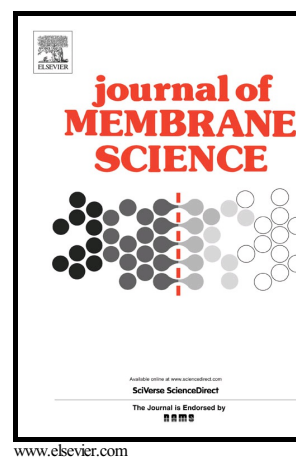


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Anion exchange membranes based on tetra-quaternized poly(arylene ether ketone)

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Abstract

A series of novel tetra-quaternized poly(arylene ether ketone)s (QPAEK-x) with highly dense quaternized pendants are investigated in this work. As polymer electrolyte precursors, the four benzyl units containing poly(arylene ether ketone)s are prepared from 4,4'-difluorobenzophenone, 4,4'-(hexafluoroisopropylidene) bisphenol and designed bisphenol monomer. Then, the objective ionomer is successfully obtained via free-radical bromination, followed by quaternization of the four benzyl units containing poly(arylene ether ketone)s. These anion exchange membranes show excellent dimensional stability, adequate thermal stability and high hydroxide conductivity, owing to the pendent quaternary ammonium structures concentrated on the side chain. The highest hydroxide conductivity (0.0653 S cm^{-1}) appears in QPAEK-0.8 (IEC = 1.69 mmol g^{-1}), and the swelling ratio of length is 11.7% at $80 \text{ }^\circ\text{C}$. The suitable morphology is investigated using SAXS, which should be a possible reason for the enhancement.

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