

Solid Polymer Electrolyte Membranes on Fluorine-siloxane Matrix

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The hydrosilylation reaction of 2.4.6.8-tetrahydro-2.4.6.8-tetramethylcyclotetrasiloxane (D_4^H) with 2.2.3.3-tetrafluoropropyl acrylate and vinyltriethoxysilane at 1:4.2 and 1:3:1 ratio of initial compounds in the presence of platinum catalysts have been carried out and corresponding D_4^R and $D_4^{RR'}$ type adduct have been obtained. Via ring opening copolymerization reaction of D_4^R and $D_4^{R,R'}$ with regulated agent hexamethyldisiloxane, in solution, in the presence of anhydrous powder-like potassium hydroxide, as well as with tetramethylammonium fluoride at various temperatures, new comb-type siloxane polymers with pendant propyl tetrafluoropropyl propionate side groups and ethyltriethoxysilane groups, as cross-linking moieties have been obtained.

Synthesized D_4^R and $D_4^{R,R'}$ monomer and comb-type polymers were analyzed by FTIR, 1H , ^{13}C , and ^{29}Si NMR spectroscopy. For comb-type polymers DSC and GPC investigation have been carried out.

Sol-gel reactions of $D_4^{RR'}$ type monomer and polymers doped with lithium trifluoromethylsulfonate (triflat) and lithium bis(trifluoromethanesulfonyl)imide have been studied and solid polymer electrolyte membranes have been obtained. The electric conductivity of the membranes was determined via electrical impedance spectroscopy.

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