SCATTERING-TYPE NEAR-FIELD MICROSCOPY: FROM NANOSCALE INFRARED MATERIAL RECOGNITION TO SUPERLENS STUDIES

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The development of novel nanoelectronic and photonic structures requires ultrahigh-resolution optical microscopy for characterization and mapping of local material properties and nanoscale confined light fields. I will demonstrate such an optical microscopy technique providing a spatial resolution of about 10-20 nm independent of the wavelength. It is based on elastic light scattering from the probing tip of an atomic force microscope (scattering-type near-field optical microscopy, s-SNOM [1]). Besides a short introduction of the technique, I will demonstrate some s-SNOM applications such as mid-infrared mapping of material [2,3] and doping contrasts in semiconductor devices [4], single nanoparticle mapping [5,6] and near-field characterization of a SiC superlens [7].

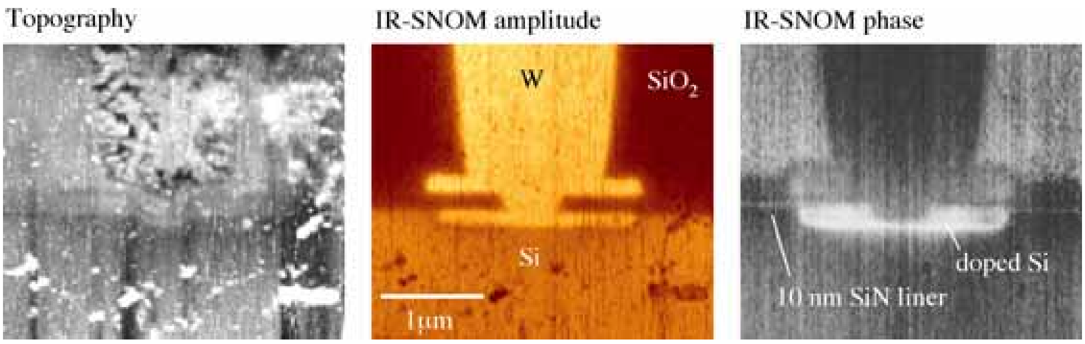

Fig. 1: Nanometer-scale resolved s-SNOM images of a cross section of a MOS-transistor drain contact recorded at a wavelength of about 10.8 µm. Pseudoheterodyne infrared detection yields amplitude and phase images showing distinct material and doping contrasts simultaneously to topography.

References:

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