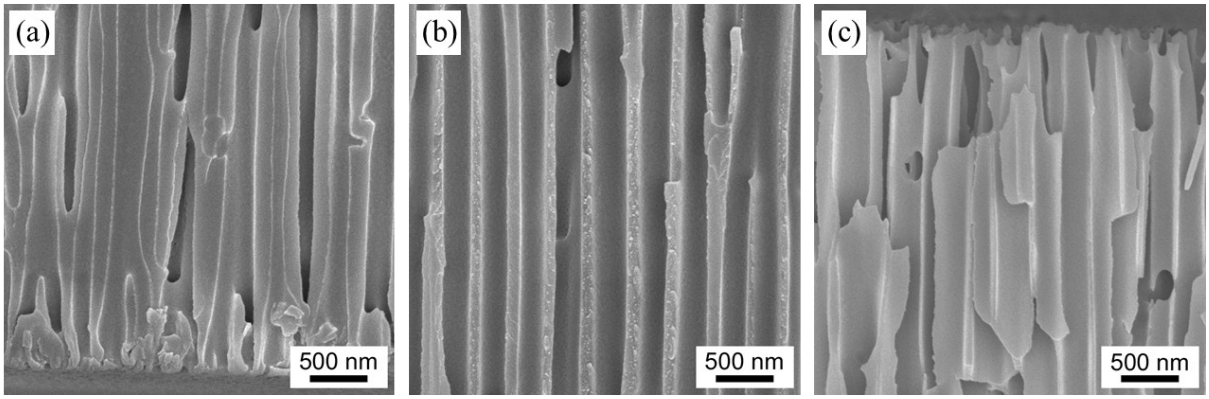

Figure S8. Cross-sectional SEM images of the PMAPS-grafted AAO membranes (run 5) at different position: (a) one end of the AAO membranes with branched nanopores, (b) middle region of the AAO membranes, (c) the other end of the AAO membranes with slightly thinner walls.

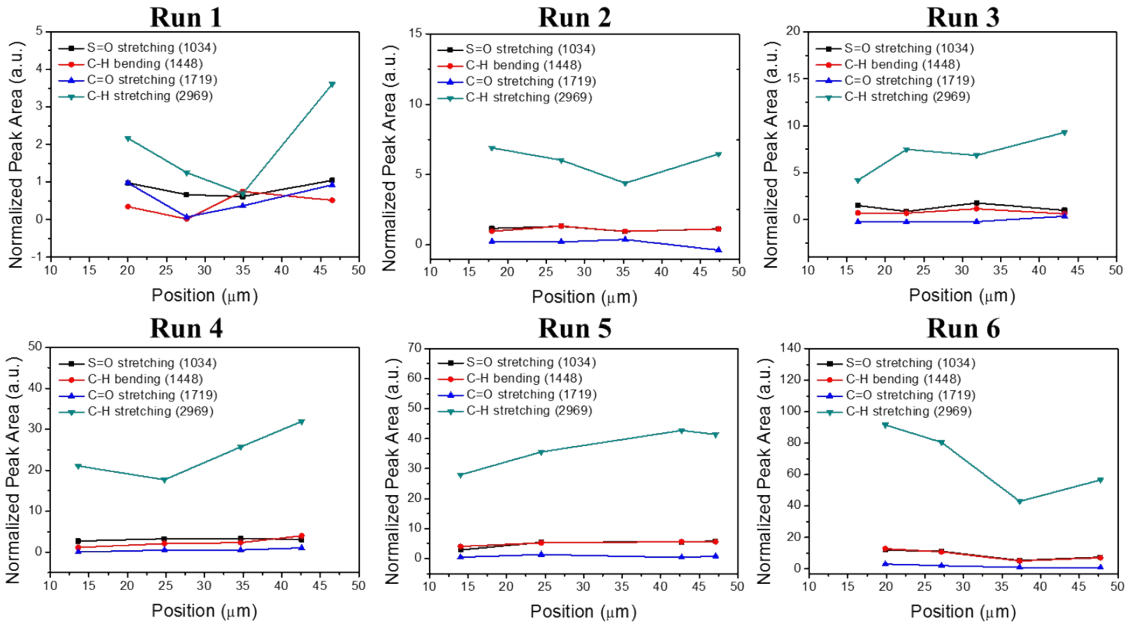

Figure S9. PMAPS content at different positions along the pores of the PMAPS-grafted AAO membranes synthesized according to various experimental conditions (run 1-6).