Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Spectroscopic near-field microscopy using frequency combs in the mid-infrared MARKUS BREHM, ALBERT SCHLIESSER, FRITZ KEILMANN, Max Planck Institute of Biochemistry, Martinsried (Muenchen), Germany — We introduce a new concept of spectroscopic scattering-type near- field optical microscopy that records 200 cm^{-1} broad infrared spectra at each pixel during scanning. Two coherent beams with harmonic frequency-comb spectra are employed, one for illuminating the scanning tip, the other as reference for multi- heterodyne detection of the scattered light. Our implementation yields amplitude and phase spectra centered at 950 cm^{-1}(this band can be tuned between 700 and 1400 cm^{-1}). A new technique of background suppression is introduced which is enabled by the short, 10 μs "snapshot" acquisition of infrared spectra which allows time-resolving the tapping motion. Thus we demonstrate broad-band mid-infrared near-field imaging that is essentially free of background artefacts.
(1) A. Schliesser, M. Brehm, F. Keilmann & D. W. van der Weide *Frequency-comb infrared spectrometer for rapid, remote chemical sensing* Optics Express, 13, 9029-9038 (2005)
(2) M. Brehm, A. Schliesser & F. Keilmann *Spectroscopic near-field microscopy using frequency combs in the mid-infrared* Optics Express, 14 ,11222-11233 (2006)

Fritz Keilmann
Max Planck Institute of Biochemistry, Martinsried (Muenchen), Germany

Date submitted: 27 Dec 2006 Electronic form version 1.4