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P03-060

STUDIES OF MECHANICAL AND ELECTRICAL PROPERTIES OF EPDM NANOCOMPOSITES USING SILICA NANOPARTICLES

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Abstract: We have studied the mechanical and electrical properties of EPDM (Ethylene Propylene Diene Monomer) nanocomposites using different concentration of silica Nanoparticles. The nanocomposites were prepared by mixing EPDM, silica Nanoparticles and the cross linking agent in a bambury mixer. We performed the mixing using 80% of the total volume of the chamber in order to get higher shear rate to obtain better dispersion of the particles in the bulk. The surface of silica Nanoparticles was modified by a silanization process using vinyltriethoxisilane as coupling agent to improve compatibility between polymer and silica. The results shown that, the mechanical properties are improved as the concentration of unmodified silica Nanoparticles in the polymer matrix increases. However, the best results were obtained when the nanoparticles were treated with silane. The dielectric strength voltage increased about 50% when we use treated Nanoparticles at small sample thickness. When increasing sample thickness, this property decays drastically due to the material imperfections during manufacturing. These results open the opportunity to development high performance insulation materials.
Keywords: nanocomposite, elastomer, silica.

P03-062

EFFECT OF PROCESSING ON THE PROPERTIES OF POLY(METHYL METHACRYLATE)/SILICA NANOCOMPOSITES

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Abstract: The incorporation of nanosilica into thermoplastic matrices by polymer melting compounding is a promising approach for producing nanocomposites. In this work, PMMA nanocomposites were prepared using the commercial PMMA and PMMA/elastomer blend with nanosilica obtained from burned Equisetum arvense L and investigated by mechanical, thermal and flammability tests. Torque rheometry was used to optimize the processing conditions of the raw polymeric materials and the nanocomposites with 2wt% of nanosilica. These nanocomposites were blended by melt compounding using a twin screw extruder. The morphology of the nanocomposites was analyzed using cryo-ultramicrotomy and transmission electron microscope (TEM). Addition of silica nanoparticles in PMMA promoted some improvement on the thermal stability and viscosity of the nanocomposites produced. The properties of the nanocomposites PMMA/nanosilica have shown significant dependence on particles morphologies which could be optimized in order to achieve an improvement on composite performance
Keywords: nanocomposite, processing, properties.