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s-SNOM based microscopy and spectroscopy for nanoscale material characterization MAX EISELE, neaspec GmbH — Scattering-type Scanning Near-field Optical Microscopy (s-SNOM) is a scanning probe approach to optical microscopy and spectroscopy bypassing the ubiquitous diffraction limit of light to achieve a spatial resolution below 10 nanometer. s-SNOM employs the strong confinement of light at the apex of a sharp metallic AFM tip to create a nanoscale optical hot-spot. Analyzing the scattered light from the tip enables the extraction of the optical properties (dielectric function) of the sample directly below the tip and yields nanoscale resolved images simultaneous to topography. In addition to near-field microscopy the technology has been advanced to enable Fourier-transform spectroscopy (nano-FTIR) on the nanoscale using broadband radiation from the far-infrared to the visible spectral range. This presentation will summarize the latest achievements in the in the field of near-field microscopy and spectroscopy on polymers, biomaterials and 2D materials. In addition, the combination of near-field microscopy with ultrafast pump-probe experiments will be discussed opening a complete new approach solid-state physics where intriguing phenomena like surface plasmons polaritons or carrier relaxation dynamics can be observed with a combined <200fs temporal and <20nm spatial resolution.

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