Unidirectional Fiber-Reinforced Nanocomposites: Effect of Carbon Nanotubes Distribution on Interfacial Shear Strength

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Layered systems as fiber reinforced polymers (CFRPs) are susceptible to fracture in the interlaminar and interfacial regions. Vertically Aligned Multi-Walled Carbon Nanotubes (MWCNTs) are grown on PAN-based carbon fibers, improving inter- and intra-ply mechanical properties and reinforce the interface between carbon fibers and the polymer matrix [1,2]. The main objective on this work is to study the interfacial shear strength (IFSS) using short-beam shear (SBS) test that involves three-point bending of a specimen with a short span and small span-thickness relation, following the ASTM standard D2344. The behavior of the shear–stress distribution was analyzed and compared with the MWCNTs characteristics of each specimen. Scanning electron microscopy (SEM) characterized the MWCNTs and aid in the detection of initial damage modes in cracking areas. Also, the effects of the Chemical Vapor Deposition (CVD) parameters on the carbon fiber were studied using the single fiber strength and Weibull Distribution. Raman spectroscopy analyzed MWCNTs structural characteristics.

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[2] H. W. Zhou, L. Mishnaevsky Jr., H Y. Yi, Y. Q. Liu, X. Hu, A. Warrier, G. M. Daí, **Carbon fiber/carbon nanotube reinforced hierarchical composites: Effect of CNT distribution on shearing strength**. Composites Part B (2015)