Electronic Supplementary Information (ESI)

The effect of crystallinity of HDPE precursor film on the properties of the resultant radiation-grafted anion-exchange membranes

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This electronic supplementary information document contains Figures that are in support of those in the main article.

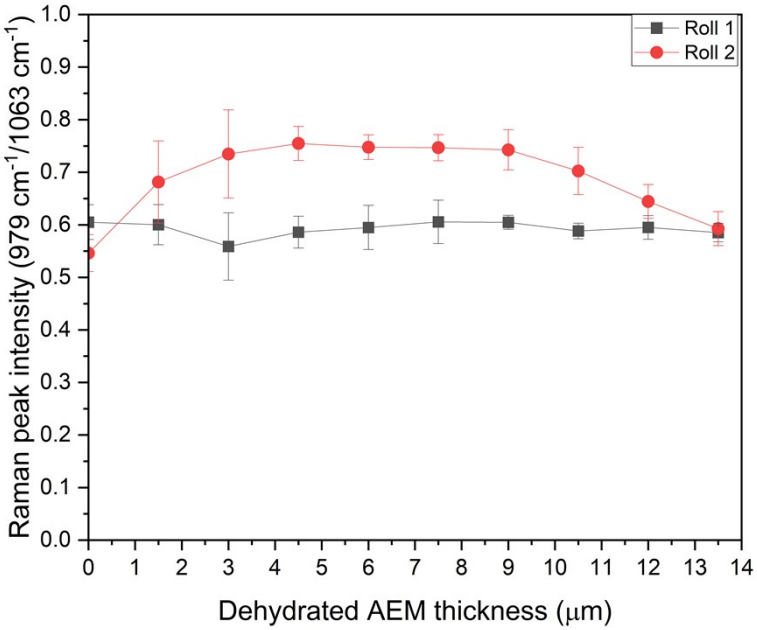

Figure S1 *A plot demonstrating the homogeneity of the amination reaction using a peak intensity ratio, obtained using Raman spectroscopy. The intensity ratio of a 979 cm^{-1} peak (from quaternary trimethylammonium group) was plotted normalised to the intensity of a 1063 cm^{-1} C-C anti-symmetric stretching peak (from precursor HDPE) to demonstrate homogeneous amination through the core of the RG-AEM. An InVia Reflex Raman Microscope (Renishaw UK) fitted with a cool charged couple detector, holographic notch filters, a 1200 mm^{-1} grating and a 785 nm laser was used to obtain the spectra. A 50XL (NA = 0.50) objective was used along with an exposure time of 1 s and 20 accumulations per spectra. The peak intensity ratio was collected through the core of the dehydrated RG-AEM samples using a 1.5 μm step size. This measurement was repeated with a random sample from roll 1 and 2 with* n = *3repeats from each sample.*

