

## Synthesis of sulfonated poly(arylene ether ketone) copolymers for polymer electrolyte membranes

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Poly(arylene ether ketone)s (PAEK-BPs) were prepared by polycondensation via a nucleophilic substitution reaction of biphenyl-2,5-diol (BPDO), 4,4'-(hexafluoroisopropylidene) diphenol (6F-BPA), and 4,4'-difluorobenzophenone (DFBP) at various molar ratios of dihydroxy monomers and constant molar ratios of ketone moiety. Sulfonated PAEK-BPs (SPAEK-BPs) with different sulfonation content values were successfully synthesized via chlorosulfonic acid as a sulfonating reagent. It was discovered that only one sulfonic acid group can be selectively introduced without degradation per each repeating unit of polymer due to requirements for controlling reaction conditions such as reaction time and temperature. In this study, the experimentally observed DS were close to the theoretical values expected from the monomer ratios. The glass transition temperatures (T<sub>g</sub>'s) and decomposition temperatures (T<sub>d</sub>'s) of the polymers varied from 167 - 213 °C and 298 - 343 °C, respectively. In addition, the proton conductivities of the SPAEK-BP membranes exhibited up to a maximum of about 0.083 S/cm at 25 °C and 0.098 S/cm at 80 °C.

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