

Nanogels of the polypropylene modified by gamma irradiation and incorporation of AgNPs biocide

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The objective of this work is to study the formation of nanogel and microgel in modified polypropylene (PP) and incorporation of silver nanoparticles. The PP in pellets was modified by gamma irradiation of pristine PP under a crosslinking atmosphere of acetylene in doses of 5, 12.5 and 20 kGy, followed by thermal treatment for radical recombination and annihilation of the remaining radicals. Thin film of polypropylene gel was obtained by extraction in boiling xylene for period of 12 hours at 138 °C, followed by decantation in beaker at room temperature of 25°C with the total volatilization of the xylene. Deposition of dried material on fine glass blades under agitation by settling process formed films containing nanosilver. The thin films of gel AgNPs formed of pristine PP, as well as, modified (i.e., irradiated) were characterized using Scanning Electron Microscopy (SEM), Energy Dispersive Spectroscopy (EDX), Atomic Force Microscopy (AFM), X-Ray diffraction (DRX), Differential Scanning Calorimetry (DSC) other than determination of antibacterial activity. The PP morphology indicated the nanogels and microgel formation with increase of spherulites concentration and crystallinity at dose 12.5 kGy. Further, the antibacterial properties of the gel-AgNPs polypropylene were investigated against *Escherichia coli* (Gram-negative) and *Staphylococcus aureus* (Gram-positive) bacteria.

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