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s-SNOM based IR and THz spectroscopy for nanoscale material characterization TOBIAS GOKUS, ANDREAS HUBER, ADRIAN CERNESCU, neaspec GmbH — Scattering-type Scanning Near-field Optical Microscopy (s-SNOM) allows to overcome the diffraction limit of conventional light microscopy enabling optical measurements at a spatial resolution of 10nm.
s-SNOM employs an externally-illuminated sharp metallic AFM tip to create a nanoscale hot-spot at its apex. The optical tip-sample near-field interaction is determined by the local dielectric properties (refractive index) of the sample and detection of the elastically tip-scattered light yields nanoscale resolved near-field images simultaneous to topography.
Development of a dedicated Fourier-transform detection module for analyzing light scattered from the tip which is illuminated by a broadband laser source enables IR spectroscopy of complex polymer nanostructures. Applications presented further demonstrate characterization of embedded structural phases in biominerals (bone), organic semiconductors or functional semiconductor nanostructures.
Furthermore, by extending the concept of broadband-s-SNOM spectroscopy to the THz-spectral range, we demonstrate optical near-field imaging and spectroscopy at THz-frequencies (0.5-2.5 THz) by coupling the free space beam of a dedicated THz-TDS to the s-SNOM system.

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