

An Indian-Australian research partnership

Project Title:

Assessment of the thermal conductivity of carbon nanotubes.

Project Number

IMURA0218



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Research Academy Themes:

Highlight which of the Academy's Theme(s) this project will address?

(Feel free to nominate more than one. For more information, see www.iitbmonash.org)

1. Advanced computational engineering, simulation and manufacture
2. Infrastructure Engineering
3. Clean Energy
4. Water
5. Nanotechnology
6. Biotechnology and Stem Cell Research

The research problem

Carbon nanotubes (CNT) have been found to possess extremely high thermal conductivity (10 times that of copper). This is due to the phonon dominated thermal properties of carbon nanotubes. In previous studies, the phonon transfer velocity has been quoted to be more than 10 km/s. For industrial situations involving high viscosity liquids, where high thermal conductivity is important, a composite mixture of CNT in fibre form mixed with the original liquid product may provide process enhancements. This project aims to investigate the effect of high velocity thermal conduction of CNT on heat transfer within the mixture. The study will also investigate methods for adequate dispersion of CNT fibres within high viscosity liquids.

Project aims

To investigate if carbon nano-tubes can improve the thermal conductivity of high viscosity liquids.

Expected outcomes

Highlight the expected outcomes of the project

The expected outcomes are:

- a fundamental understanding of techniques for the measurements of variations in bulk thermal conductivity in high viscosity liquids;
- results showing the variation in thermal conductivity on emulsions as a function of mass, type and size of nanoparticles; and
- fundamental understanding of methods for the dispersion of CNT within high viscosity liquids, and the role of surfactants on this process.

Capabilities and Degrees Required

Essential: : Masters in Chemistry/Chemical engineering with polymer science background.

Desirable: Colloids Chemistry, fibre science

Desirable: Simulation and computation experience with CNT,