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E I N L A D U N G

zum

V O R T R A G

von

Prof. Dr. John Lombardi

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An Introduction to Surface Enhanced Raman Spectroscopy (SERS)

Donnerstag, 10. April 2008, 16:00 Uhr

Akademie der bildenden Künste, Schillerplatz 3

Vortragssaal R5 (Erdgeschoss)

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Institut für Naturwissenschaften und Technologie in der Kunst

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Universität für angewandte Kunst Wien
University of Applied Arts Vienna
Abt. Chemie - Science Visualization, Abt. Archäometrie

Abstract:

We provide an introduction to surface enhanced Raman spectroscopy (SERS). Normal Raman spectroscopy usually provides the same information as infrared spectroscopy (IR) in that both are sensitive to molecular vibrational motions, sometimes called normal modes. Unlike IR, Raman spectroscopy has the advantage that it may be carried out in aqueous solution. However, it is normally quite weak and often obscured by florescence. Surface enhanced Raman spectroscopy overcomes both difficulties.

When a molecule is adsorbed on to a Ag metal nanoparticle surface, at certain wavelengths (near a surface plasmon resonance), the molecule feels a greatly augmented electric field, and therefore the Raman signal is greatly enhanced. At the same time, new transitions between the molecule and metal surface (charge-transfer resonances) are induced, further enhancing the signal. The signal enhancement is usually of the order of 10^6, but in some experiments it is as large as 10^{14}, enabling detection of a single molecule. Furthermore, adsorption on the surface provides a relaxation mechanism that quenches fluorescence.

In this talk we will explore some of the manifestations of the SERS effect and discuss the mechanism of the enhancement.

Biographical Sketch:

Education

A.B., Cornell University, 1963
A.M., Harvard University, 1965
Ph.D., Harvard University, 1967

Professional Experience

1963-1964, Research Assistant, Los Alamos Scientific Laboratory
1967-1972, Assistant Professor, University of Illinois, Urbana, Illinois
1972-1973, Visiting Scientist, University of Leiden, The Netherlands
1973-1975, Visiting Scientist, MIT, Cambridge, Massachusetts
1975-1977, Associate Professor, City College, CUNY, New York, NY
1977-present, Professor, City College, CUNY, New York, NY

Research Interests

Electronic structure and spectra of diatomic and polyatomic molecules using high-resolution spectroscopic techniques; and, some theoretical studies into the nature of vibration–rotation and vibration–electronic interactions. Theoretical studies in the Momentum Representation in Quantum Mechanics. Use of lasers in optical spectroscopy. Light scattering. Surface Enhanced Raman Scattering. Transition Metal Cluster Spectroscopy.

Editorship: Advances in Laser Spectroscopy, Asian Journal of Spectroscopy.