Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Strong Field Enhancement in a Scanning Nanogap for Infrared Imaging of Single Nanoparticles (lambda/1000) JAVIER AIZPURUA, Donostia International Physics Center, San Sebastian, Spain, ANTONIJA CVITKOVIC, NENAD OCELIC, REINHARD GUCKENBERGER, RAINER HILLENBRAND, Max-Planck Institute for Biochemistry, Martinsried, Germany — Far-field infrared analysis of individual nanoparticles has not been possible so far due to the extremely weak scattering cross section of nanosize objects at infrared wavelengths, which is 5 orders of magnitude smaller than at visible wavelengths. Scattering type near-field optical microscopy (s-SNOM) offers nanoscale spatial resolution at IR wavelengths and background- free imaging [1,2]. We investigate theoretically and experimentally the use of strong optical field enhancement in the nanogap formed between the s-SNOM tip and the substrate supporting the particles. We show the key role of the substrate response to obtain strong field enhancement at the scanning gap, and therefore spatially resolve the nanoparticles. We provide clear experimental evidence that for highly reflective substrates, single particles as small as 8 nm can be detected with a mid-IR s-SNOM operating at 10 micrometer wavelength. [1] F Keilmann and R. Hillenbrand, Phil. Trans. Roy. Soc. A 362, 787 (2004). [2] A. Cvitkovic et al., Phys. Rev. Lett. 97, 060801 (2006).

Javier Aizpurua
Donostia International Physics Center, San Sebastian, Spain

Date submitted: 17 Nov 2006 Electronic form version 1.4