s-SNOM technology for nanoscale analytics

Dr. Adrian Cernescu
attocube systems AG, Munich, Germany
adrian.cernescu@attocube.com

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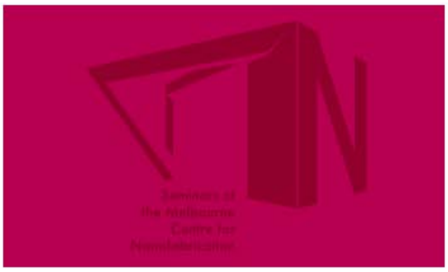
151 Wellington Road, Clayton, 3168
Zoom link: here
Meeting ID: 859 8956 8025 and passcode: 357846



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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 (absorption, reflectivity) of the sample directly below the tip and yields nanoscale images simultaneous to mechanical properties. In addition to near-field microscopy the technology has been advanced to enable hyperspectral, nanoscale Fourier-transform spectroscopy (nano-FTIR) using broadband radiation from the the visible spectral range, Mid-IR and THz spectral range

Equipping s-SNOM systems with cw light sources, near-field imaging can be performed at time scales of 30-300s per image. Use of material-selective frequencies in the mid-IR spectral range can be exploited to fully characterize polymer blends or phase change polymers with nanometer-scale domains. Quantification of free-carrier concentration and carrier mobility in doped semiconductor nanowires, analysis of 2D (graphene) nanostructures, or study phase propagation mechanisms in energy storage materials is achieved by amplitude- and phase-resolved near-field optical imaging.

A broad range of applications of the s-SNOM technology for biomaterials, inorganics and 2D materials research, will be presented.

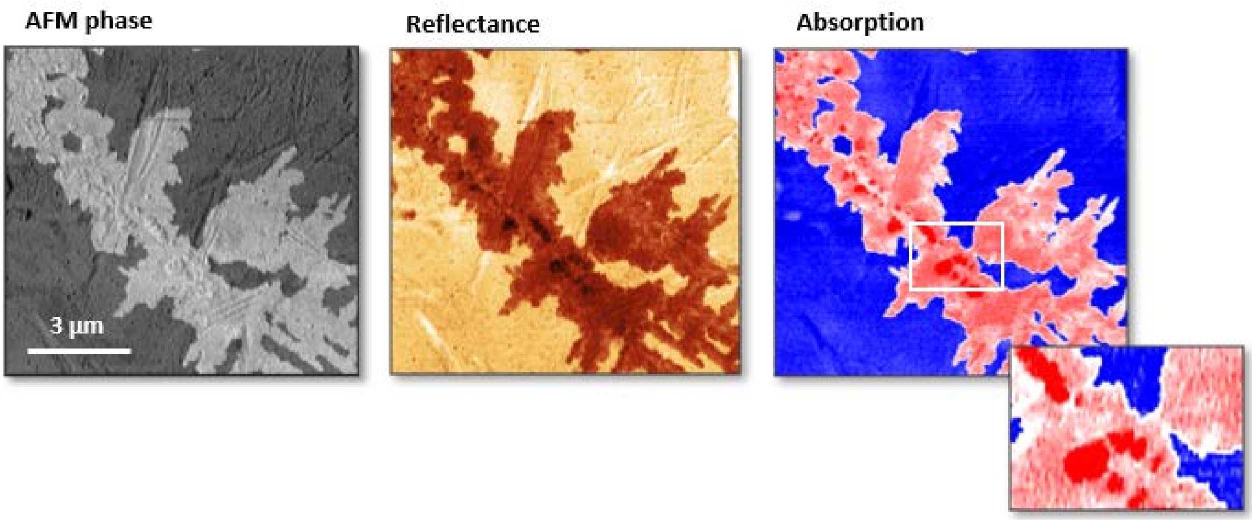

Figure: *Imaging of a 10 nm thin PEO monolayer at 1123 cm^{-1} (asy. C-O-C stretching) shows self-assembled nano-structures and areas of different material thickness. High contrast absorption images allow to clearly distinguish between mono- and bilayer film areas*

Dr. Adrian Cernescu is an Application Engineer at neaspec – attocube systems in Munich, Germany, a well-known company in the optical near-field technology, combining atomic force microscopy with optical imaging and spectroscopy at resolution well below diffraction limit (20 nm). His research in the field of nanophotonics and near-field optical applications started during his post-doctoral fellowship in 2012 under the supervising of Dr. Fritz Keilmann, one of the pioneers of near-field optics, at the Ludwig Maximilian University, Munich.
Having a PhD in Electron Magnetic Resonance and a Master degree in Biophysics, Adrian has broad interest in interdisciplinary research projects where nanoscale optical analytics brings insights, solutions and industrial innovation.