

Abstract Submitted  
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**Resonant Plasmonic and Vibrational Coupling in a Tailored Nanoantenna for Infrared Detection** JAVIER AIZPURUA, AITZOL GARCIA-ETXARRI, CSIC-UPV/EHU and DIPC, San Sebastian, Spain, THOMAS W. CORNELIUS, SHAFKAT KARIM, Gesellschaft fur Schwerionenforschung, Darmstadt, Germany, FRANK NEUBRECH, ANNEMARIE PUCCI, Univ. of Heidelberg, Germany — Gold nanowires are introduced as plasmonic infrared antennas for effective molecular spectroscopy. A novel resonant mechanism involving the interference of the broadband plasmon with the narrowband vibration from molecules is presented in the context of Surface-Enhanced Infrared Absorption (SEIRA). With the use of this concept, we demonstrate experimentally the enormous enhancement of the vibrational signals from less than one attomol of molecules on individual gold nanowires, tailored to act as plasmonic nanoantennas in the infrared. By detuning the resonance via a change in the antenna length, a Fano-type behavior of the spectral signal is observed, which is clearly supported by full electrodynamic calculations. This resonant mechanism can be a new paradigm for sensitive infrared identification of molecular groups.  
F. Neubrech *et al.* Phys. Rev. Lett. **101**, 157403 (2008).

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