

Crosslinked quaternized-polyphenylene oxide based anion-exchange membranes for all-vanadium redox flow battery

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In this work, novel thin reinforced anion-exchange membranes have been successfully fabricated and characterized for the application to efficient all-vanadium redox flow battery. Especially, cost-effective and stable polyethylene-based porous substrate and polyphenylene oxide (PPO) were used as a reinforcing material and the base polymer, respectively. For better chemical and mechanical stabilities, we have investigated the optimal chemical crosslinking of quaternized-PPO (QPPO) based membranes. For this work, four cross-linkers with different molecular weights were employed. The prepared cross-linked QPPO membranes showed excellent electrochemical characteristics and stabilities and the maximum energy efficiency of the vanadium redox flow battery employing them was determined as 87.4%, which is superior to that of a commercial membrane (AMX, Astom Corp.). (Acknowledgements: MOTIE No. 10047796 and ME No. RE201702218/2017000140002)