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OH<sup>-</sup> Conducting Membrane for Alkaline Water Electrolysis

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**Massachusetts Institute of Technology**

# **A Highly Conductive and Mechanically Robust OH<sup>-</sup> Conducting Membrane for Alkaline Water Electrolysis**

Ketian Zhang,<sup>a</sup> Michael B. McDonald,<sup>b</sup> Islam E. A. Genina,<sup>c</sup> and Paula T. Hammond<sup>\*b</sup>

<sup>a</sup> Department of Materials Science and Engineering, Massachusetts Institute of Technology, Cambridge, MA, 02139, United States

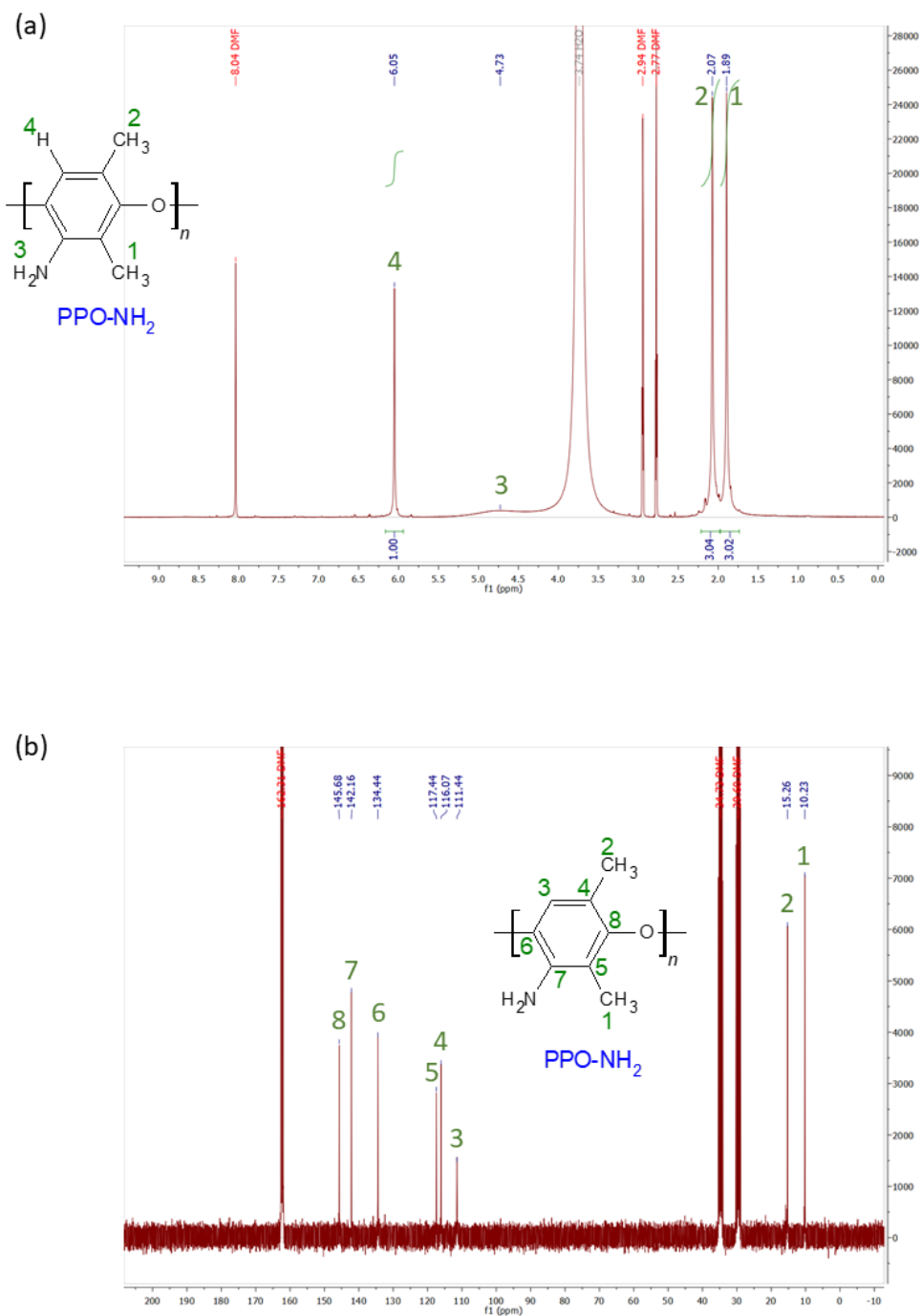
<sup>b</sup> Department of Chemical Engineering, Massachusetts Institute of Technology, Cambridge, MA, 02139, United States

