Membrane capacitive deionization employing pore-filled ion-exchange membranes for energy-efficient desalination

최영은, 김도형, 이지환[1], 조성근[1], 박진수, 강문성†
상명대학교 그린화학공학과; [1]Kumkang Engineering, Inc.
(solar@smu.ac.kr†)

Capacitive deionization (CDI) is one of attractive environmentally-friendly and energy-efficient desalination processes. It consumes relatively low energy for operation compared with other competing processes such as reverse osmosis. Comparing to the conventional CDI, membrane-CDI (MCDI) which uses porous carbon electrodes together with ion-exchange membranes (IEMs) has gained great interests due to the higher ion selectivity and removal efficiency. In this work, we have developed pore-filled ion-exchange membranes (PFIEMs) for the applications to cost and energy efficient MCDI processes. The PFIEMs composed of a highly inert and tough porous substrate and an ionomer with high selectivity for specific ions that fills the pores can provide both high ion conductivity and excellent mechanical properties. The PFIEMs with high selectivity for specific ions have been successfully prepared and characterized via various electrochemical analyses. Their electrochemical characteristics have also been optimized for the successful applications to MCDI processes. (Acknowledgements- No. 2015H1C1A1034436 & No. 10047796)