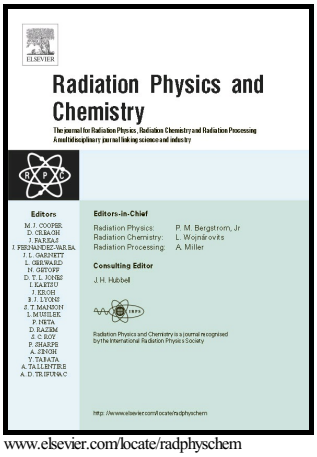

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Thermal Resistance, Tensile Properties, and Gamma Radiation Shielding Performance of Unsaturated Polyester/Nanoclay/PbO Composites

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Abstract

Composites of unsaturated polyester containing 5 wt.% nanoclay and different amounts of lead monoxide particles (0, 10, 20, and 30 wt.%) were prepared. XRD patterns showed the exfoliation of nanoclay layers in the polymer. Morphological properties of the composites were studied using SEM micrographs. The prepared composites were investigated for their thermal resistance and mechanical properties using thermogravimetric analysis and tensile testing method, respectively. Addition of lead monoxide to the polymer worsened its thermal resistance and tensile properties, whereas the observed negative effects could be moderated by the clay nanoparticle. Gamma attenuation performance of the composites was evaluated by ^{192}Ir, ^{137}Cs, and ^{60}Co gamma radiation sources. Linear attenuation coefficient and mass attenuation coefficient of the composites were found to be increased with the increase of PbO content. Shielding efficiency of the prepared composites was compared with some conventional shielding materials regarding their half value layer thickness. UP/nanoclay/PbO composites were found to be suitable materials for the low-energy gamma radiation shielding applications.

Keywords:

Unsaturated polyester; Nanoclay; Lead oxide; Nanocomposite; Gamma ray attenuation; Radiation shielding