

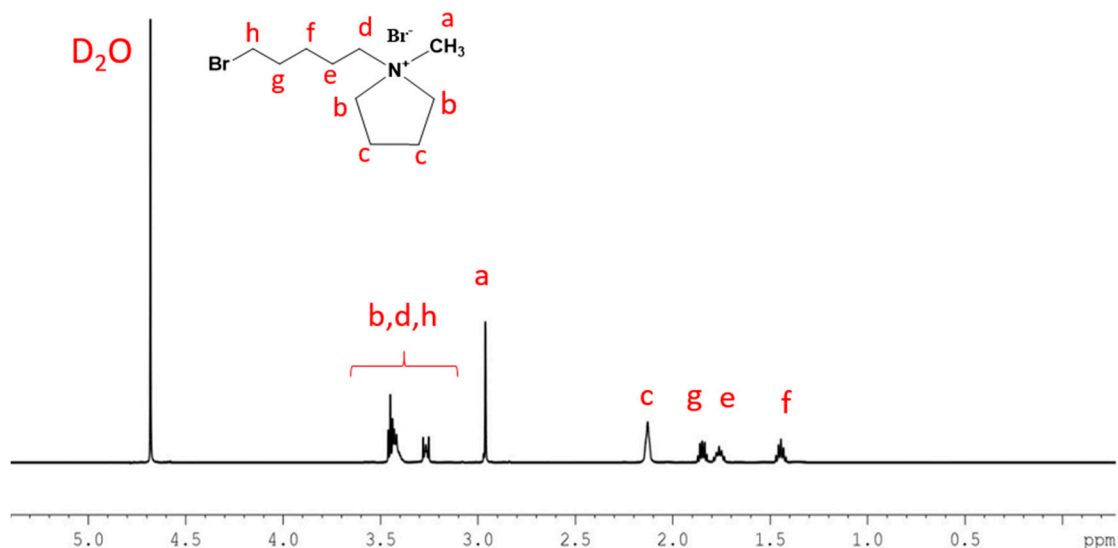
# Supplementary Material

## Cycloaliphatic quaternary ammonium functionalized poly (oxindole biphenyl) based Anion Exchange membranes for Water Electrolysis: Stability and Performance

