A PARAMETRIC EVALUATION OF CARBON NANOTUBE SYNTHESIS FROM ALUMINA PARTICLES

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ABSTRACT

Carbon nanotubes (CNTs) are a new material which was first discovered in 1991, and they have generate huge activities in most science and engineering areas due to their unprecedented electrical, thermal, and mechanical properties. These properties make CNTs ideal, not only for a wide range of applications but also as a test bed for fundamental science.

Alumina particles are used as supports for CNTs. CNTs are synthesized by floating catalyst chemical vapor deposition (FCCVD). Two different sizes of alumina particles are used as support, and 4 different surface application are employed with each size of alumina. Each of the 8 different alumina-CNTs sample configurations were subjected to multiple analysis techniques to characterize the CNT yield with respect to CNT morphology, density, morphology, and diameter distribution. The techniques used include scanning electron microscopy (SEM), transmission electron microscopy (TEM), thermo gravimetric analysis (TGA) and Raman spectroscopy.

The CNTs are also used as strain sensors and oil capture devices. The alumina-CNTs demonstrate excellent linearity, stability, and fast piezoresistive response to uniaxial strain. Similar alumina-CNT structures may have potential in flexible electronics and distributed sensing networks. These applications demonstrate the potential for the adoption of high-volume CNT growth from powder substrates.