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Radiation Synthesis of Acrylic Acid onto Poly(tetrafluoroethylene-perfluorovinyl ether) Film: Chemical Modifications and Electrical Conductivity

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Graft-polymerization of acrylic acid (AAc) monomer onto poly(tetrafluoroethylene-perfluorovinyl ether) copolymer film was carried out using gamma irradiations techniques to synthesize graft copolymer membranes PFA-g-PAAc (PFA-COOH). The effect of the irradiation dose on the degree of grafting of AAc onto PFA films was investigated. The results showed that the degree of grafting increases with increasing the irradiation dose. The grafting yield 19, 47 and 73 % of the prepared films [PFA-COOH] were selected for chemical modification by reaction with aniline to produce modified membrane [PFA-CO-NH-ph] followed by sulphonation reaction to introduce sulfonic acid (SO₃H) groups to get other modified membrane [PFA-CO-NH-ph-SO₃H]. The chemical structures of the grafted and modified membranes were characterized by (FT-IR), (XRD), and (SEM) techniques.

It is of particular interest to measure the AC conductivity of flexible chemical modified membranes as a function of degree of grafting. The modified membranes of the grafting yield 40 and 80 % exhibited AC electrical conductivity. The electrical conductivity increases with increasing the degree of grafting and by chemical modification especially aniline modified grafted films. The electrical conductivity of modified membranes considered for use as semiconductor materials in fuel cell applications.

Country/Organization invited to participate

Egypt

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