

Preparation and characterization of polymer electrolyte membranes by two types of the sulfonation method for fuel cell application

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Sulfonated poly(ether ether ketone) membranes were synthesized by two types of sulfonation method. Firstly, post-sulfonated polymers were synthesized using PEEK (Victrex®) with sulfuric acid (95%) as sulfonating agent. Secondly, pre-sulfonated copolymers were synthesized using sulfonated monomer. Membranes of the two different polymers were prepared by a polymer casting method. Degree of sulfonation was adjusted by reaction time of PEEK, percentage of sulfonated monomer, respectively. Analysis by atomic force microscope (AFM) and small angle X-ray scattering (SAXS) showed microstructures of both membranes. The glass transition temperature and thermal stability were studied by DSC and TGA. The proton conductivity increased with degree of sulfonation and proton conductivity of the pre-sulfonated membrane showed higher than that of the post-sulfonated one at similar IEC.