Nano-chemical mapping and IR-nanoscopy on polymers and biomaterials

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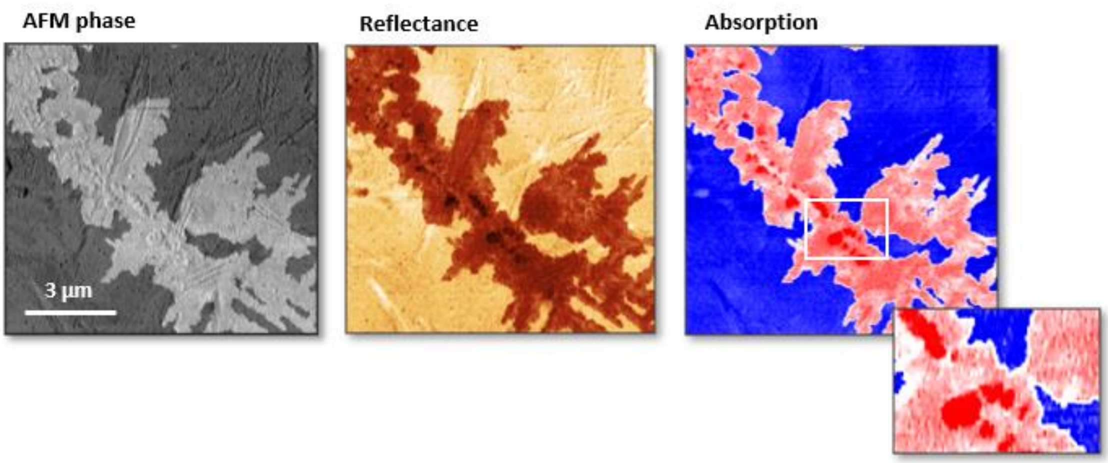
AFM-IR and s-SNOM have become key technologies to study the optical properties and chemical composition of materials at the nanoscale. These AFM-based technologies exploit the strong confinement of light at the end of a sharp, metallic AFM tip to generate a nanoscale optical hotspot at the sample surface. The use of broadband or tunable IR sources combined with interferometric detection enables optical spectroscopy with <10 nanometer precision, as well as nanoscale mapping of the sample chemical composition.

With tremendous sensitivity compared to classical spectroscopy and microscopy techniques, AFM-IR and s-SNOM allow chemical identification of nanocomposites based on their spectroscopic fingerprint. It further reveals optical properties of nanoscale materials with impact on recent applications development.

Equipping the neaSCOPE systems with IR tunable light sources, nanoscale chemical mapping 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 biomaterials, polymer blends or phase change polymers with nanometer-scale domains. In this seminar various nanoIR applications on carbon-



based materials including nanotubes and graphene will be presented.

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.