The use of Strong Magnetic Field Treatment for Preparation of Proton Exchange Membrane Doped by SeO₂ and its electrochemical properties

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48% sulfonation degree SPEEK membranes were prepared with rare earth nanoparticles doped and strong horizontal and vertical magnetic field treatment. The experimental results show that the dopant evenly dispersed in the matrix, and took place acid-base pairing interaction with sulfonic acid groups. The interaction of SeO₂ and sulfonic acid group are only occurred in the two-phase interface which has no impact on the crystal structure of doped membrane. After strong magnetic field treatment, the microstructure morphology of doped membrane has no obvious changes. The conductivity of doping modification membrane increased with temperature rising, and reduced with the increase of doping amount. After magnetic field treated, the conductivity of membranes increased significantly, and the vertical direction is obviously superior to the parallel to magnetic field direction. The polar groups take place deformation or re-orientation after processing by strong vertical magnetic field, and form parallel to the film surface of layered distribution, which conduce to the proton transition and prevent the penetration of the methanol molecules. Doping membrane processing by parallel strong magnetic field, polar groups in the membrane re-orientation in vertical plane direction of orientation and form strip random distribution, which is advantageous to the membrane proton in transition.

Keywords: Electrochemical properties, rare-earth doped, strong magnetic field

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