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Optimization of multi-walled carbon nanotubes for improved heat transfer

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Abstract

Carbon nanotubes (CNTs) are excellent for heat transfer in fluids due to their high thermal conductivity of (>3000 W/mK) and specific heat capacity of (49.11 W/m2 K). They are preferred in industry due to their high thermophysical properties. In this study, CNTs were synthesized using chemical vapour decomposition (CVD). Morphology and structure of the CNTs were revealed using scanning electron microscopy (SEM) and transmission electron microscopy (TEM), allowing for the measurements of individual CNTs inside and on the surface of composite materials. Dynamic light scattering (DLS) measured the Brownian motion of the macromolecules in the carbon nanotubes fluid which have been found to be 2-10 nm long. Nanofluids stability has been analysed using zeta potential, UV–vis spectroscopy characterize the dispersion effect of carbon nanotube suspensions. For more stability of multi-walled carbon nanotubes (MWCNTs)/water nanofluids, surface active reagent such as polyvinylpyrrolidone (PVP) was utilized. The results shows that heat transfer efficiency in fluids is improved by MWCNTs, and confirms that MWCNTs are promising nanoparticle material in nanofluids and hence predict their wide application in heat transfer industry.

Keywords: Carbon nanotubes, Heat transfer, Brownian motion, Nanofluids.

Apply to be considered for a student ; award (Yes / No)?

yes

Level for award;(Hons, MSc, PhD, N/A)?

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