

Thermophysical properties of Composites LDPE / Graphite

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The conducting polymer/graphite nanocomposites have attracted interest because of their exceptional electrical, thermal and mechanical properties. Polymeric nanocomposites prepared from high aspect ratio layered graphite nanofillers achieve significant improvements in thermophysical and electrical properties at low filler concentrations, compared to conventional composites, without a significant increase in density. In this work, we present various aspects of electrical and thermophysical of nanocomposites based on Low-density polyethylene (LDPE) matrix filled with nanostructuralized expanded graphite and standard, micro-sized graphite. A periodical method developed in the laboratory was used to measure simultaneously thermal conductivity, specific heat and diffusivity of the composites at room temperature. We have compared the influence of micro and nano sized fillers on the final thermophysical and electrical properties. It was found that the electrical conductivity of composites strongly depends not only on the filler content but also on the graphite structure. When the micro-sized graphite was used, the percolation concentration of the filler was found to be 15 vol.%, whereas the percolation concentration of the filler in nanocomposites filled with expanded graphite was significantly lower. Similarly, it was showed that the graphite significantly improves the thermophysical behaviour of composites filled with micro and nano filler sizes. The thermal conductivity measured values were also compared to some theoretical models for the prediction of the thermal conductivity.