

Kent State University

Physics Colloquium

DR. CHRIS D. GEDDES

**DIRECTOR OF THE INSTITUTE OF FLUORESCENCE
UNIVERSITY OF MARYLAND BALTIMORE COUNTY**

Metal-Enhanced Fluorescence: A Paradigm Shift in How We Think and Use Fluorescence Spectroscopy Today

In recent years Dr Geddes has described in over 150 peer-reviewed publications the favorable interactions and outcomes of both plasmon supporting particles (Ag, Au, Cu, Zn, Ni, Cr) and substrates with electronically excited states (fluorophores). These favorable effects have included significantly enhanced fluorescence emission from singlet states, S_1 and S_2 , as well as enhanced phosphorescence yields from triplet, T_1 , states (MEP). In addition, we have observed and described plasmon enhanced chemiluminescence intensities (MEC), as well as highly directional surface plasmon coupled Fluorescence. As a result of enhanced triplet yields, we have also observed both enhanced singlet oxygen and superoxide anion yields.

These favorable influences on the photophysical properties of close proximity excited states to plasmon supporting substrates / particles has led to wealth of biochemical applications and commercially available products, such as the *high sensitivity* and *ultra fast detection* of proteins, DNA, RNA; ultra bright and photostable metal-enhanced fluorescence based particles for downstream cellular imaging applications and high-enhancing surfaces for protein arrays and immunoassays. In addition, there are a lot downstream applications for MEP, such as in photodynamic therapy by surface plasmon controlled single oxygen generation.

Current thinking, describes Metal-Enhanced Fluorescence as the near-field coupling of electronic excited states to surface plasmons (a surface mirror dipole), the particle subsequently radiating the photophysical characteristics of the coupled excited state quanta. In this lecture, we communicate our recent findings for metal-fluorophore interactions, our current thinking and progress towards developing a unified metal-fluorophore description and our subsequent understanding of the tuning of fluorescence profiles. In addition, we will discuss the metal-enhanced fluorescence technology in NIH funded clinical trials and the commercialization path for dozens of products which have come out of Dr Geddes' laboratory in the last few years.

THURSDAY, APRIL 7, 2016

1:30 PM

SMITH HALL 111

REFRESHMENTS: 1:15- PM – SMITH HALL 111