<sup>c</sup> Department of Environmental Engineering, Zewail City of Science and Technology, 6<sup>th</sup> of October City, Cairo, 12578, Egypt

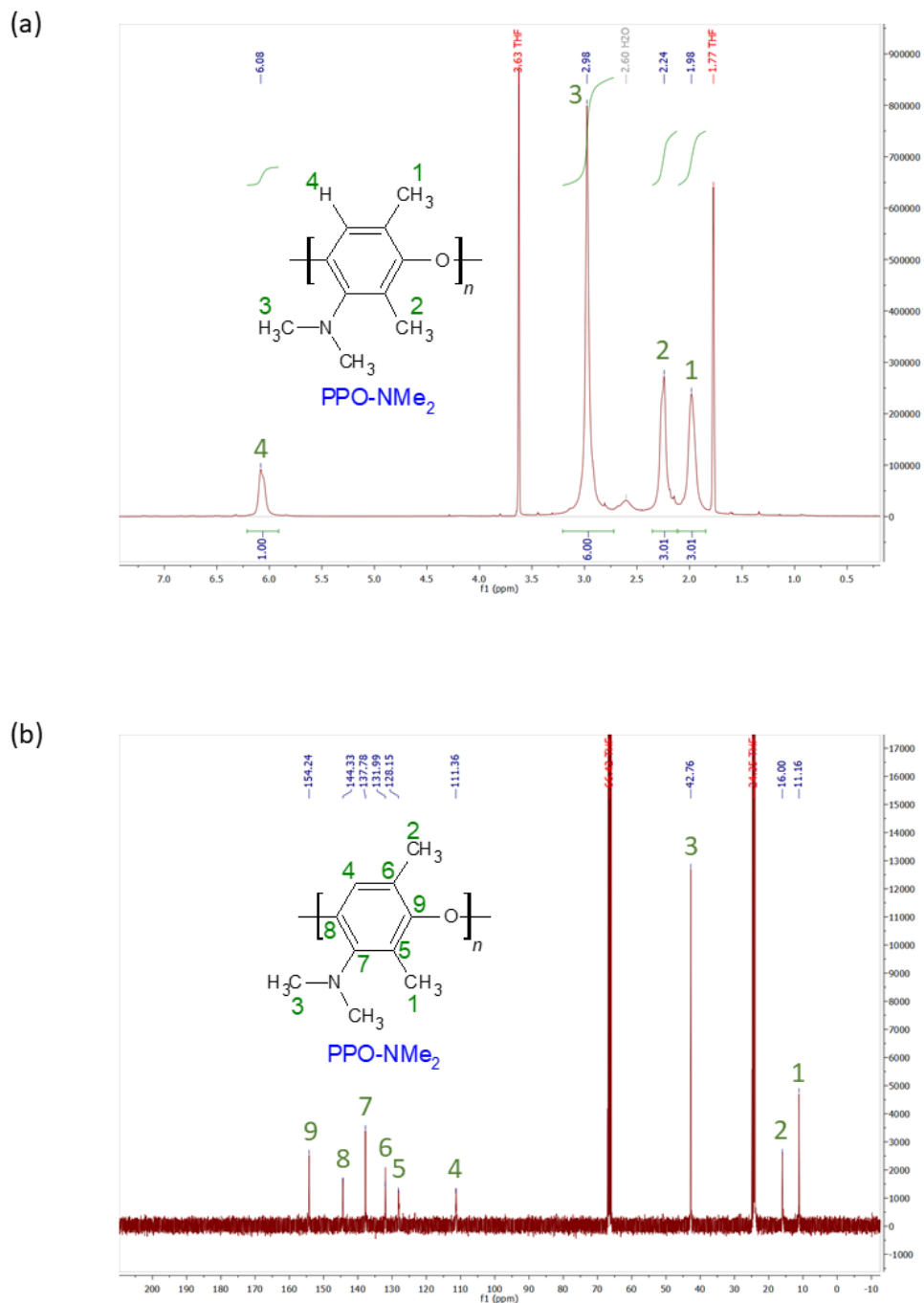
\* Corresponding author. E-mail: [hammond@mit.edu](mailto:hammond@mit.edu)

