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The effect of graphene oxide (GO) filler on the mechanical properties of polyethylene

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Polyethylene (PE) is one of the commodity plastic used in various industry due to its good processibility, varies physical properties based on its linear or branched structure. In the past thirty years, there is a high interest to develop physical properties of polymers using low cost but effective additives. Graphite, graphene, graphene oxide (GO), carbon nanotubes, carbon fibers are some of the carbon-based fillers used to form polymer matrix composites. In this research, PE/GO composites with GO loading ranging from 0 wt.% to 2 wt.% are prepared by using a melt compounding method. The samples for characterizing and mechanical testing are shaped by injection molding machine. The mechanical properties of PE composites are investigated by tensile and fatigue test and hardness tests. The morphology and thermal characterization of PE/GO composites are determined by using X-ray diffractometer (XRD), transmission electron microscopy (TEM) and differential scanning calorimeter (DSC). Based on the mechanical test results; the tensile strength, Young's modulus, and Shore D hardness value were increased by 27.4%, 31.3%, and 9%, respectively, with a GO loading. The number of cycles to failure in fatigue test for 2 wt.% GO addition to PE sample is increased up to 100 times more than pure PE. The morphological analysis via XRD and TEM indicated that GO nanolayers were well exfoliated in the PE matrix. Based on DSC analysis results, GO addition to PE has negligible effect on thermal transitions of the PE matrix.

Biography

Ebru Gunister has completed her PhD from Istanbul Technical University. She is an Assistant Profesor in The Petroleum Institute as a part of Khalifa University of Science and Technology. She has over 15 years of research experience in the areas of materials science; clay modifications, rheological and electrokinetic behavior of clay and modified clay dispersions, polymer/clay composites, and biocomposites. She worked as Principal Investigator in Polymer/Clay Nanocomposite project and currently she has been working in Polymer/Graphene Composites projects as co-investigator. She has published more than 18 papers in reputed journals and book chapters.

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