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Nano-FTIR: infrared spectroscopic chemical identification of materials at the nanoscale FLORIAN HUTH, Neaspec GmbH, Martinsried, Germany, ALEXANDER GOVYADINOV, CIC Nanogune Consolider, Donostia-San Sebastian, Spain, SERGIU AMARIE, Neaspec GmbH, Martinsried, Germany, WIWAT NUANSING, CIC Nanogune Consolider, Donostia-San Sebastian, Spain, FRITZ KEILMANN, Dept. of Physics and CeNS, LMU Munich, Garching, Germany, RAINER HILLENBRAND, CIC Nanogune Consolider, Donostia-San Sebastian, Spain — Recently, we applied the principles of FTIR to scattering-type Scanning Near-field Optical Microscopy (s-SNOM). s-SNOM employs an externally illuminated sharp metallic tip to create a nanoscale hot-spot at its apex which greatly enhances the near-field interaction between the probing tip and the sample. The light backscattered from the tip transmits the information about this near-field interaction to the far zone where the FTIR spectra can be recorded. The result is a novel nano-FTIR technique, which is capable to perform near-field spectroscopy and imaging with nanoscale resolution. Here we demonstrate nano-FTIR with a coherent-continuum infrared light source. We show that the method can be used to determine the fingerprint IR absorption spectrum of organic samples with a spatial resolution of 20 nm. Corroborated by theory, the nano-FTIR absorption spectra correlate well with conventional FTIR absorption spectra, as experimentally demonstrated with PMMA samples. Nano-FTIR can thus make use of standard infrared databases of molecular vibrations to identify organic materials in ultra-small quantity and at ultrahigh spatial resolution.

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