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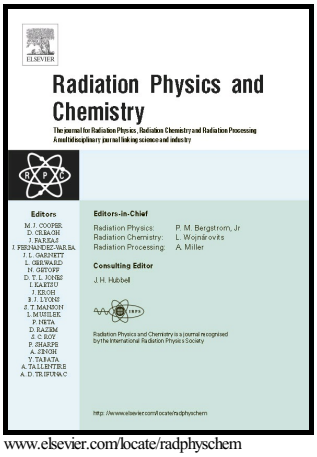

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Intensifying radiation induced grafting of 4-vinylpyridine/glycidyl methacrylate mixtures onto poly(ethylene-co-tetrafluoroethylene) films using ultrasound

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ABSTRACT

A new ultrasound-aided method was used to enhance grafting of 4-vinylpyridine (4-VP) and glycidyl methacrylate (GMA) monomers mixtures onto electron beam (EB) irradiated poly(ethylene-co-tetrafluoroethylene) (ETFE) film for the first time. The effects of reaction parameters such as absorbed dose, monomer concentration, reaction time on both of degree of grafting (DG) and grafting efficiency (GE) were investigated under sonication and conventional grafting at similar temperature. Fourier transform infrared (FTIR) and atomic force microscopy (AFM) were used to monitor the impact of the applied ultrasound on composition and surfaces of the grafted films whereas ^{1}H-NMR was used to investigate composition of the grafting residues. The ultrasound-aided grafting of 4-VP/GMA was found to enhance both of DG% and GE remarkably. Moreover, it produced grafted ETFE films with smoother surfaces and no homopolymer contamination compared to grafted films obtained from conventional grafting. The results of this study suggest that the use of ultrasound is a promising way for intensifying grafting process and improving its economy.

Keywords: Ultrasound-intensified grafting; pre-irradiation method; reaction parameters; homopolymer removal; graft copolymer surface properties.

1. Introduction

Radiation induced grafting (RIG) is an interesting method for producing various functional polymeric materials for a wide range of applications including energy, environmental and