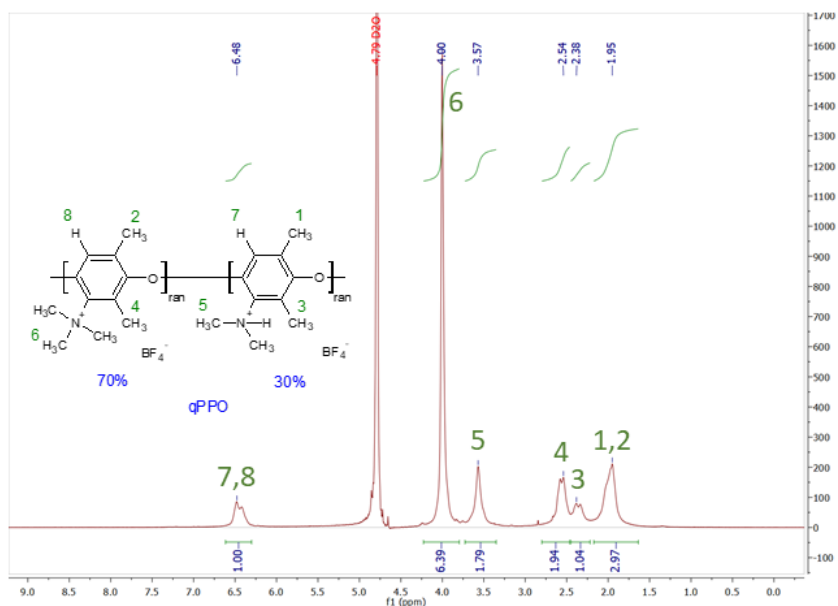
ORCID: Ketian Zhang, 0000-0002-9155-6797

## Supporting Information

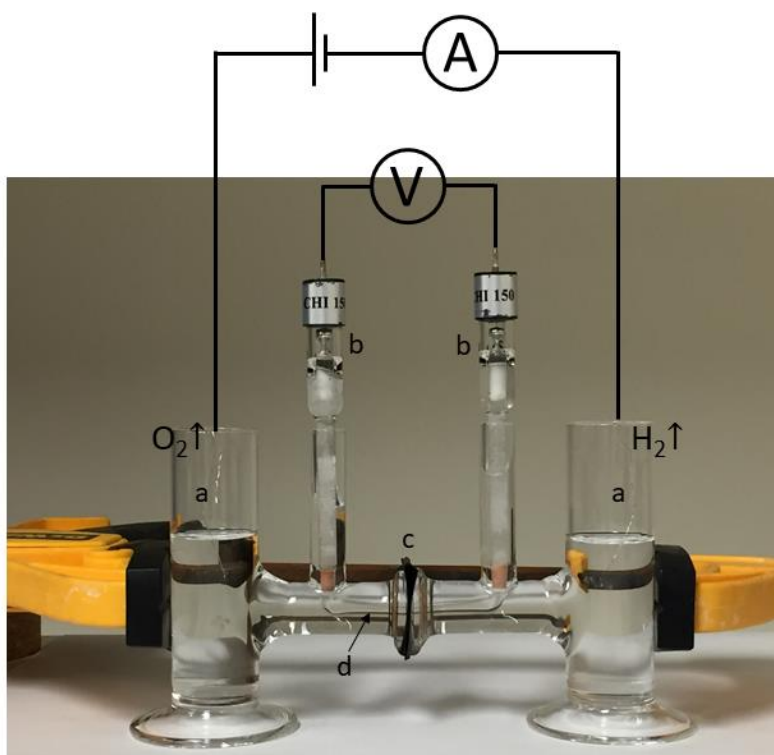


**Figure S1.** (a)  $^1\text{H}$  and (b)  $^{13}\text{C}$  NMR spectra of PPO-NH<sub>2</sub> in N,N-dimethylformamide-d<sub>7</sub>. The peaks with red labels are solvent peaks (same in other NMR spectra).