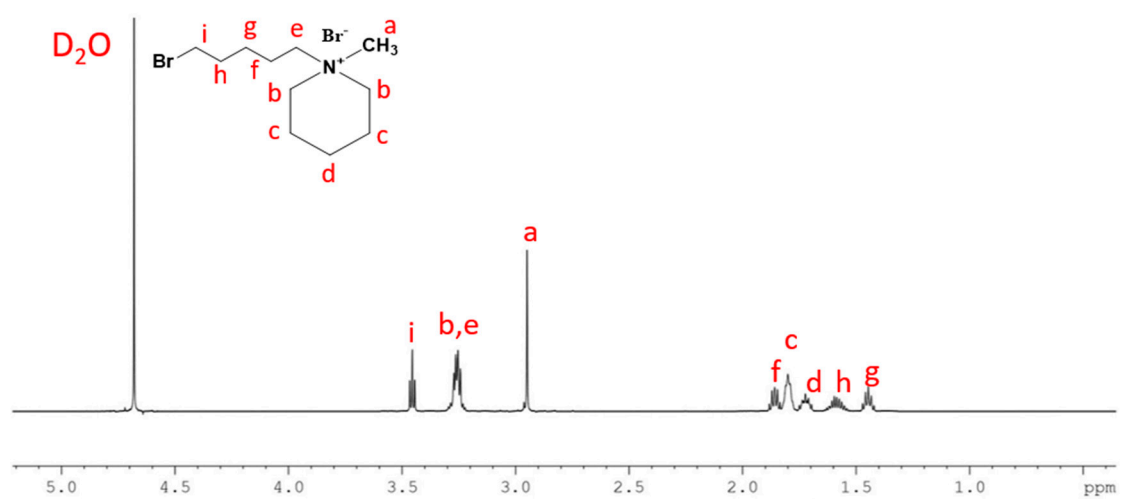
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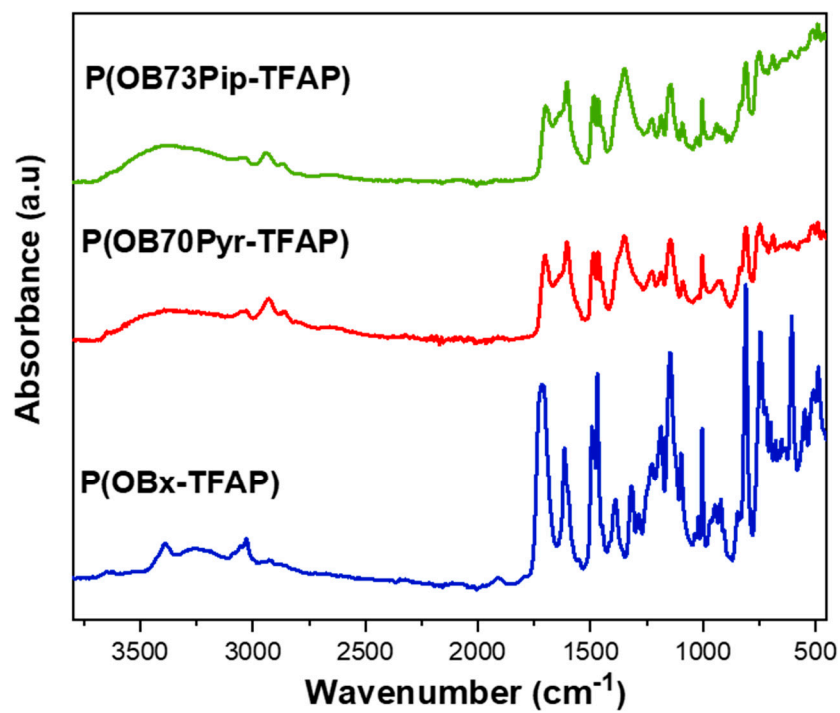
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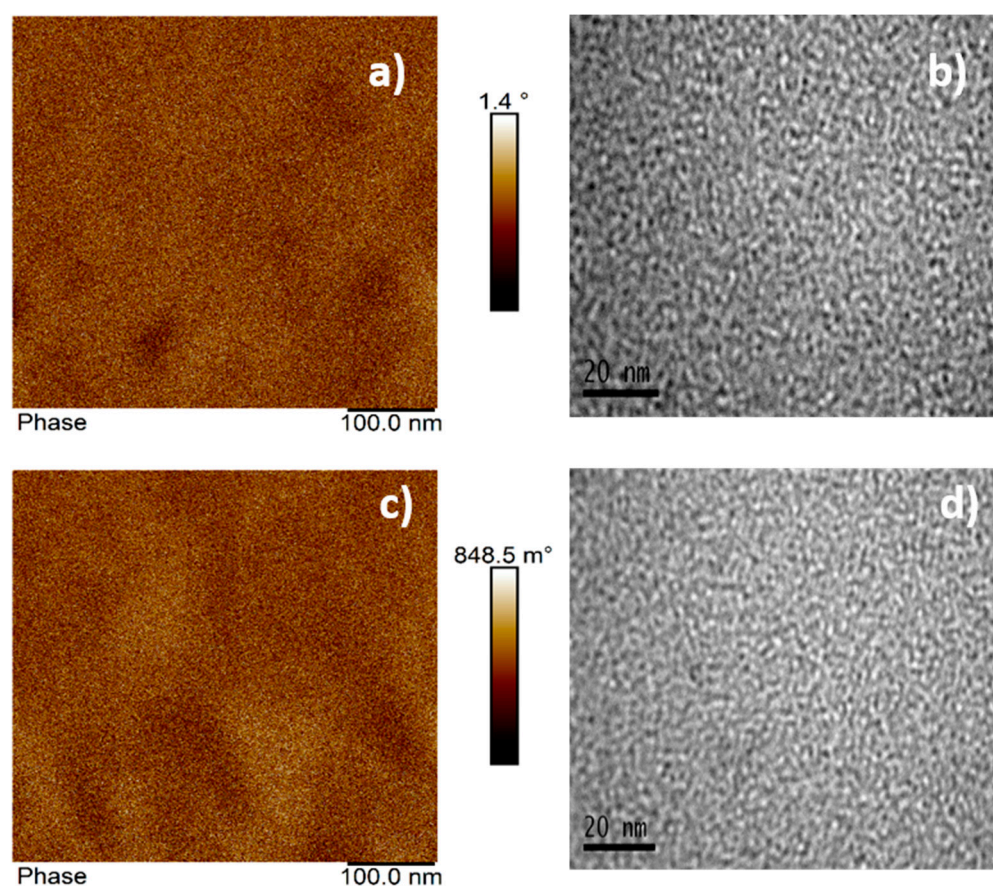
**Figure S1.** <sup>1</sup>H NMR spectrum of 1-(5-bromopentyl)-1-methylpyrrolidinium bromide (BrPyr).



