Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

Supporting Information

High Dehumidification Performance of Amorphous Cellulose Composite Membranes prepared from Trimethylsilyl Cellulose

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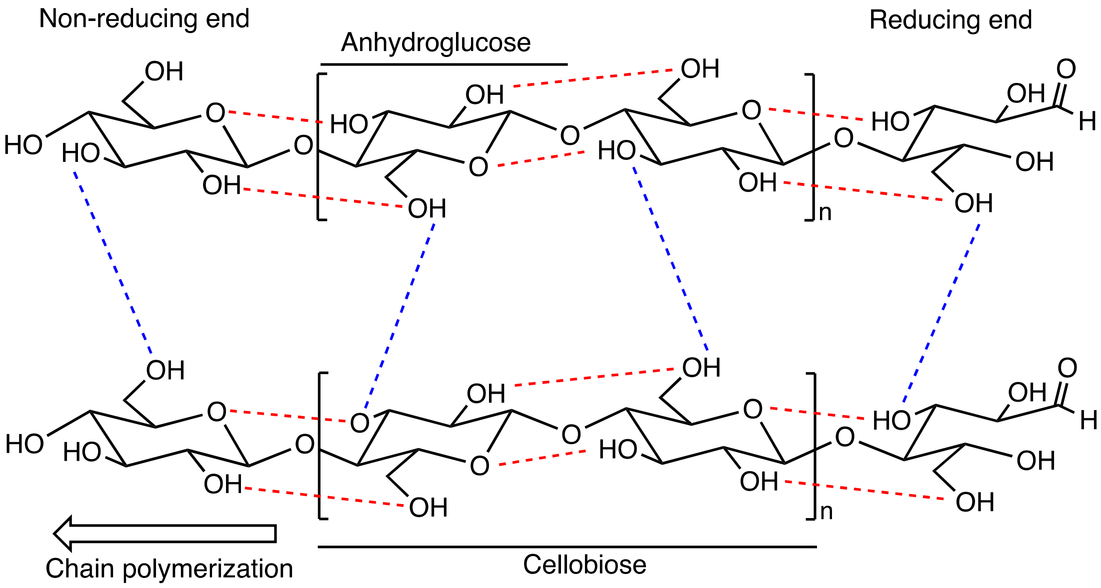

Fig. S1 Cellulose structure with the intra- and inter-chain hydrogen bonds.

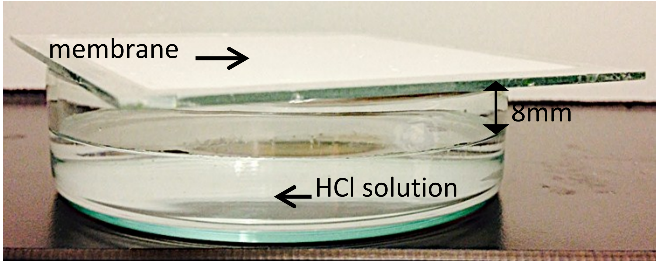

Fig. S2 Cellulose regeneration using acid vapor

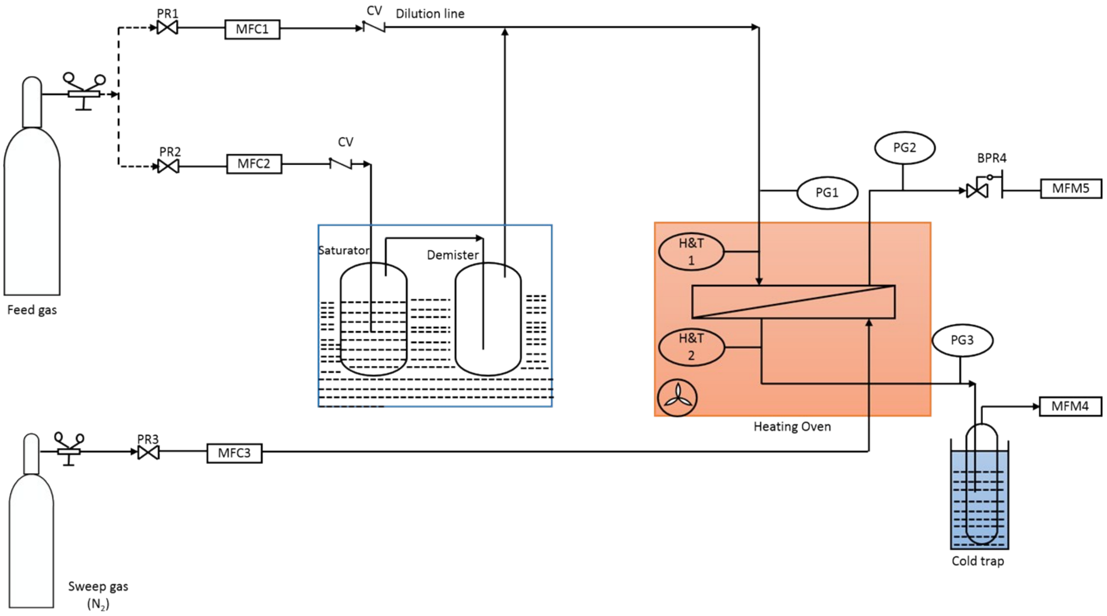

Fig. S3 Dehumidification experimental setup.

