Electronic Supplementary Material (ESI) for RSC Advances.

Electronic Supplementary Information

Spirocyclic Quaternary Ammonium Cations for Alkaline Anion Exchange Membrane Applications: An Experimental and Theoretical Study

Liang Gu,[†] *Huilong Dong,*[‡] *Zhe Sun,*[†] *Youyong Li,*[‡] *and Feng Yan*[*,†]

[†]Jiangsu Key Laboratory of Advanced Functional Polymer Design and Application, Department of Polymer Science and Engineering,College of Chemistry, Chemical Engineering and Materials Science, and [‡]Jiangsu Key Laboratory of Carbon-Based Functional Materials & Devices, Institute of Functional Nano & Soft Materials (FUNSOM) and Collaborative Innovation Center of Suzhou Nano Science and Technology, Soochow University, Suzhou 215123, P. R. China

E-mail: fyan@suda.edu.cn

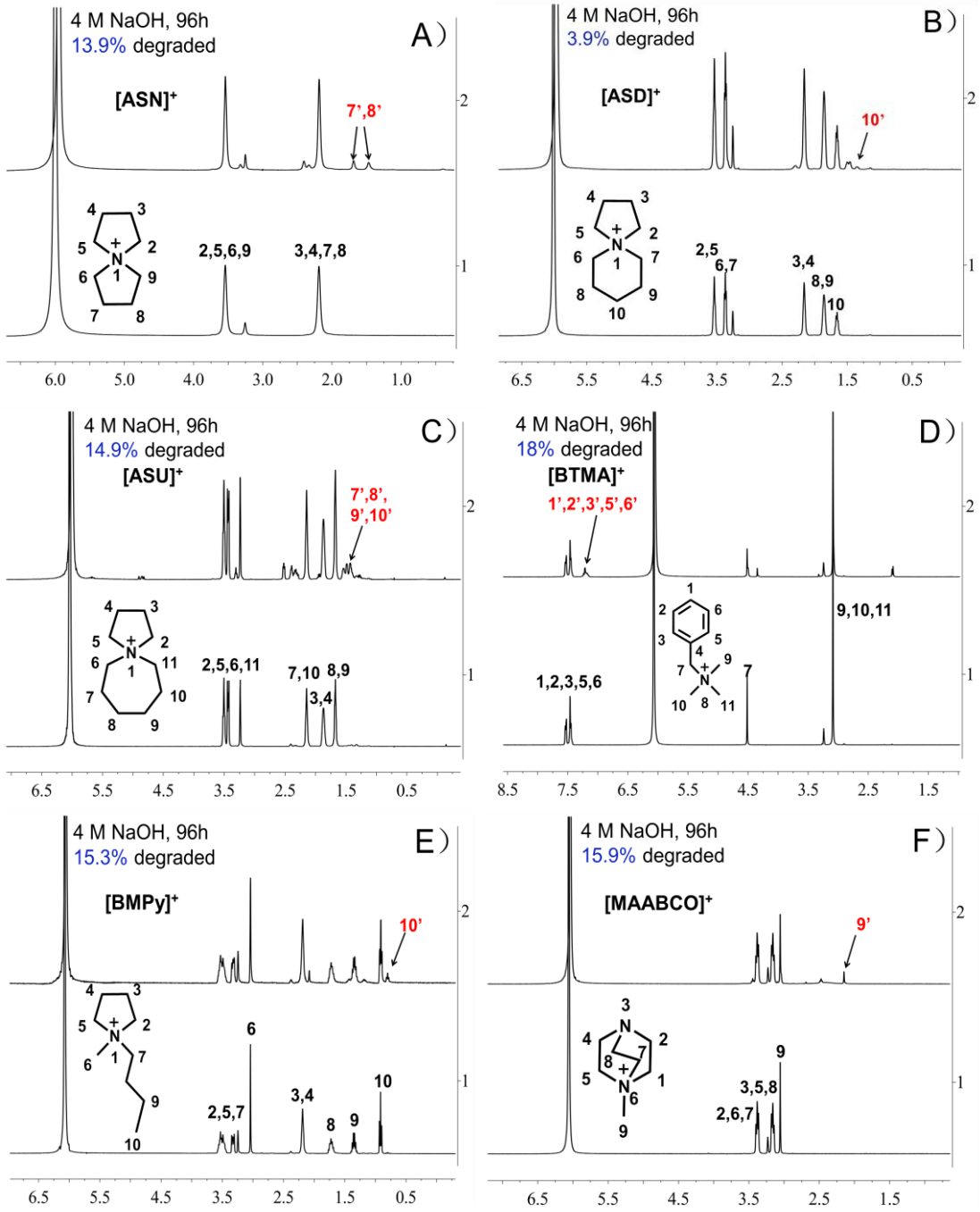


Figure S1. ^{1}HNMR spectra of (A) $[ASN]^{+}$, (B) $[ASD]^{+}$, (C) $[ASU]^{+}$, (D) $[BTMA]^{+}$, (E) $[BMPy]^{+}$, (F) $[MAABCO]^{+}$ in 4 M NaOH CD_3OD/D_2O solution (V_{CD3OD}:V_{D2O}=3:1) at 80 ^{o}C for 96 h.

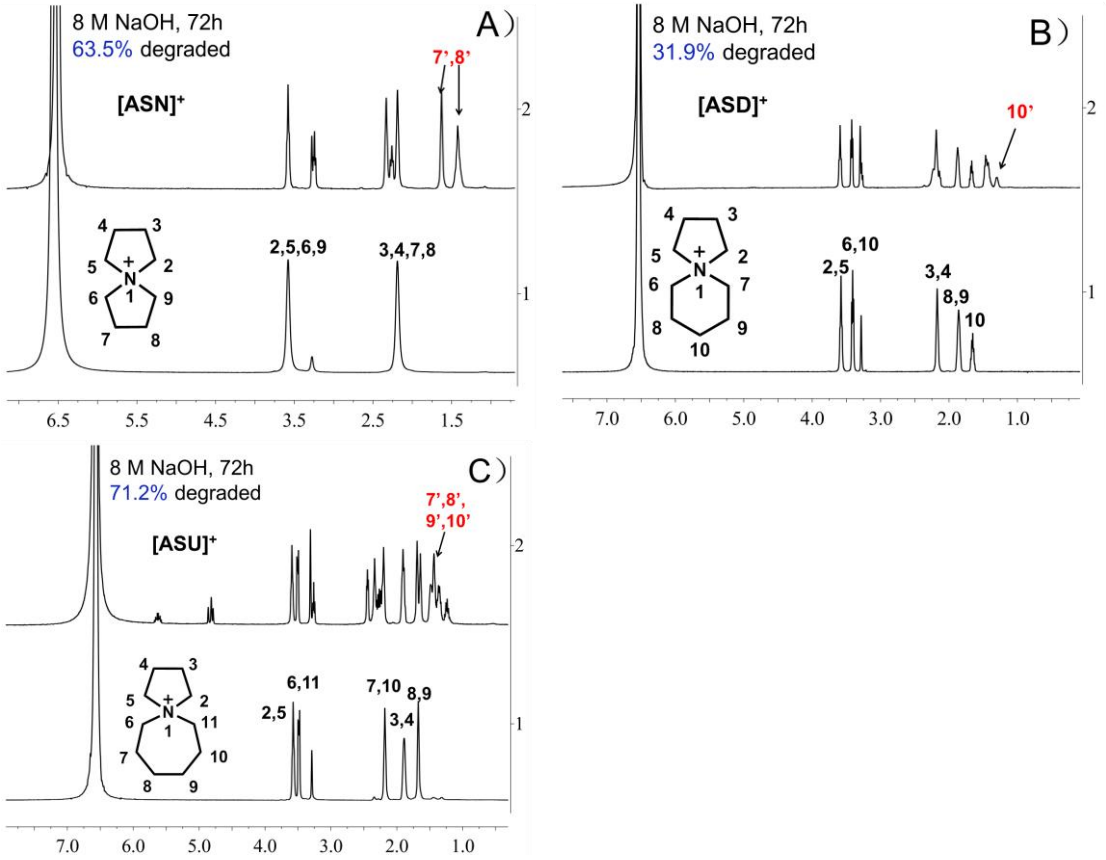
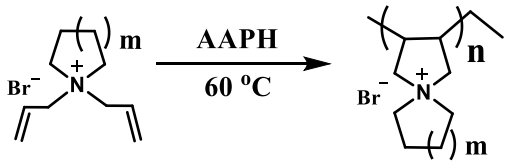
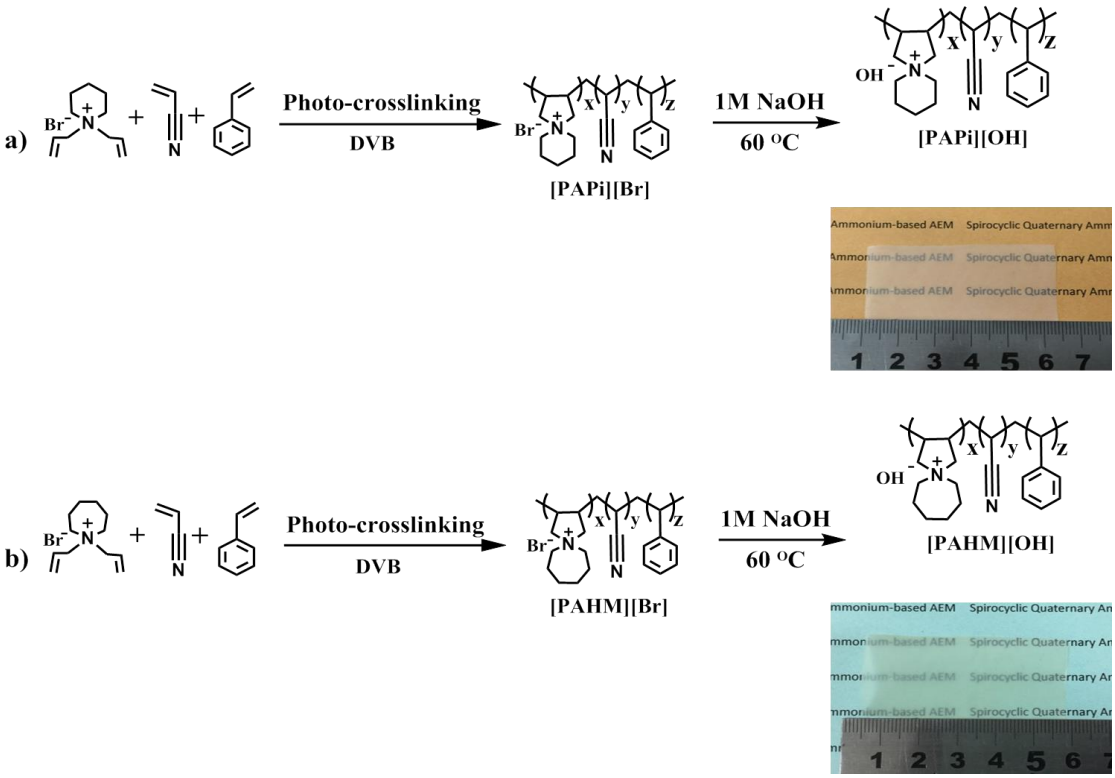


