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Quantum State Absorptions Coupled To Resonance Raman Spectroscopy Could Result In A General Explanation of TERS From Multiprobe NSOM & Raman Scattering AARON LEWIS, Retired, ZACHARY SCHULTZ, University of Notre Dame, JOHN PARTHENIOS, FORTH/ECI-HT, Patras, Greece, RIMMA DEKHTER, Hebrew Univ. of Jerusalem, DIMITRIS ANESTOPOULOS, SPIRIDON GRAMMATIKOPOULOS, KOSTANTINOS PAPAGELIS, FORTH/ECI-HT, Patras, Greece, JAMES MARR, University of Notre Dame, COSTAS GALIOTIS, FORTH/ECI-HT, Patras, Greece, DIMITRY LEV, Hebrew Univ. of Jerusalem — Tip enhanced Raman scattering (TERS) amplifies the intensity of vibrational Raman scattering by employing the tip of a probe interacting, in ultra close proximity, with a surface. Although a general understanding of the TERS process is still to be fully elucidated, scanning tunneling microscopy (STM) feedback is often applied with success in TERS to keep a noble metal probe in intimate proximity with a noble metal substrate. Since such STM TERS is a common modality, the possible implications of plasmonic fields that may be induced by the tunneling process are investigated. In addition, TERS of a 2D resonant molecular system, a MoS_2 bilayer crystal and a 2D non-resonant, lipid molecular bilayer are compared. Data with multiple excitation wavelengths and surfaces for the resonant system in the near- (TERS) and far-field are reported. An interpretation based on weak coupling interactions within the framework of conventional resonance Raman scattering can explain the observed TERS enhancements. The none-resonant molecular lipid system, on the other hand, requires strong coupling for a full understanding of the reported observations.

Aaron Lewis
Retired

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