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Novel combination of near-field s-SNOM microscopy with peak-force tapping for nano-chemical and nano-mechanical material characterization with sub-20 nm spatial resolution MARTIN WAGNER, Bruker Nano Surfaces, Santa Barbara, KARINA CARNEIRO, STEFAN HABELITZ, UC San Francisco, THOMAS MUELLER, BNS, BNS TEAM, UCSF TEAM — Heterogeneity in material systems requires methods for nanoscale chemical identification. Scattering scanning near-field microscopy (s-SNOM) is chemically sensitive in the infrared fingerprint region while providing down to 10 nm spatial resolution. This technique detects material specific tip-scattering in an atomic force microscope. Here, we present the first combination of s-SNOM with peak-force tapping (PFT), a valuable AFM technique that allows precise force control between tip and sample down to 10s of pN. The latter is essential for imaging fragile samples, but allows also quantitative extraction of nano-mechanical properties, e.g. the modulus. PFT can further be complemented by KPFM or conductive AFM for nano-electrical mapping, allowing access to nanoscale optical, mechanical and electrical information in a single instrument. We will address several questions ranging from graphene plasmonics to material distributions in polymers. We highlight a biological application where dental amelogenin protein was studied via s-SNOM to learn about its self-assembly into nanoribbons. At the same time PFT allows to track crystallization to distinguish protein from apatite crystals for which amelogenin is supposed to act as a template.

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