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RADIATION-INDUCED GRAFTING OF STYRENE INTO POLY(VINYLIDENE FLUORIDE) FILM BY SIMULTANEOUS METHOD WITH TWO DIFFERENT SOLVENTS

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Abstract - Grafting of monomers in fluorinated polymers has been the object of study in the last few decades to produce ion exchange membranes for fuel cells, membranes for filtration and waste treatment and polymeric actuators due to the good chemical inertia of the fluorinated polymers and in every case it is important for the polymer to exhibit ion exchange capacity. Grafting may be one step to achieve ion exchange capabilities in membranes and radiation-induced grafting is one way to obtain a grafted polymer. In this work, radiation-induced grafting of styrene into poly(vinylidene fluoride) (PVDF) films with 0.125 mm thickness at doses of 1 and 2.5 kGy in the presence of a styrene/N,N- dimethylformamide (DMF) solution (1:1, v/v) and at doses of 20, 40 and 80 kGy in presence of a styrene/toluene solution (1:1, v/v) at dose rate of 5 kGy h^{-1} was carried out by simultaneous method under nitrogen atmosphere and at room temperature, using gamma rays from a Co-60. The films were characterized before and after modification by the grafting yield (GY) calculated infrared spectroscopy (FT-IR), scanning electron microscopy (SEM), differential scanning calorimetry (DSC) and thermogravimetry (TG/DTG). GY results shows that grafting increases with dose, and it was possible to confirm the grafting of styrene by FT-IR due to the new characteristics peaks and by the TG and DSC due to changes in thermal behavior of the grafted material. Results showed that the system allows the controlled grafting of styrene into PVDF using gamma irradiation at doses as low as 1 kGy.