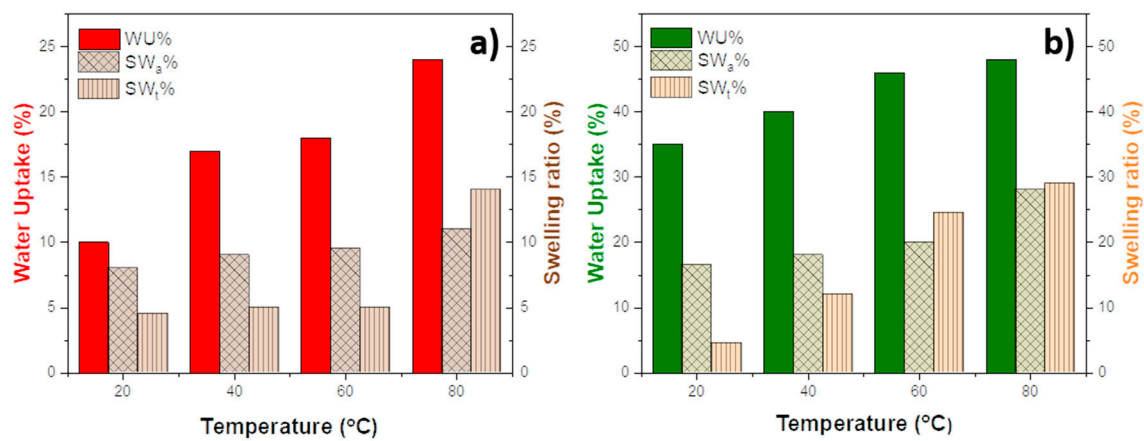
**Figure S2.** <sup>1</sup>H NMR spectrum of 1-(5-bromopentyl)-1-methylpiperidinium bromide (BrPip).



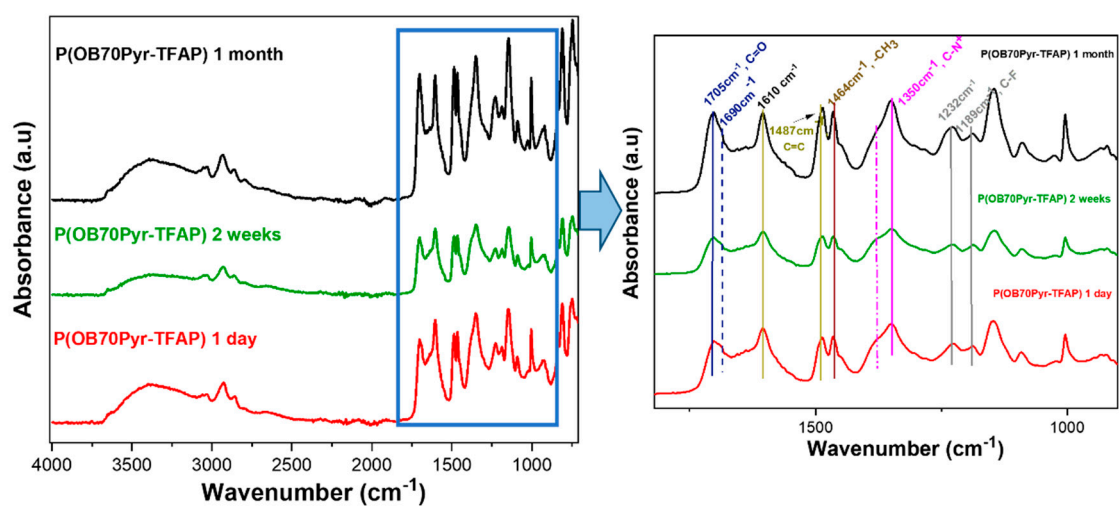
**Figure S3.** ATR spectra of precursor copolymer P(OBx-TFAP) and pyrrolidinium and piperidinium based AEMs in bromide form.



