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Polymer-Conducting Polymer Composites JUAN MONRREAL, HEINRICH D. FOLTZ , ELSA GARCIA, KAREN LOZANO, MARCOS VIL-LAREAL, STEVEN C. TIDROW, MAGDALENA DORINA CHIPARA, MIRCEA CHIPARA, University of Texas Pan American — Polyaniline is a conducting polymer with high electrical conductivity, good thermal and thermo-oxidative resistance, and poor mechanical properties. To overcome these weaknesses, the conducting nanoparticles were dispersed within polymeric matrices characterized by high mechanical strength or high elasticity. Such composite materials found applications as lightweight antistatic materials (at low doping levels) and electromagnetic shielding capabilities (at high doping levels, typically above the percolation threshold for electrical conductivity) and exhibit potential applications as metamaterials. Nanosized particles of polyaniline were dispersed within polymeric matrices (polystyrene, polyvinylchloride, and polyethylene). The thermal properties were investigated by Thermal Analysis and Differential Scanning Calorimetry. FTIR/ATR, Raman spectroscopy, and Electron Spin Resonance spectroscopy provided additional information about the effect of nanofiller on the polymeric matrix. Electrical (dc) measurements confirmed the increase of the electrical conductivity as the concentration of conducting nanoparticle is increased and revealed a broad percolation behavior. The effect of the conducting nanofiller on the mechanical properties is reported.

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