Characterization of Carbon Nanotubes for Use in the Fabrication of Nanocomposite Thermal Switches

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Due to the ultra high thermal conductivity of carbon nanotubes (CNT), researchers have proposed a high thermal conducting composite material as a building block for thermal switch devices by integrating carbon nanotubes with a polymer matrix. However, the performance of the nanotube composite strongly depends on physical attributes such as morphology, diameter, length, angle of kink, and bundle size after materials processing. In this research, we present the population distribution of these physical attributes of the CVD grown CNT because CVD growth methods are highly promising for scale-up of defect-free nanotube materials. CVD also enables well-aligned CNT growth with better control than is possible with arc-discharge or laser ablation techniques. Once this classification process is performed on different batches of carbon nanotubes, it is possible to ascertain which synthesis conditions will produce the proper population distribution of nanotube sizes, shapes, and properties to be used in the fabrication of a nanocomposite thermal switch.