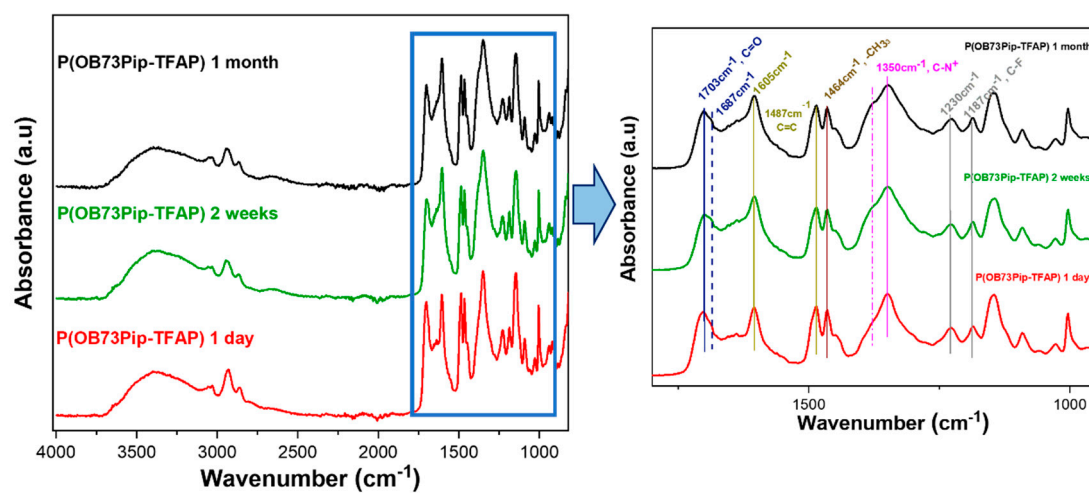
**Figure S4.** AFM and TEM images of pyrrolidinium (a and b) and piperidinium (c and d) based AEMs in bromide form.



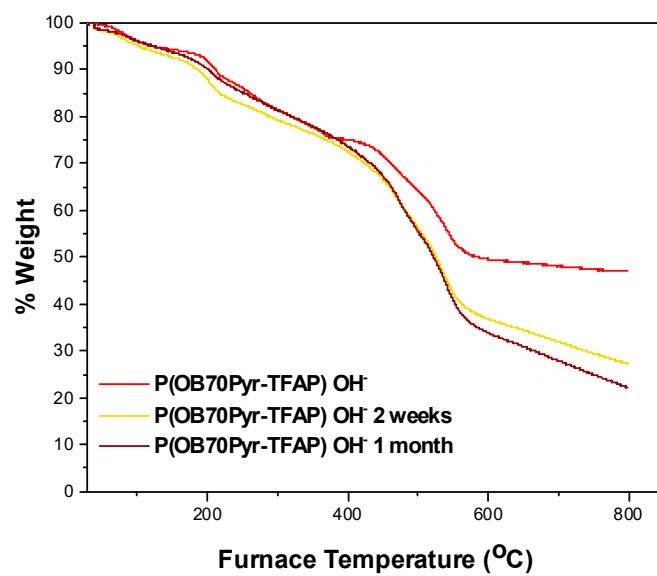
**Figure S5.** Water uptake and swelling behavior of a) P(OB70pyr-TFAP) and b) P(OB73pip-TFAP) in the OH<sup>-</sup> form as a function of temperature.



**Figure S6.** ATR spectra of pyrrolidinium based AEM after storage in 2M KOH at 80 °C for 2 weeks and 1 month. The inset corresponds to the region from 1700 to 900 cm<sup>-1</sup>.

