

TEMPERATURE DEPENDENT THERMAL CONDUCTIVITY ENHANCEMENT OF WATER WITH SURFACTANT ENCAPSULATED SINGLE-WALLED CARBON NANOTUBE DISPERSIONS

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ABSTRACT

In the present work, we report the thermal and electrical conductivity of water seeded with single walled carbon nanotubes. Single walled nanotubes were synthesized using the alcohol catalyzed chemical vapour deposition method and dispersed in water with the aid of the surfactant sodium deoxycholate. Electrical conductivity measurements show an electrical percolation threshold of ~ 0.02 vol% at which a sharp increase in electrical conductivity occurs. On the contrary thermal conductivity measurements carried out using a transient hot wire technique shows no such distinct percolation threshold for thermal conduction. Besides, thermal conductivity enhancement was found to be dependent on temperature. For the highest volume concentration tested (0.3 vol%), the fluid thermal conductivity increases by 13% at room temperature to 50% at 333K. Percolation of nanotubes to form a tri-dimensional structure is considered to be the possible mechanisms for the enhancement noticed.