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# Supporting Information

# Facile Preparation Method of Surface Patterned Polymer Electrolyte Membranes for Fuel Cell Applications

Jong Kwan Koh‡, Yukwon Jeon‡, Yong il Cho, Jong Hak Kim*, Yong Gun Shul*

Department of Chemical and Biomolecular Engineering, Yonsei University, 50 Yonsei-ro, Seodaemun-gu, Seoul 120-749, Korea

‡ *These authors contributed equally to this work.*

* *Corresponding Author: E-mail: jonghak@yonsei.ac.kr (Prof. J.H. Kim), shulyg@yonsei.ac.kr (Prof. Y.G. Shul),*

**Figure S1**. SEM surface images of Nafion membranes with different pattern shapes fabricated using various patterned PDMS molds. (a) Square pattern, (b) hexagonal pattern, (c) circle pattern, and (d) rounded rectangle pattern.

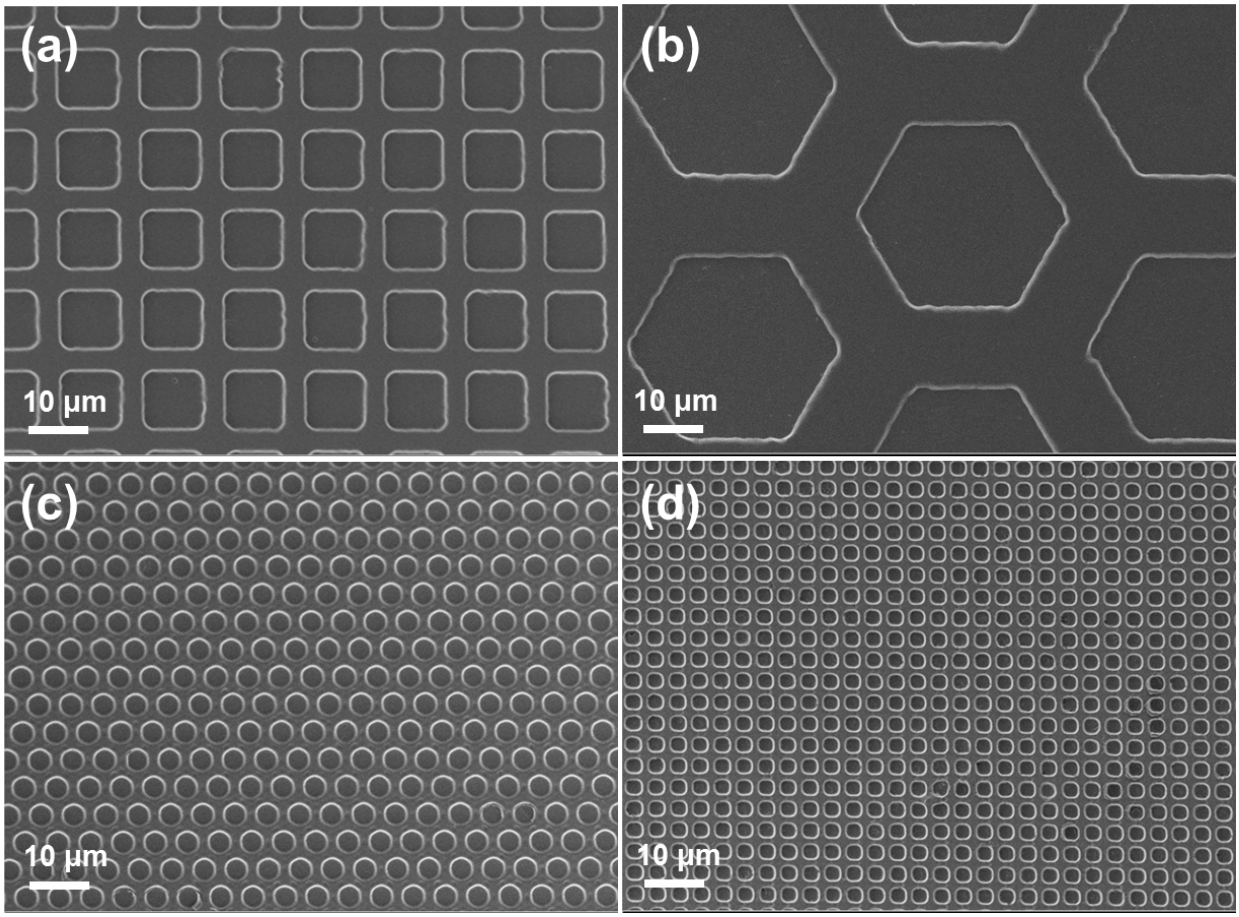

**Figure S2.** XRD patterns of the catalyst layers sprayed on the Nafion membranes before performance testing.

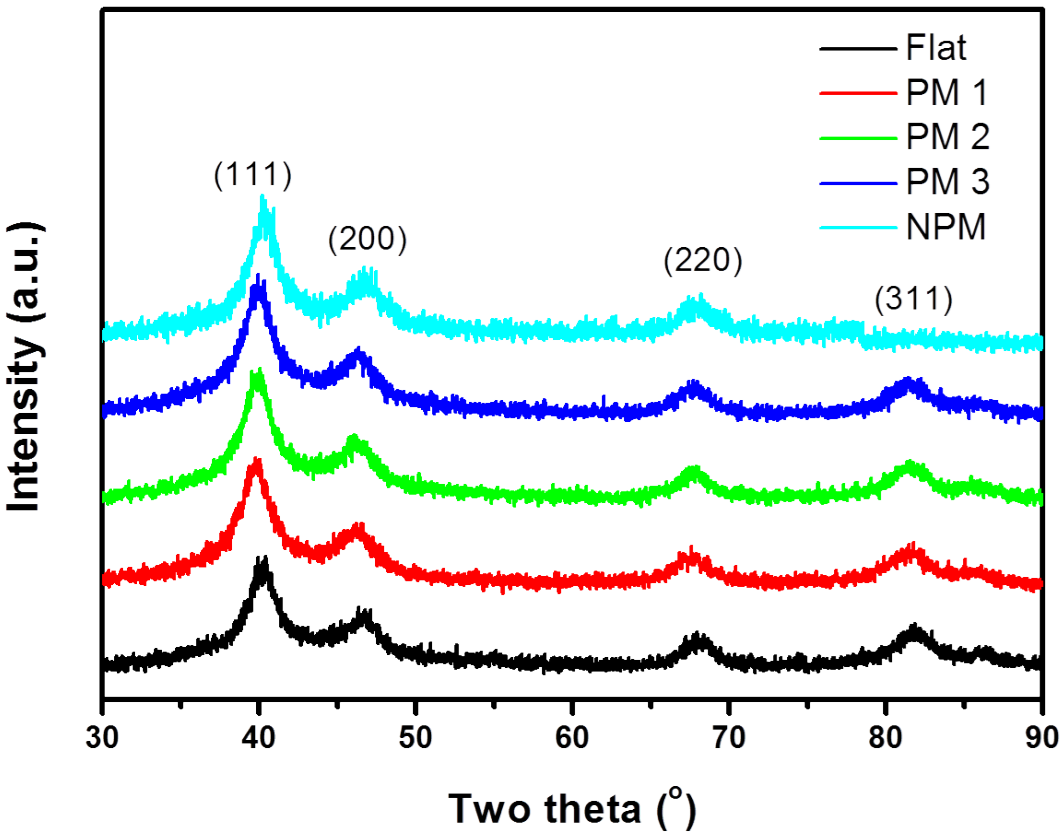

**Figure S3.** (a) polarization (I-V) curves and power density curves, (b) CV curves and (c) Nyquist plots of single PEM fuel cell MEAs fabricated with the commercial Nafion 212 membrane at 75 $^{o}$C 100 % RH.

