One-Step Synthesis of Sulfonated Silica-Poly(dimethylsiloxane) Proton Exchange Membranes for High Temperature PEMFC

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A free-standing and flexible inorganic-organic nanocomposite hybrid proton exchange membranes were synthesized by sol-gel process with tetraethoxysilane (TEOS), Poly (dimtethylsiloxane) (PDMS) as precursors. In-situ sulfonation of TEOS-PDMS network using (3-mercaptopropyl)trimethoxysilane (3-MPTMS) was conducted at the same time. Their structural, thermal, and proton conductivity properties were studied by several instrumental analyses. The content of silica affected the flexibility and brittleness, and the ratio of TEOS/MPTMS affected the ion exchange capacity and proton conductivity of the synthesized membrane critically, respectively.