Thermal Analysis of Polyamide-66/POSS Nanocomposite Fiber. (2017)

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Abstract
Poly Hexamethylene Adipamide (PA-66) nanocomposite fibers were prepared by melt mixing PA-66 using two Polyhedral OligomericSilsesquioxane (POSS) as fillers: Octaphenyl Polyhedral Oligomeric Silsesquioxane (OPS) and Octa-Aminophenyl Polyhedral Oligomeric Silsesquioxane (OAPS). OPS and OAPS in PA-66 was varied between 1% wt. and 3% wt. PA-66 nanocomposite fibers with varying concentrations of POSS were then analyzed using TGA, DSC and then compared to that of neat PA-66. PA-66 was thermally stable up to 350°C with low molecular weight species burning off below 200°C. PA-66-OPS were also thermally stable up to 350°C with burn-off of low molecular weight species being below 240°C. PA-66-OAPS was found to be more thermally stable (up to 400°C) with low molecular weight species burning off below 200°C. The decomposition temperatures of the PA66/POSS nanocomposites increased as the POSS content was increased, an indicator that the thermal decay of the PA66/POSS nanocomposites was slowed down by incorporating POSS into the PA66 matrix. Addition of POSS to PA-66 also increased crystallization temperature but did not change the melting temperatures. OAPS exhibited better thermal behavior when added to PA-66 compared to OPS and therefore is recommended as a prospective nanomaterial for further studies.
Index Terms—Nanocomposites,Polyamide 66,Polyhedral Oligomeric Silsesquioxane, Thermal Properties.

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