

Irradiated Sodium–alginate/poly(ethylene oxide) Blend Films Improved by Methyl Acrylate Monomer

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ABSTRACT

Sodium alginate (SA)-based poly(ethylene oxide) (PEO) blend films were improved by methyl acrylate (MA) monomer and γ irradiation toward practical application. The films were prepared by a casting method and modified by glycerol (Gol) and mustard oil (MO). The SA-based films were successfully produced with γ irradiation (12 kGy) with 10% PEO, 15% Gol, 20% MO, and 7% MA on a mass basis as optimized. The tensile strength (TS), tear strength (TT), elongation at break (EB), Young's modulus, moisture content, water vapor permeability (WVP), and structural properties of the blended films were determined. The thermal properties of the films were characterized by thermogravimetric analysis, dynamic mechanical analysis, and differential scanning calorimetry, and the structural features were examined with Fourier transform infrared spectroscopy. The ultimate results of this study show a rather remarkable enhancement in the tensile properties (30% TS and 67% TT) and reduction in EB (40%) of the SA-based films with MA addition and γ irradiation. The as-prepared SA-based films demonstrated considerable reductions in the moisture content and WVP and also conferred a desired stability of the films.

KEYWORDS: differential scanning calorimetry (DSC); grafting; irradiation; mechanical properties; packaging

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