Fabrication and application of bipolar membranes having improved junction adhesion and water-splitting performance

송현비, 이지민[1], 강문성[1,†]
상명대학교 천안캠퍼스; [1]상명대학교
(solar@smu.ac.kr[†])

A bipolar membrane (BPM) is an ion-exchange membrane in which a cation-exchange layer and an anion-exchange layer are combined together and can dissociate water molecules into H+ and OH- ions by the effect of an electric field. The durability and water-splitting performance of such a BPM largely depend on the characteristics of the bipolar junction. In this study, polydopamine (PDA) was used as a basic material to enhance interfacial bonding strength, and at the same time, ionomer and metal complex were introduced together to improve the water-splitting performance of the BPM. As a result, the prepared BPMs showed superior interfacial adhesion and water-splitting properties than the commercial membrane. In addition, we have confirmed that it is possible to fabricate a large-area BPM through a slot-die coating. Finally, the prepared BPMs were used in a water-splitting electrodialysis for the production of LiOH, one of the raw materials of a lithium secondary battery, and its performance was evaluated. This work was supported in part by the Technology Innovation Program funded by the MOTIE (No. 20010491) and by the NRF grant funded by the MSIT (No. 2019R1A2C1089286).