

Sulfonated poly(indene) and PVDF hybrid polyelectrolyte polymer membranes for use in fuel cells

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New thermally stable polymer electrolyte membranes have been developed for use in low humidity conditions in fuel cell polymer electrolyte membranes (PEMFC). In the present work polymer electrolyte membranes were prepared with poly(vinylidene fluoride) (PVDF) and sulphonated poly(indene)(PInd) with the objective to evaluate the efficiency of the polymer hydrocarbon as electrolyte. The PVDF/SPInd membranes were obtained by casting solutions of polymers in dimethylacetamide (DMAc) containing 5, 15 or 25 % SPInd. The poly(indene) precursor was laboratory synthesized and functionalized with sulphonic groups (-SO₃H) using a sulphonating agent such as chlorosulfonic acid in 1,2-dichloroethane. The PVDF/SPInd membranes were evaluated for their capacity to ion exchange, degree of swelling in water, permeability to ethanol and also for electrochemical impedance for ion conductivity analysis. The thermal stability of the membranes was evaluated by thermo gravimetric analysis(TGA) and differential scanning calorimetry (DSC). Preliminary results show that the properties of the PVDF/SPInd membranes varied significantly with percentage SPInd. The membranes containing 25 % SPInd presented a capacity for ion exchange in the region of 0.36 mequiv/g and a 1.20 % average swelling in water. The increased concentration of SPInd within the composition reduced the permeability to ethanol and thermal stability and increased the ionic conductivity. This shows that the sulfonated poly(indene) has potential for use as polymer electrolyte in the preparation of cationic membranes.

Biography

Deyse Carpenter has got her Ph.D degree from Birmingham University, UK, followed by a research fellowship at the same university. Her postdoctoral studies were undertaken at Manchester University, UK. She is Course Coordinator and a Senior lecturer at the University of Blumenau, Brasil. Her research interests are in fuel cells, corrosion and surface treatment. She is a member of the editorial board of The Transaction of the Institute of Metal Finishing Journal.

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