

Electron Beam Cross-Linking Of Hybridized Kenaf/Pineapple Leaf Fiber-Reinforced High-Density Polyethylene Composite With And Without Cross-Linking Agents.

Abstract

Hybridized kenaf/PALF-reinforced HDPE composite was produced and characterized. Prepared hybrids were irradiated at various doses of EBI and subsequently with 1%, 2%, and 3% concentrations of vinyltri(2-methoxy ethoxy) silane and TMPTMA as cross-linking agents. The effects of EBI on the mechanical properties of treated and untreated composites were compared. Specimens without cross-linking agents were irradiated using a 2.0 MeV EB accelerator at dose range of 10, 20, 30, 40, 60, 80, and 100 kGy. Thereafter, 10 kGy was selected to irradiate specimens that were prepared with cross-linking agents. Hybrid without the addition of any cross-linking agent showed increase in tensile strength and modulus with increase in radiation dose. Flexural strength, however, showed decline at 80 and 100 kGy. Optimum impact strength was obtained in hybrid prepared without cross-linking agents and at only 10 kGy, while 20 kGy gave superior flexural modulus. Unlike in tensile strength, silane performed better as a cross-linking agent in flexural properties than TMPTMA. Additions of cross-linking agents had less significantly improved the tensile and flexural properties of the hybrid. It was clear that HDPE self-cross-linked by radiation, making silane and TMPTMA less effective. Fractured surfaces of the composites, examined by a scanning electron microscope showed good adhesion between fiber and matrix.

Keyword: Hybrid; Cross-linking; EB-irradiation; Mechanical properties; Strength