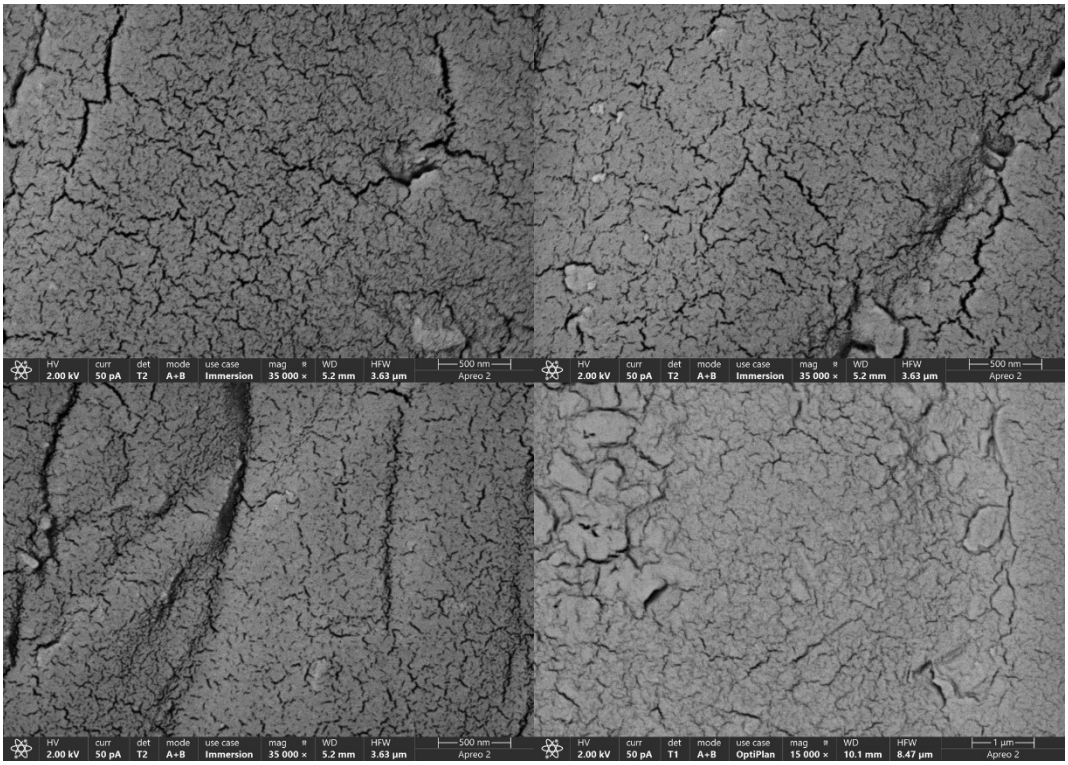

Figure S2 *SEM of RG-AEMs synthesised from roll 1, collected using an Apreo SEM. RG-AEMs were prepared by heating at 50 °C for 3 h. The samples were then mounted on to a stub using double sided carbon tape and applying a 3 nm layer of gold to the surface using a Quorum Q150 ES plus.*

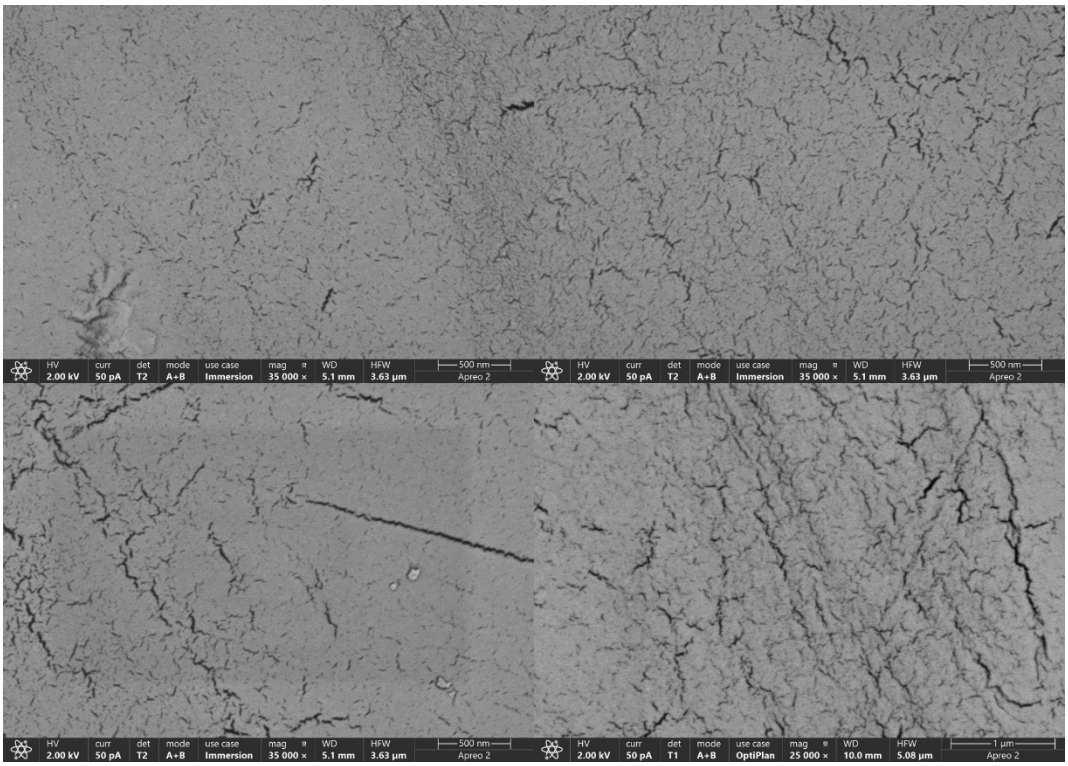

Figure S3 *SEM of RG-AEMs synthesised from roll 2, collected using an Apreo SEM. RG-AEMs were prepared by heating at 50 °C for 3 h. The samples were then mounted on to a stub using double sided carbon tape and applying a 3 nm layer of gold to the surface using a Quorum Q150 ES plus.*

Figure S4 *Photo of a typical RG-AEM. No obvious structural defects are observed on the macroscale.*