



**THE CHINESE UNIVERSITY OF HONG KONG**  
**Department of Physics**  
**SEMINAR**

**Development of Advanced Flow Diagnostic Techniques  
to Study Complex Thermofluid Phenomena**

*by*

**Professor Hui HU**

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Iowa State University, USA

*Date: May 23, 2011 (Monday)*

*Time: 4:00 - 5:00 p.m.*

*Place: L5, Science Centre, CUHK*

**ALL INTERESTED ARE WELCOME**

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**Abstract**

The talk will start with description of the recent progress made by the speaker in developing Molecular Tagging Velocimetry and Thermometry (MTV&T) technique (U.S. patent pending) for simultaneous measurements of velocity and temperature distributions in fluid flows. Unlike commonly-used particle-based techniques such as PIV and LDV, MTV&T technique utilizes specially-designed phosphorescent molecules that can be turned into long-lived "glowing" traces for flow diagnostics when they are excited by photons of appropriate wavelength. The unique glamour of the molecular tagging techniques will be demonstrated from the application examples to study complex fluid flow and heat transfer phenomena such as the thermal effects on the wake instabilities behind a heated cylinder, transient behavior of electroosmotic flows in electrokinetically-driven microfluidics, and visualization of the unsteady heat transfer and phase changing process within micro-sized icing water droplets for aircraft and/or wind turbine de-/anti icing applications.

The second part of the talk will give a brief introduction about some ongoing research projects in the speaker's laboratory, which include laminar separation bubble and flow control on low-Reynolds-number airfoils; bio-inspired aerodynamic designs for Micro-Air-Vehicle applications; trailing edge cooling of gas turbine blades, wandering of wing tip vortex structures in the near field and fluid-structure interaction around building models in tornado-like winds.