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Understanding the TERS Effect with On-line Tunneling and Force Feedback Using Multiprobe AFM/NSOM with Raman Integration AARON LEWIS, Hebrew University of Jerusalem. Dept. of Applied Physics, Jerusalem, Israel, RIMMA DEKHTER, PATRICIA HAMRA, YOSSI BAR-DAVID, HESHAM TAHA, Nanonics Imaging Ltd., Jerusalem, Israel — Tip enhanced Raman scattering (TERS) has evolved in several directions over the past years. The data from this variety of methodologies has now accumulated to the point that there is a reasonable possibility of evolving an understanding of the underlying cause of the resulting effects that could be the origin of the various TERS enhancement processes. The objective of this presentation is to use the results thus far with atomic force microscopy (AFM) probes with noble metal coating, etching, transparent gold nanoparticles with and without a second nanoparticle [Wang and Schultz, ANALYST 138, 3150 (2013)] and tunneling feedback probes [R. Zhang et. al., NATURE 4 9 8, 8 2 (2013)]. We attempt at understanding this complex of results with AFM/NSOM multiprobe techniques. Results indicate that TERS is dominated by complex quantum interactions. This produces a highly confined and broadband plasmon field with all k vectors for effective excitation. Normal force tuning fork feedback with exposed tip probes provides an excellent means to investigate these effects with TERS probes that we have shown can circumvent the vexing problem of jump to contact prevalent in conventional AFM methodology and permit on-line switching between tunneling and AFM feedback modes of operation.

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