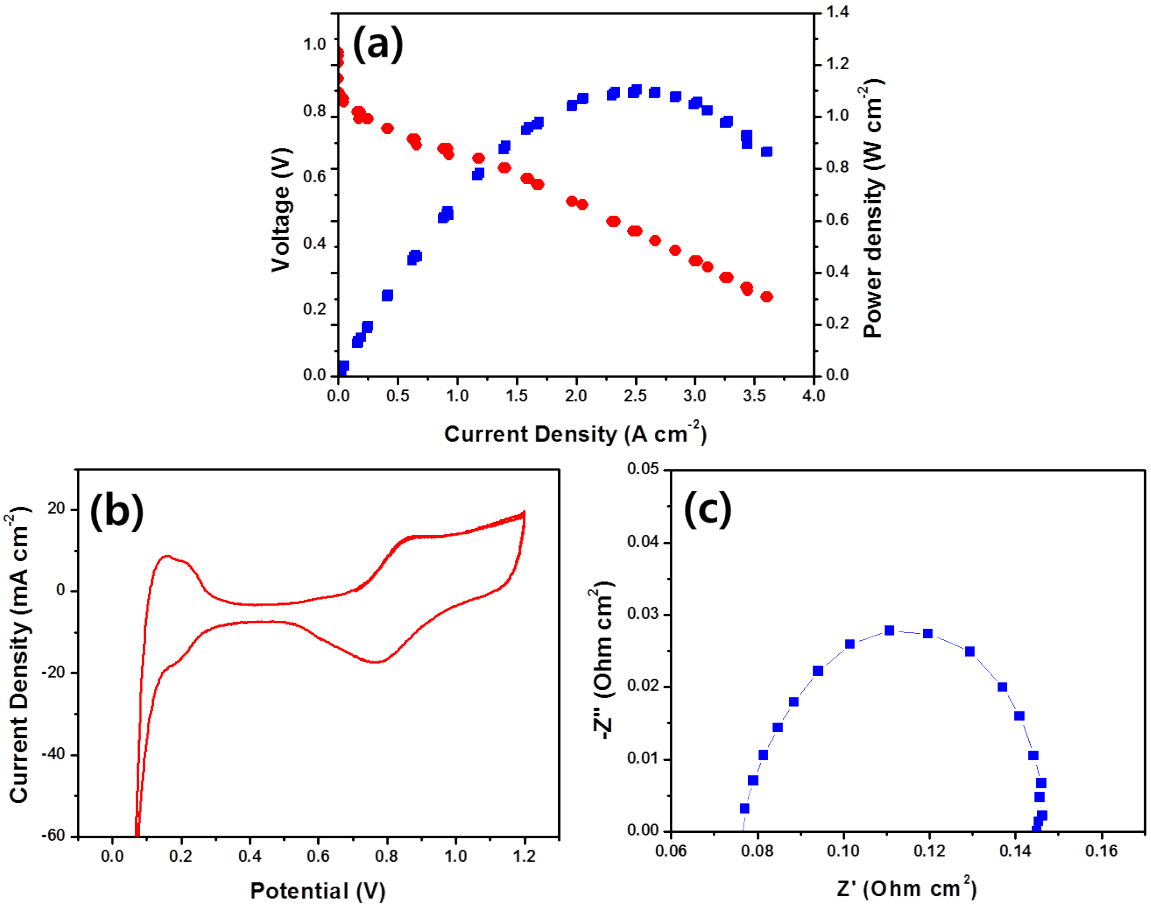

**Table S1**. Membrane properties and performance of of single PEM fuel cell MEAs fabricated with commercial Nafion 212 membrane at 75 $^{o}$C 100 % RH.

| | Commercial Nafion 212 |
|---|---|
| Pattern size (μm) (width/space/height) | - |
| Specific membrane surface area | 1 |
| Thickness (μm) | 50 |
| ECSA ($m^2/g$) | 42.3 |
| Current density at 0.6 V ($A/cm^2$) | 1.58 |
| Maximum power density ($W/cm^2$) | 0.79 |
| Ohmic resistance ($\Omega\ cm^2$) | 0.08 |
| Charge transfer resistance ($\Omega\ cm^2$) | 0.07 |