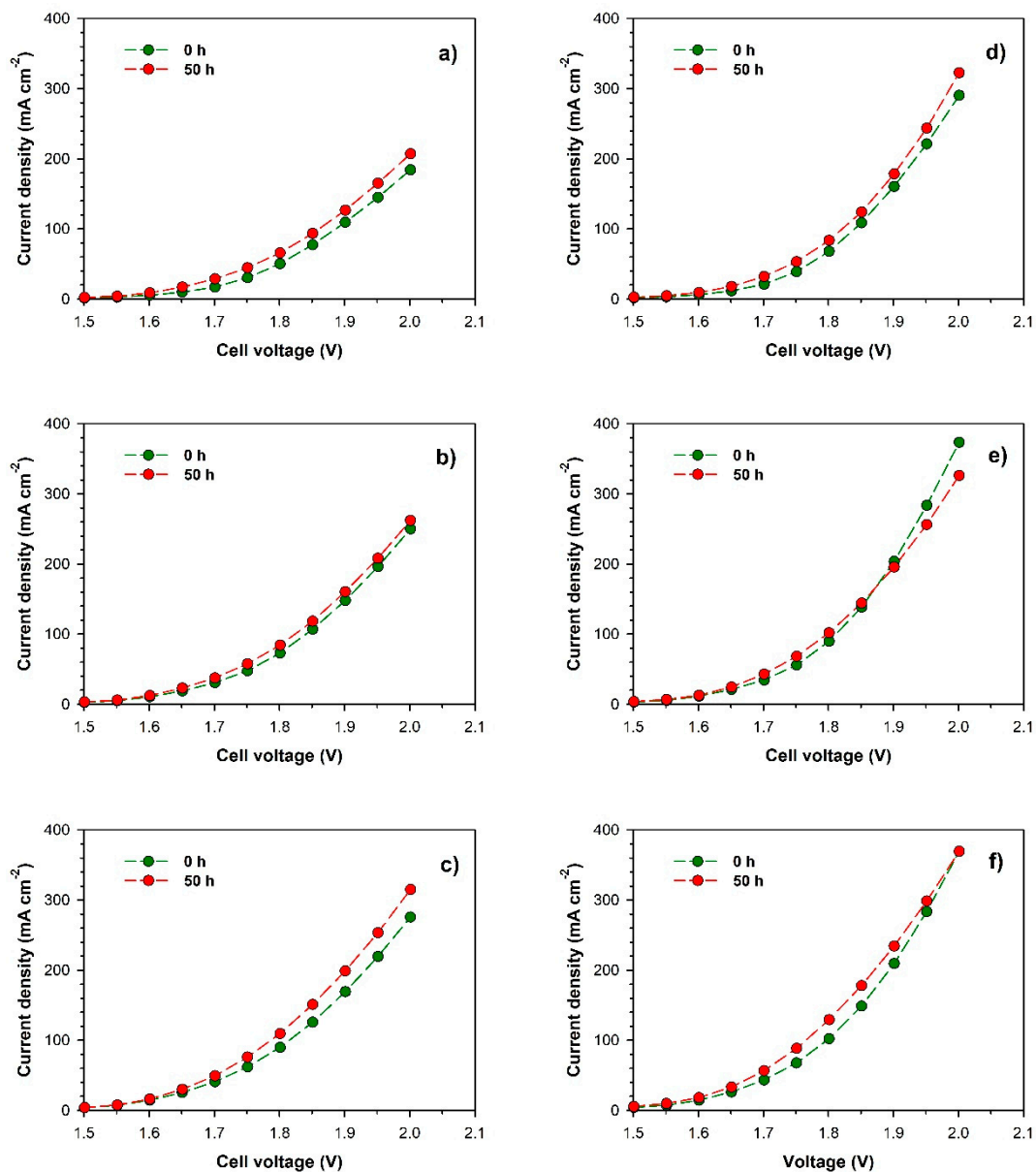


**Figure S7.** ATR spectra of piperidinium based AEM after storage in 2M KOH at 80 °C for 2 weeks and 1 month. The inset corresponds to the region from 1700 to 900 cm<sup>-1</sup>.

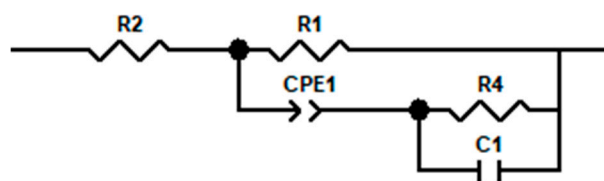


**Figure S8.** TGA curves of pyrrolidinium based AEM (hydroxide form) before and after storage in 2M KOH at 80 °C for 2 weeks and 1 month.





**Figure S9.** Load curves measured for (A–C) P(OB70pyr-TFAP) and (D–F) P(OB73pip-TFAP). 1 mol dm<sup>-3</sup> KOH at temperatures 50 (a, d), 60 (b, e) and 70 °C (c, f); Ni foam electrodes (4 cm<sup>2</sup> geometrical area)



**Figure S10.** Equivalent electrical circuit used for EIS spectra evaluation. R2 – ohmic resistance; R1 – polarisation resistance; R4 – resistance of the pores in Ni foam