NUS National University of Singapore | Department of Mechanical Engineering
Faculty of Engineering

You are cordially invited to our:
Department Seminar

Topic: **Nanofluids and Biological Applications**

Speaker: **Prof. Sarit Kumar Das**
Professor and Dean of Academic Research
Indian Institute of Technology

Date: **Tuesday, 23 July 2013**

Time: **10am to 11am**

Venue: **E3-06-04** *(map of NUS can be found at http://map.nus.edu.sg/)*

Host: **Asst. Prof. Lee Poh Seng**

Abstract

Since their inception, nanofluids have attracted the attentions of the world-wide research community due to their unique properties and characteristics. Nanofluids have been reported to exhibit enhanced thermal and electrical conductivities, enhanced dielectric breakdown strengths, smart and tunable optical properties and unique electrical and magnetic properties. Nanofluids have the potential to be the future raw materials for fabricating thin film electronic devices and carrier agents for targeted drug delivery.

Under the present investigation Nanofluids have been studied extensively to experimentally and theoretically understand the mechanisms of thermal and electrical transport and their viscous behaviors. Experimental analyses have been conducted on a wide variety of nanofluids, based on different base fluids and nano-particles. Theoretical models to explain thermal conduction and viscous behavior in various types of nanofluids (metals, metal oxides, CNT, Graphene, etc) have been proposed and validated against experimental results. Recent studies into experiments of electrical properties of nanofluids and its analytical modeling is providing interesting data about the physics of nanofluids.

We have also used Nanofluids as an important agent in bio-therapies like LASER mediated thermal ablation of tumors, where the plasmonic characteristics of gold nano-antennae, gold-nanorods and gold-mesoflowers in human serum have been studied in-vivo in lab mice. Hyperthermia treatment utilizing magnetic nanofluids under alternating magnetic field excitation in bio-tissue mimics have been extensively studied. For both the above studies, assisting computational studies have been performed to predict treatment parameters based on tumor size, depth and nanofluid concentration against variants like LASER power, wavelength and excitation field strength. Computational modeling of DNA-nanoparticle assembly mediated drug delivery systems has been explored. Presently, exploring the LASER induced hyperthermia of nanofluid injected sub-surface tumors in presence of blood flow through capillary networks is yielding interesting results.

About the Speaker

Dr. Sarit Kumar Das is a Professor of Mechanical Engineering and the Dean of Academic Research at the Indian Institute of Technology, Madras. He has published four books and more than 200 research papers. He is the editor-in-chief of the International Journal of Micro-Nano Scale Transport and also an associate editor of Journal of Heat Transfer Engineering. His research interests include heat transfer in nano-fluids, micro-fluidics, super-hydrophobicity, biological heat transfer, nano particle mediated drug delivery in cancer cells, heat exchangers, boiling in mini/micro channels, fuel cells, jet instabilities, heat transfer in porous media and computational fluid dynamics. He is the recipient of DAAD and the Alexander von Humboldt Fellowship of Germany and the 'India Citation Awards 2012' conferred by Thomson Reuters. He is a Fellow of the Indian National Academy of Engineering and National Academy of Sciences, India. He is also the recipient of the Award and Medal for Excellence in Research, conferred by the Indian Society for Heat and Mass Transfer in 2006. He has been awarded the Peabody Visiting Professorship at the Mechanical Engineering Department of Massachusetts Institute of Technology (Cambridge, USA), 2011. He has also held the positions of Guest Professor at MIT, Cambridge, University of BW, Hamburg, Germany and Lund University, Sweden.

Admission is free. All are welcome to attend.