

Winter 2006 SEMINAR SERIES

F21C Bioprocessing & Biosensing Center

• DIVISION OF FOOD SYSTEMS & BIOENGINEERING •

PRESENTER: **James W. Chan, Ph.D.**
Medical Physics and Biophysics Division, Lawrence
Livermore National Laboratory

TITLE: **Development and Application of Raman-based
Spectroscopy and Chemical Imaging echniques
for Real-Time Biological and Biomedical Studies**

ABSTRACT:
Raman spectroscopy is a laser-based optical technique that analyzes intrinsic molecular vibrations in a material. A Raman spectrum can be viewed as a “molecular fingerprint” of the sample, yielding information on molecular bonds, three-dimensional conformations and intermolecular interactions. Since the use of exogenous fluorescent tags is not required, this approach is noninvasive, and is therefore ideally suited for live single cell and subcellular studies. We are developing and applying Raman-based spectroscopic and microscopic techniques for biological and biomedical applications. The development of laser tweezers micro-Raman spectroscopy as a technique suitable for rapid spectral analysis of small (down to sub-microns) particles in solution will be discussed, as well as its applications for biodetection, single cell cancer detection, and real-time monitoring of fundamental biological processes. It is well known that one of the main limitations of Raman spectroscopy is the weak signal from a molecular vibration. This restricts the practical use of this technique for detecting low levels of biomolecules or for rapid spectral analysis and imaging of dynamic cellular processes. We are developing methods such as surface enhanced Raman spectroscopy (SERS) and coherent anti-Stokes Raman scattering (CARS) to enhance these signals. Preliminary work on applying SERS metallic nanoparticles as nanosensors and CARS for noninvasive chemical imaging and rapid spectral analysis of biological processes will be presented.

DATE • TIME • LOCATION:

Tuesday, February 7, 4:00pm
Ag Eng Bldg 105 • Refreshments

