

SPPO-Based Cation Exchange Membranes with a Positively Charged Layer for Cation Fractionation

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Abstract : The synthesis of monovalent cation perm-selective membranes (MCPMs) to efficiently discriminate amongst cations from seawater is of great importance for several industrial applications. However, a technical approach is highly desired to construct MCPMs to obtain a high ionic flux and sustain perm-selectivity simultaneously. In the present work, the thickness of the quaternized poly (2, 6-dimethyl-1, 4-phenylene oxide) (QPPO) layer on the surface of the SPPO-PVA (SPVA) composite membrane was adjusted using a facile procedure to achieve high permselectivity without scarifying the ionic flux. The thickness of the selective layer was precisely controlled using various concentrations of the QPPO solution. By the introduction of the cationic layer on the SPVA membrane, the monovalent cation can be separated from the divalent cation by their difference in charge density. The influence of the selective barrier (thickness) endows MCPMs with high perm-selectivity up to 12.7 for 0.1 mol L⁻¹ Li⁺/Mg²⁺ system, which is very satisfactory for polymeric membranes. The fabricated membranes have low electrical resistance and high limiting current density (i_{lim}). Keeping in view the ED results, the prepared membranes with selective surface layers could be a viable candidate for Li⁺ selective separation from divalent cation Mg²⁺.

Keywords : monovalent cation perm-selective membranes, cation fractionation, perm-selectivity, ionic flux, electro dialysis

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