

Fabrication and characterization of thin reinforced bipolar membranes including water-splitting catalysts

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In this study, bipolar membranes (BPMs) for efficient and long-term stable water dissociation were fabricated and characterized. Thin reinforced BPMs were prepared by casting sulfonated ionomer solution (sulfonated poly(ether ether ketone), SPEEK) on a pore-filled anion-exchange membrane which is fabricated by filling a styrene-based ionomer into a porous polyethylene substrate. In addition, $\text{Fe}(\text{OH})_3$, $\text{Fe}(\text{OH})_2$ -EDTA, $\text{Fe}(\text{OH})_3@ \text{TiO}_2$, $\text{Fe}(\text{OH})_3@ \text{Fe}_2\text{O}_3$, and $\text{Fe}_3\text{O}_4@ \text{ZIF-8}$ were investigated as catalysts to facilitate water dissociation in BPM. The prepared BPMs were also systematically characterized to determine the optimum composition of the transition metal catalysts. This work was supported in part by the Technology Innovation Program funded by the MOTIE (No. 2001049) and by the NRF grant funded by the MSIT (No. 2019R1A2C1089286).