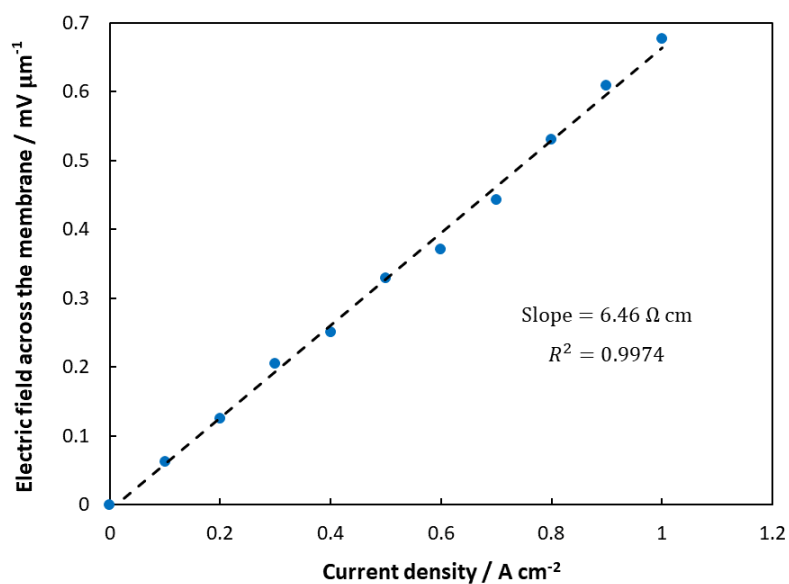




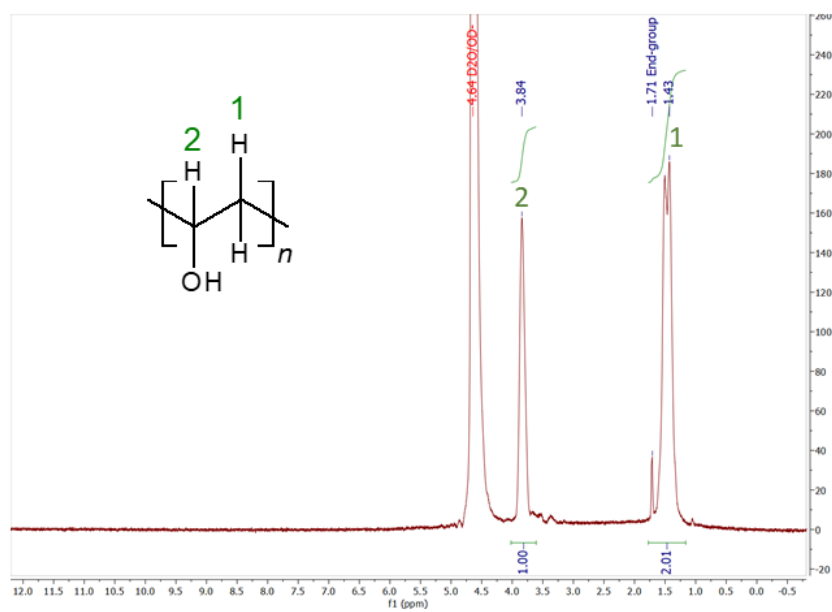
**Figure S3.** H-1 NMR spectrum of qPPO (HBF<sub>4</sub> form) in D<sub>2</sub>O.



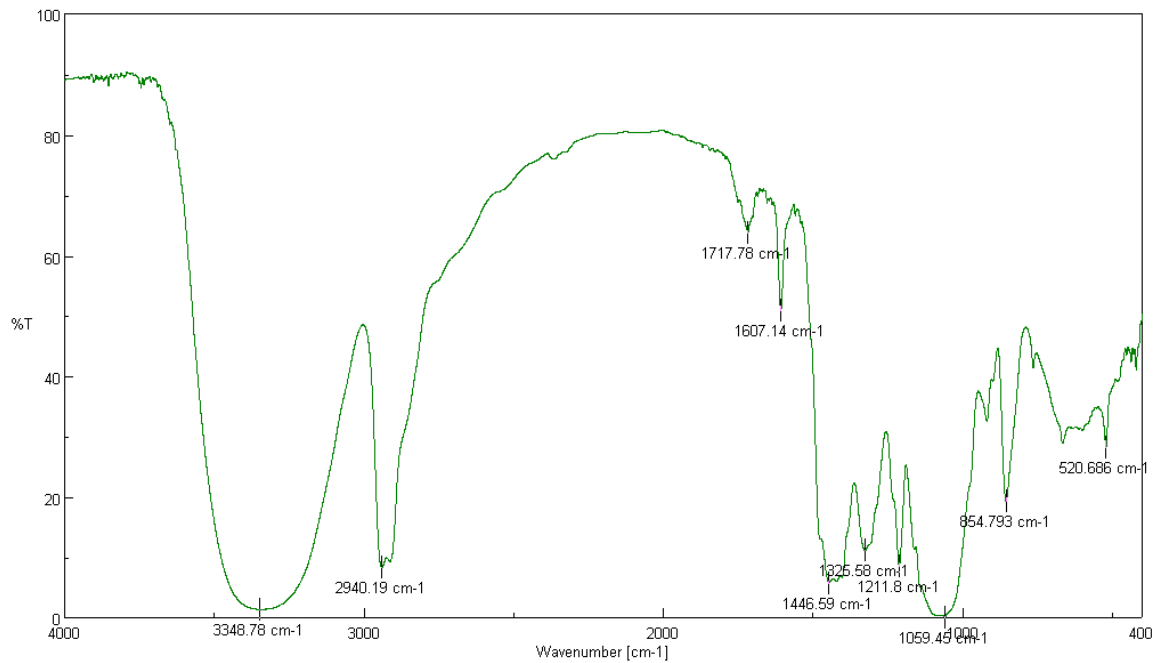
**Figure S4.** Photograph of the H-cell for ionic conductivity measurements and the circuit diagram. (a) Two current-carrying Pt-wire working electrodes. (b) Two saturated calomel reference electrodes. (c) Membrane and two gaskets. (d) Luggin capillary.



