SYNTHESIS AND CHARACTERIZATION OF FUNCTIONAL PEEK FOR ION-EXCHANGE MEMBRANES

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The ion-exchange membrane is rather advanced achievement of material science and it is widely used in various industrial fields: medicine, analytical chemistry, electro- and diffusion dialysis, sensors, both separator and solid polymer electrolyte in electrolysis, batteries, fuel cells, etc.\(^1\). The research on ion-exchange membranes has grown considerably in recent years with the growing interest in fuel cell technology for the automotive and portable applications\(^2\). The requirements for a good membrane are: high chemical stability, high proton conductivity, low fuel and oxygen permeabilities and preferentially low cost\(^3\).

Chlorosulfonic acid is strong acid which is widely used as a powerful sulfonating agent\(^6\):
\[
\text{Ar-H} + \text{CISO}_2\text{H} \rightarrow \text{Ar-SO}_3\text{H} + \text{HCl}
\]

An equimolar amount of chlorosulfuric acid or an excess of the chlorosulfonic acid also can be used for chlorosulfonation of aromatic compounds:
\[
\text{Ar-H} + 2\text{CISO}_2\text{H} \rightarrow \text{Ar-SO}_2\text{Cl} + \text{HCl} + \text{H}_2\text{SO}_4
\]

The sulfonated and sulfinated polyetheretherketone (SsPEEK) was prepared via a novel method. SsPEEK has two types of functional groups, the functional groups for ion-exchange and the functional groups for further strengthening of the ion-exchange membrane by cross-linking. The discussed membrane is low cost due to the use of non-expensive chemicals and simple production procedure.

Structure of PEEK positions marked with arrows is possible sites of substitution.

References: