

Carbon nanotubes - based hybrid composites: size-related effects

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Abstract: The percolation threshold and macroscopic properties of the randomly organized multi-facial media is a problem that was studied for a long time. In modern material science, the main focus is the percolation phenomena in composite with randomly distributed carbon nanoinclusions like graphite nanoplatelets, carbon nanotubes, carbon black, onion-like carbon, etc. The problem is well-studied for the case of one type of inclusions having continuous spatial and angular distribution. However in case of hybrid composites the situation is not so clear. One of the most interesting combinations here is conductive filler of high aspect ratio (like carbon nanotubes) paired with non-conductive counterparts. In this case the second filler only indirectly impacts the overall conductivity.

The present report delivers the Monte Carlo modeling results and their experimental verification of a hybrid CNT-filled composite system with a second inclusion in for of non conductive spherical particles.

Keywords: Carbon nanotubes, hybrid composites, Monte Carlo modeling