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Proton exchange membranes derived from sulfonated polybenzothiazoles containing naphthalene units

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ABSTRACT

Sulfonated polybenzothiazoles were synthesized by polycondensation of 6-sulfonate-1,4-naphthalene dicarboxylic acid, 2,5-diamino-1,4-benzenedithiol dihydrochloride and either 1,4-naphthalene dicarboxylic acid or 2,2-bis(4-carboxyphenyl) hexafluoropropane. The two series are denoted sPBT-NA and sPBT-6F, respectively. While the sPBT-NA series are insoluble in common solvents, the sPBT-6F series are soluble due to the incorporation of hexafluoroisopropylidene moieties, which impart more chain flexibility rather than disrupting the regular packing of the polymer main chain. The sPBT-6F series exhibited high proton conductivity, high thermal and oxidative stability, good mechanical properties and appropriate water uptake and dimensional swelling