Date: **March 3rd**

Time: **11:00 AM**

Location: **Maryland Hall 110**

Speaker: **Dr. Hui Hu**
Department of Aerospace Engineering
Iowa State University

Title: **"Molecular Tagging and Quantum Dot Imaging for Thermofluid Diagnostics"**

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 for simultaneous measurements of velocity and temperature distributions in fluid flows. Unlike most 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 MTV&T will be demonstrated from the application examples to study complex fluid flow and heat transfer phenomena such as the thermal effect on the wake instability behind a heated cylinder and transient behavior of electroosmotic flows in electrokinetically-driven microfluidics.

The second part of the talk will focus on the photophysical properties of (CdSe)ZnS Quantum Dots (QDs) and their applications for thermofluid diagnostics. Chemically synthesized semiconductor quantum dot nanoparticles can offer certain advantages for fluorescence imaging compared to other commonly-used dyes such as Fluorescein and Rhodamine B. The photophysical properties of (CdSe)ZnS QDs are presented in terms of their absorption and emission spectra, stability against photobleaching and temperature sensitivity under laser excitations at different wavelengths. The application of QDs for thermal-fluid diagnostics will be demonstrated by using them to conduct flow visualization and concentration measurements in a pulsed jet flow, and temperature distribution mapping in a stratified flow.