Attenuated total reflectance infrared (ATR-IR) spectra of membranes were collected using a Fischer Scientific Nicolet iS10 spectrometer and were recorded in the range between 550 and 4000 cm^{-1} over 32 scans. ATR-IR spectra of both bare PAN membranes shown in Fig. S4 reveals that both membranes are of the similar polymer with slightly different composition. Both spectra were similar except the different intensity of some peaks. The broad peak at 3000 - 3700cm^{-1} was a characteristic band of O-H vibration due to water adsorption. The bands at 2940, 1452 and 1370 cm^{-1} characterized the aliphatic CH groups along the PAN backbone. Specific assignment at 2240 cm^{-1} showed the presence of $C\equiv N$ groups from the acrylonitrile segment. Stronger vibration appeared for the GMT membrane at around 1600cm^{-1}. It was most likely due to higher methyl acrylate content used as a *co*-monomer during polymerization. Bands at 1070 and 1240 were attributed to the C-N vibration.

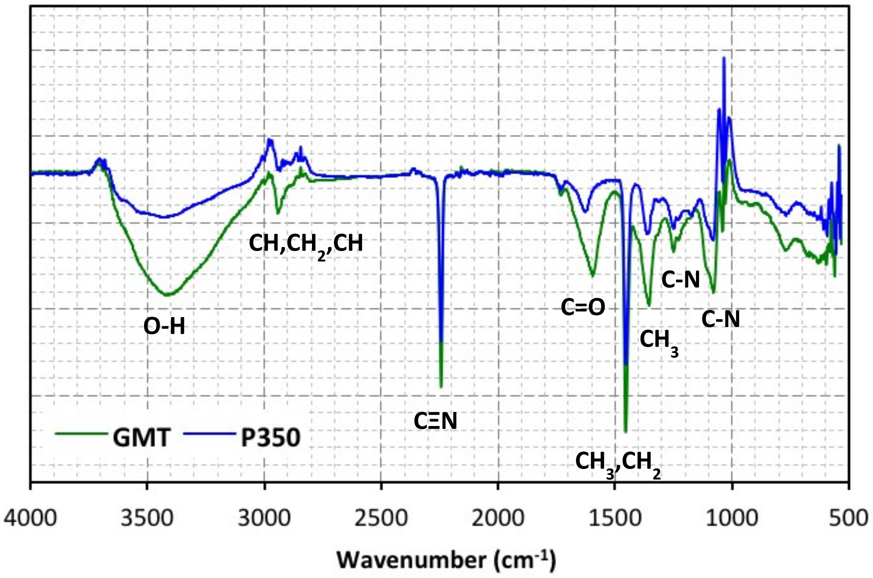

Fig. S4 ATR-IR of GMT and P350 Support

Membrane surface topographies were analyzed by atomic force microscope (AFM) with an Agilent 5400 SPM microscope (Agilent Technologies) operating in noncontact mode over an area of 2×2 μm^2. After scanning the images were flattened to remove curvature and slope. Roughness was given as the root-mean-square (R_{rms}) value based on the data standard deviation.

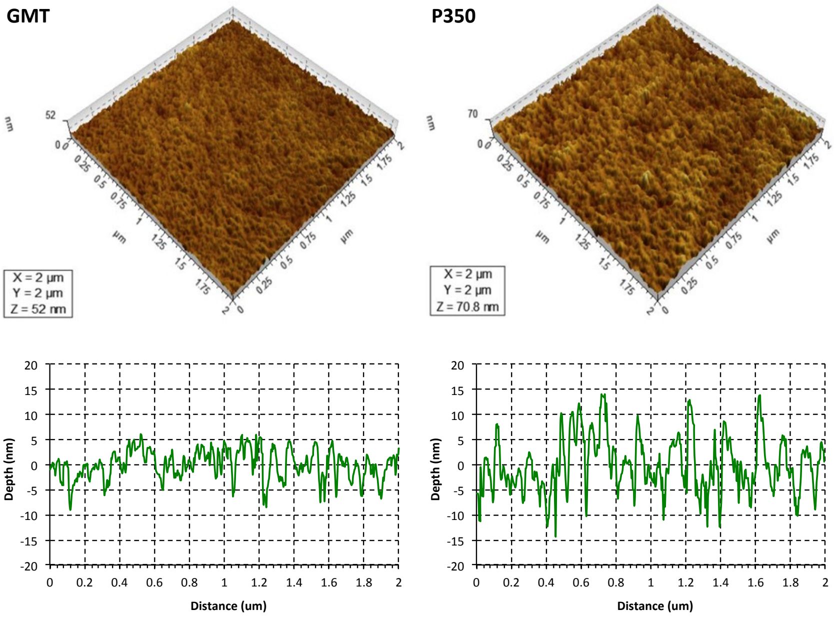

Fig. S5 AFM images of the supports.