

Preparation of solid proton conductors for intermediate temperature fuel cell

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The proton conductors, $\text{SiO}_2\text{-P}_2\text{O}_5\text{-TiO}_2\text{-PWA}$ and $\text{SiO}_2\text{-P}_2\text{O}_5\text{-TiO}_2\text{-imidazol}$ membrane, were prepared by sol-gel technique. Proton(H^+) transport in solids has attracted much attention because of its potential use in clean energy fields, such as fuel cell, batteries and sensors. Tetraethoxysilane(TEOS), Trimethylphosphate(TMP), Titanium tetrabutoxide(TBOTi), Phosphotungstic acid(PWA) and imidazol were used as precursors of proton conducting membranes. The structural analysis of membranes have been studied by Fourier transform infrared spectroscopy (FTIR), X-ray diffraction(XRD), differential thermal analysis (DTA) and thermal gravimetric analysis (TGA). The proton conductivity of $\text{SiO}_2\text{-P}_2\text{O}_5\text{-TiO}_2\text{-PWA}$ and $\text{SiO}_2\text{-P}_2\text{O}_5\text{-TiO}_2\text{-imidazol}$ membranes show $2.22 \times 10^{-4} \text{ Scm}^{-1}$, $3.94 \times 10^{-4} \text{ Scm}^{-1}$ and a maximum power density value of those were found to exhibit 0.12 mW/cm^2 , 0.17 mW/cm^2 under humidified atmosphere respectively.