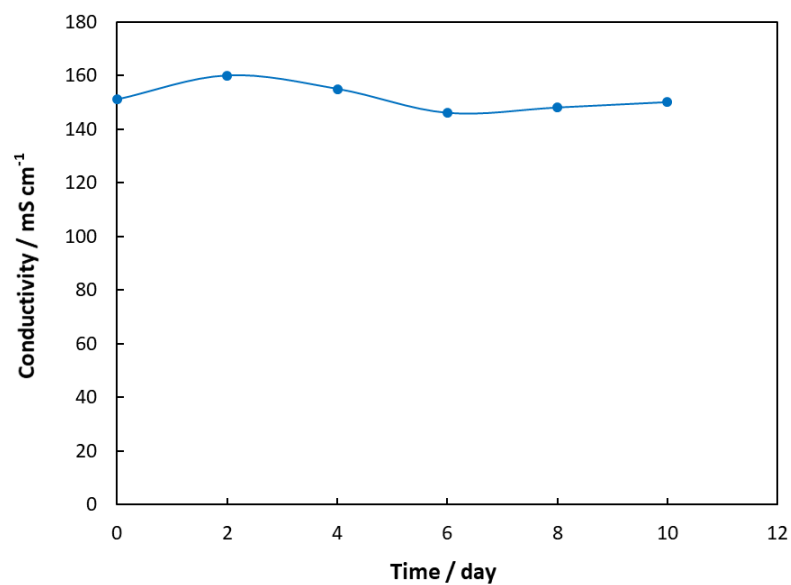
**Figure S5.** The electric field across the 30% qPPO membrane as a function of current density.



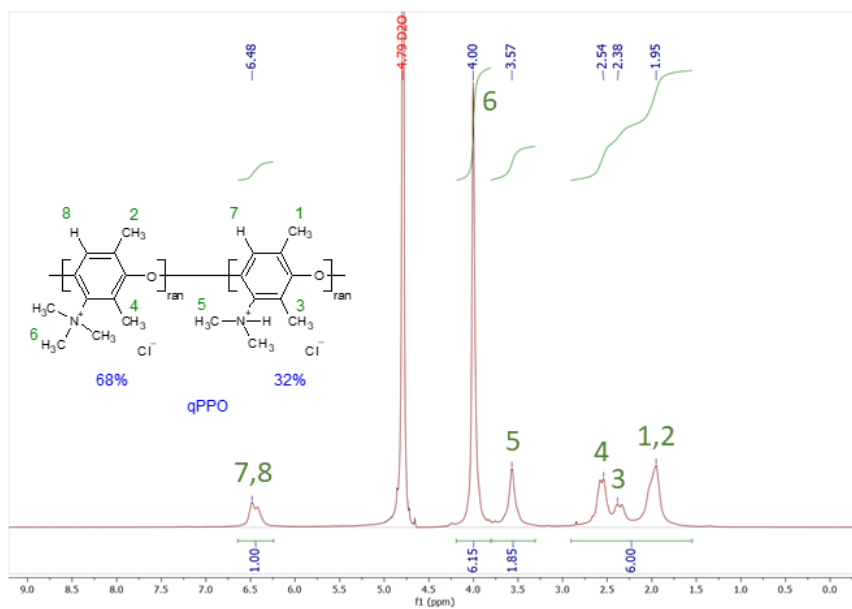
**Figure S6.** <sup>1</sup>H NMR spectrum taken immediately after a drop of 10% PVA solution in H<sub>2</sub>O was added into and mixed with 0.1 M NaOD solution in D<sub>2</sub>O.



**Figure S7.** FTIR spectrum of the 30% qPPO-70% PVA membrane.



**Figure S8.** The conductivity of the qPPO-PVA semi-IPN membrane with 30 wt% qPPO over a period of 10 days running water electrolysis at a current density of 0.13 A/cm<sup>2</sup> at room temperature in 6 M KOH.



**Figure S9.** H-1 NMR spectrum of qPPO after immersing in 6 M KOH for 10 days. The NMR solvent was DCI/D<sub>2</sub>O.