



P-A-524

POLYPROPYLENE/GRAPHITE NANOCOMPOSITES: USE OF SONICATION IN THE GRAPHITE FOLIATION

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Polymeric nanocomposites have attracted a great interest due to the possibility of obtaining innovative materials with better thermal, electrical and mechanical properties compared to conventional composites. In this context, graphite has been reaching great relevance as nanofiller due to the possibility to obtain nanocomposites with good electrical conductivity and excellent mechanical properties. Graphite was foliated by sonication method before use in PP/graphite in order to improve the dispersion into the matrix. After the exfoliation, graphite and polypropylene was melt mixed in a in a co-rotating twin screw extruder. The time of sonication and the use of plasticizers were evaluated through mechanical properties. The ultrasonic bath with dimethylformamide as solvent showed an effective method to exfoliate graphite as seen by Atomic Force Microscopy, where was found single layers of graphene with height of 1nm and 200nm of diameter, approximately. In the nanocomposites, a higher sonication time was more effective once had increase in the tensile modulus of the samples. The plasticizers act as processing aid and interact with the nanofiller or matrix, resulting in better dispersion of the filler. In this case, plasticizers were used to penetrate between graphite layers during the sonication to aid the exfoliation during the extrusion process. Comparing the use of EMCA (apolar character) with polypropylene glycol (polar character), the last one acts more effectively in the exfoliation, increasing the modulus of the nanocomposite. Higher content of polypropylene glycol in the samples increases the mechanical properties of the nanocomposites.