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Preparation of Polyurethane Acrylate/ Organically Modified Montmorillonite Nanocomposites by Electron Beam Radiation Curing

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The electron beam radiation curing of Polyurethane acrylate (PUA)/Montmorillonite (MMT) modified by octadecylamine (ODA-MMT) nanocomposites was investigated in this article. The nanocomposites were obtained and characterized by different techniques. The produced nanocomposites, showed remarkable improvement in their mechanical and morphological properties, compared to the pristine PUA. The XRD results revealed that the ODA-MMT silicate interlayer spacing increased up to 39 Å, indicating the intercalation structure. Whereas, the pristine MMT microcomposite showed agglomeration. The FTIR results confirmed the intercalation of the PUA chains in the silicate layers, nevertheless, the chemical structure of the PUA was not influenced by the presence of the silicate layers in the matrix. The mechanical properties of the nanocomposites showed incredible increasing in the modulus value, from 8.53±0.40 to 132.43±6.60 MPa by the dispersion of 5 wt% ODA-MMT in the PUA matrix, as well as the tensile and the dynamic mechanical properties were also improved. The radiation dose and the amount of the tri-functional monomer (TMPTA) in the formula were affected significantly the cross-linking affect the cross-linking density of the cured PUA nanocomposites.

Country/Organization invited to participate

Sudan

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