

Technological Aspects in Synthesis and Characterization of Proton Conducting Polyetheretherketone (PEEK) Membranes for Fuel Cell Applications

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The ion-exchange membrane is rather advanced achievement of material science and it is widely used in various industrial fields: medicine, analytical chemistry, electro- and diffusion dialysis, sensors, both separator and solid polymer electrolyte in electrolysis, batteries, fuel cells, etc [1]. The research on ion-exchange membranes has grown considerably in recent years with the growing interest in fuel cell technology for the automotive and portable applications [2]. The requirements for a fuel cell membrane are following: high chemical stability, high proton conductivity, low fuel and oxygen permeabilities and preferentially low cost [3]. The membrane properties are defined both by ion-conducting polymer as material and by the membrane as technological object. In this project the laboratory equipment to prepare membranes under highly controllable conditions has been designed. It was possible to keep constant the membrane thickness and drying conditions (temperature, chemical environment, etc.). Under those conditions an efficient control of the cross-linking procedure might be achieved. The sulfonated and sulfinated polyetheretherketone (SsPEEK) was prepared via a novel synthesis method. The dependence of the membrane morphology, mechanical and electrical properties on preparation conditions have been studied by using spectroscopic and electrochemical methods. The membrane tests in direct methanol fuel cell are provided.

References

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