Joint Event on
30th Annual Congress on
Nanotechnology and Nanomaterials
&
8th World Congress on
Spectroscopy and Analytical Techniques
September 10 - 11, 2018 I Stockholm, Sweden

Thermally insulating and fire retardant based on polyurethane nanocomposite and multi wall carbon nanotubes

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Rigid polyurethane has a wide range of applications such as insulation, packaging, among others, due to their excellent properties. However, as many organic materials are moderately flammable and the flame propagation is very fast, which increases the risk of fire, limiting their use in case of fire. Polymer nanocomposites that are nanoparticles dispersed in a polymer matrix have earned substantial academic and industrial interest since their inception. Polymer nanocomposites for flammability applications are attractive because the formation of nanocomposite, not only improves the fire properties, but can also improve other properties (e.g., mechanical properties), and it has the potential to bring true multifunctionality to materials. Moreover the microstructure, mechanical and thermal properties of polyurethane are strongly dependent on the synthesis method employed to manufacture them. In this context, nanomaterials could reduce the quantity used, and increase the mechanical and thermal properties. In this work, polyurethane nanocomposite was synthesized with nanostructures by a reaction process in-situ and characterized by thermo gravimetric analysis (TGA) and scanning electronic microscopy (SEM). Thermogravimetric analysis was used for materials characterization, to study the reactions of decomposition of materials, in the determination of the characteristics of volatilization. The weight loss of a sample was registered to the extent that the temperature was increased, up to temperatures of 850ºC, under controlled conditions of heating speed and Argon reaction atmosphere. Polyurethane nanocomposite (PU-MWCNT) showed a discrepancy with control sample thermograms, the first had four transitions weight loss and the second had three transitions, the differences occurs since 170°C to 388°C. As a result PU-MWCNT obtained 80.121% of weight loss at 388.37°C. However, polyurethane control resulted with 79.89% of weight loss at 385.49°C. After that for both samples, at range of 400°C to 850°C, the samples no longer lost weight, but in the end inorganic residues remained. At the end, study thermal properties of polyurethane nanocomposites and their characterizations are useful for application of nanotechnology on R&D industrial strategies. Nano technological applications on polyurethane fireproof nanocomposites deepen the understanding of fire as well as fire prevention, contributing as a relevant and important industry development.

Biography

Maria Eugenia Mena Navarro is studying her PhD at the Iberoamericana University of Mexico City. Her Doctoral studies are about polyurethane nanocomposites and their properties for industrial applications. Actually, she is Coordinator of the Department of Research, Development & Innovation on Developments and Finished on Polyurethane. This is a Mexican Company that investigates and produces polyurethane systems for construction, footwear and automotive industries. She is an Inventor, and has published patents on polyurethane nanocomposites and composites. She is expert on innovate products and intellectual property. She has published some papers and participated on several international congresses.

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