Thin reinforced ion-exchange membranes for enhanced salinity gradient power generation and desalination efficiencies

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Reverse electrodialysis (RED) is one of the promising processes for generating electricity from the salt concentration gradient between river and sea water. The power generation performance of REDs significantly depends on the characteristics of ion-exchange membranes (IEMs) such as the permselectivity and resistance. In this work, we have investigated the fabrication and characterization of novel IEMs reinforced by thin and tough porous polymeric substrates. Especially, our study focused on the development of cost-effective IEMs with excellent electrochemical and mechanical properties and monovalent ion selectivity for both RED and ED applications. The prepared membranes showed excellent electrochemical and mechanical properties. In addition, the power generation and desalination performances were shown to be enhanced by the use of the developed membranes with both the low membrane electrical resistances and high permselectivity. (Acknowledgements: MOTIE No. 10047796 and ME No. RE201702218/2017000140002).