

Post irradiation time effects on the graft of poly(ethylene-*alt*-tetrafluoroethylene) (ETFE) films for ion exchange membrane application

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Grafting of styrene followed by sulfonation onto poly(ethylene-*alt*-tetrafluoroethylene) (ETFE) was studied for synthesis of ion exchange membranes. Radiation-induced grafting of styrene onto ETFE films was investigated after simultaneous irradiation (in post-irradiation condition) using a 60 Co source. The films of ETFE were irradiated at 20 kGy dose at room temperature and chemical changes were monitored after contact with styrene for grafting. The post-irradiation time was established at 21 days when the films of ETFE were remained in styrene/toluene 1:1 v/v. After this period the grafting degree were evaluated in the samples. The grafting films were sulfonated using chlorosulfonic acid and 1,2-dichloroethane 20:80 (v/v) at room temperature for 5 h. The results were evaluated by infrared spectroscopic analysis (FTIR), differential scanning calorimetry analysis (DSC), thermogravimetric analysis (TGA) and the degree of grafting (DOG). The ion exchange capacity (IEC) of membranes was determined by acid-base titration and the values for ETFE films were achieved higher than Nafion[®] films. Preliminary single cell performance using pure H₂ and O₂ as reactants at a cell temperature of 80 °C and atmospheric gas pressure is shown in figure 1.

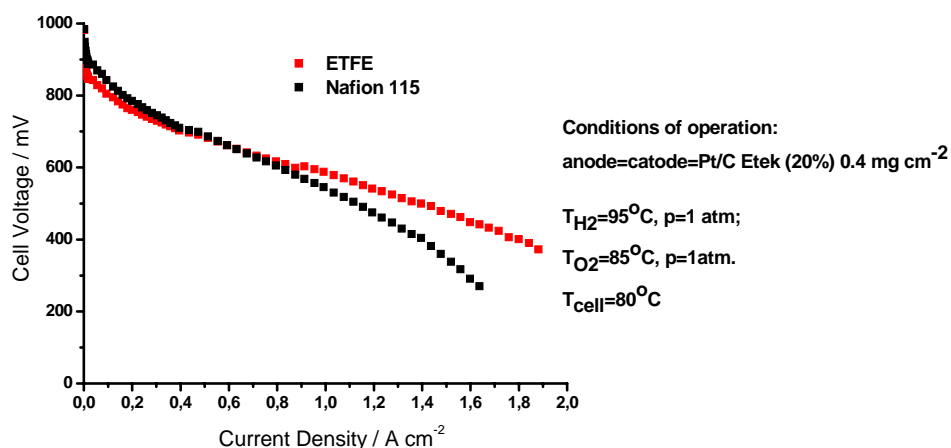


Figure 1: MEA performance data in 5.0 cm² single cell.

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