Figure S2. ^{1}HNMR spectra of (A) $[ASN]^{+}$, (B) $[ASD]^{+}$, (C) $[ASU]^{+}$ in 8 M NaOH CD_3OD/D_2O solution ($V_{CD3OD:}V_{D2O}$=3:1) at 80 ^{o}C for 72 h.



m= 1,2,3

Scheme S1. Synthesis of spirocyclic QA cation based polymers.



Scheme S2. Synthetic routes of Spiroheterocyclic Quaternary Ammonium-Based Anion Exchange Membranes and the photographs of [PAPi][OH], and [PAHM][OH]. The membranes are transparent, flexible, and could be easily cut into desired sizes.

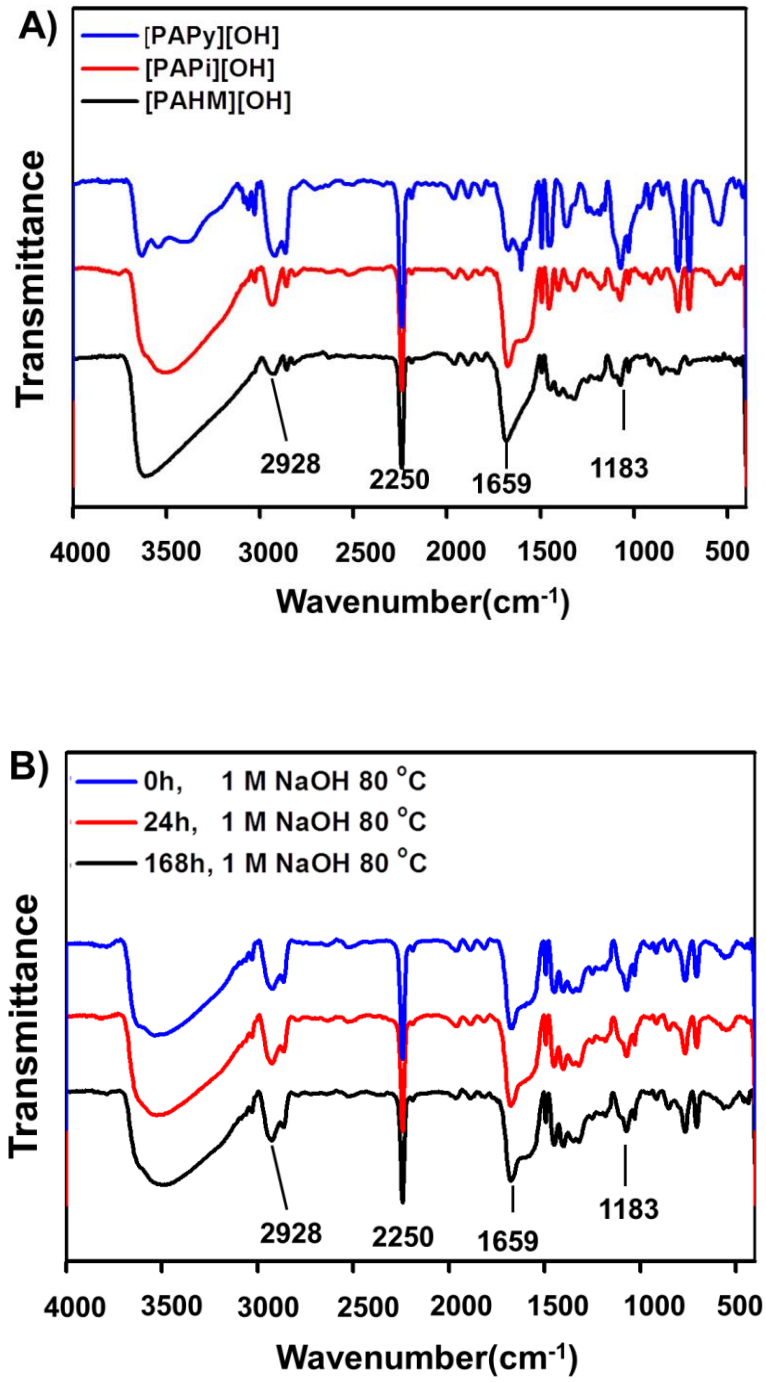


Figure S3. FT-IR of A) [PAPy][OH], [PAPi][OH], and [PAHM][OH] membranes; B) [PAPi][OH] membrane in 1M NaOH at 80 ^{o}C for various time.

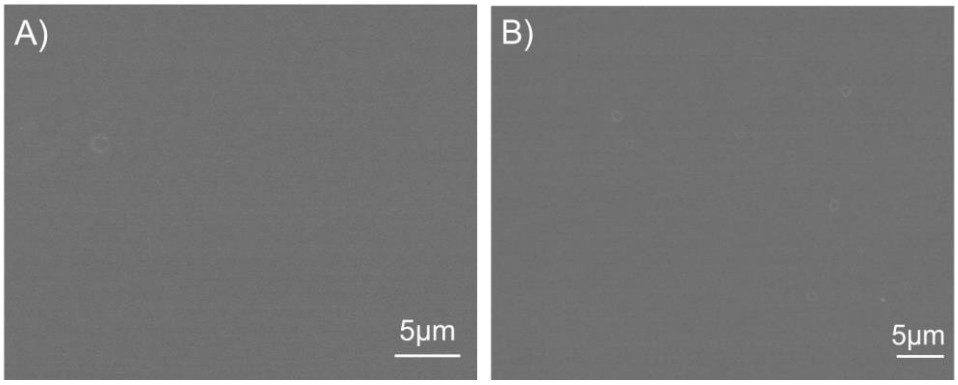


Figure S4. SEM of [PAPi][OH] membrane in 1M NaOH at 80 ^{o}C for various time: (A) 0 h, (B) 168 h.