Submicron copper-low-density polyethylene conducting composites: Structural, electrical, and percolation threshold

Alvarez, M. P.

Poblete, V. H.

Pilleux, M. E.

Fuenzalida, V. M.

Copper-embedded low-density polyethylene (LDPE) composites were fabricated using different copper concentrations in the polymer matrix. The copper particles were spherical with a mean particle size between 200 and 300 nm. All the samples were compacted under pressure and melted. The LDPE matrix was analyzed using gel permeation chromatography (GPC) and it did not evidence degradation of the LDPE matrix. The microstructure of the composites was examined with scanning electron microscopy. The electrical conductivity was measured as a function of the copper content, and the composite fabricated with a 10 vol % copper presented a conductivity 15 orders of magnitude higher than that of pure LDPE. The enhancement in conductivity can be explained by means of segregated percolation path theory and the experimental results are in agreement with the theoretical law.