

Surface-enhanced Raman scattering from a Nanoparticle-Molecule-Thin film Junction

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Abstract

We measured the surface-enhanced Raman scattering (SERS) of individual gold nanoparticle-4-aminobenzenethiol (ABT)-gold film junctions to investigate the plasmonic and chemical enhancements of the SERS signals. Despite the mild electromagnetic field enhancement ($\sim 10^5$) and high surface density of the ABT-molecules (~ 240 molecules/hotspot) at the junctions, we observed the clear spectral and temporal signatures of single-molecule SERS (SM-SERS). The result proves that overall (chemical and electromagnetic) enhancement of 10^6 – 10^8 is sufficient to observe the SM-SERS, which disproves the widespread belief that minimum enhancement of 10^{14} is required for SM-SERS.

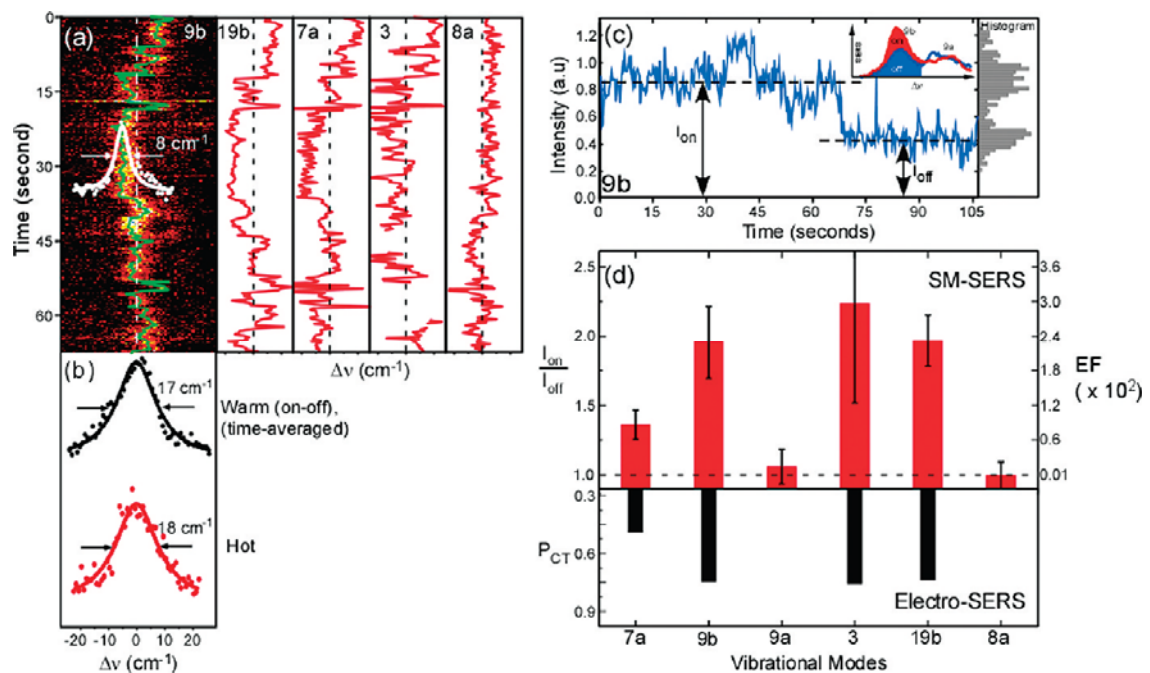


Figure 1: Single-molecule SERS trajectories