

## Preparation of Anhydrous Proton Conducting Electrolytes Membranes for high temperature fuel cells

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A comb-like copolymer consisting of a poly(vinylidene fluoride-co-chlorotrifluoroethylene) backbone and poly(hydroxy ethyl acrylate) side chains, i.e. P(VDF-co-CTFE)-g-PHEA, was synthesized through ATRP using CTFE units as a macroinitiator. Successful synthesis and a microphase-separated structure of the copolymer were confirmed by proton nuclear magnetic resonance ( $^1\text{H-NMR}$ ), FT-IR spectroscopy, and TEM. This comb-like polymer was crosslinked with 4,5-imidazole dicarboxylic acid (IDA) via the esterification of the -OH groups of PHEA and the -COOH groups of IDA. Upon doping with phosphoric acid ( $\text{H}_3\text{PO}_4$ ) to form imidazole- $\text{H}_3\text{PO}_4$  complexes, the proton conductivity of the membranes continuously increased with increasing  $\text{H}_3\text{PO}_4$  content. A maximum proton conductivity of 0.015 S/cm was achieved at 120 °C under anhydrous conditions.

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