# Thermal conductivity of single-walled carbon nanotube suspensions in ethylene glycol: Experimental results and theoretical bounds

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## Abstract

In the present work, we report measurements of the effective thermal conductivity of dispersions of single-walled carbon nanotube suspensions in ethylene glycol. Single-walled carbon nanotubes (SWNTs) were synthesized using the alcohol catalysed chemical vapour deposition method [1]. Resonant Raman spectroscopy was employed to determine the diameter of SWNTs by measuring the frequency of the vibration of its radial breathing mode. The nanofluid was prepared by dispersing the SWNTs using sodium deoxy cholate (SDC) as the surfactant. Nanotube loading of up to 0.3 wt% was used. Thermal conductivity measurements were performed by the transient hot-wire technique. Good agreement, within an uncertainty of 2%, is found in published thermal conductivities of the pure fluids. The enhancement of thermal conductivity increases linearly with respect to the nanotube loading. The maximum enhancement in thermal conductivity was found to be 15% at 0.3 wt% loading. The experimental results were compared with the Hamilton-Crosser model [2], the Lu-Lin model [3], the Nan et al. model [4] and the Hashin-Strikman model [5]. It was found that the enhancement estimated by the Hashin-Strikman model is in close agreement with the experimental results, while the rest of the analytical models consistently underestimate the enhancement.

**Keywords**: Single-walled carbon nanotube, Nanofluid, Thermal conductivity, conduction heat transfer.

## References

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