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A COMPUTATIONAL STUDY ON THERMAL CONDUCITIVITY OF CARBON NANOTUBE DISPERSED BIOLOGICAL NANOFLUIDS AND SUSPENSIONS

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A computational model, based on the random movement of Brownian thermal walkers, has been developed to predict the effective thermal conductivity of an idealized biological fluid and of suspensions containing single-walled carbon nanotubes (SWNTs). Thermal death of cancerous cells may be induced by radiating SWNTs selectively attached via functionalization to the targeted cells. A distribution of SWNTs inside cancerous cells, on their surface, or in the inter-cellular fluid may occur during this treatment process. The effects of the SWNT aspect ratio, weight fraction, and thermal resistance at the interface between the SWNTs and their surroundings were incorporated to make predictions that are required for developing an overall approach to cancerous cell targeting. The developed model was also applied to predict the thermal properties of SWNT dispersed in aqueous and oil suspensions. The dependence of the effective thermal conductivity on the temperature for aqueous suspensions was also investigated. [1] Hai M. Duong, D.V. Papavassiliou, K.J. Mullen, B.L. Wardle and S. Maruyama, Int. J. Heat Mass Trans., 2009 in revision. [2] Hai M. Duong, D.V. Papavassiliou, K.J. Mullen, B.L. Wardle and S. Maruyama, J. Phys. Chem. C, 2008, 112 (50), 19860-19865.

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