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ABSTRACT

Highly conductive, novel sulfonated poly(arylene ether) membranes with different amounts of triazole-introduced monomers (SPAE-TM) were prepared via conventional aromatic condensation reactions. The triazole-introduced monomer (TM) was used as a proton transfer moiety to increase the proton conductivities of polymer electrolyte membranes (PEMs). To compare the chemical, mechanical and thermal stabilities of non-crosslinked polymer electrolyte membranes (SPAE-TM10, SPAE-TM20), crosslinked polymer electrolyte membranes were prepared via the thermal crosslinking method (*c*SPAE-TM10, *c*SPAE-TM20). The SPAE-TM membranes exhibited excellent thermal stabilities, and the non-crosslinked SPAE-TM membranes showed satisfactory glass transition temperatures (T_g = 250 °C). The water uptakes and swelling ratios of the SPAE-TM membranes were successfully suppressed in comparison with the SPAE-TM0 membrane. The proton conductivities of all membranes were higher than those of Nafion 212 over a wide range of temperatures (0.211 – 0.256 S/cm at 80 °C, 100% R.H.). The SPAE-TM20 presented a proton conductivity that was 2.3 times higher than that of SPAE-TM0 at 80 °C and 30% R.H.