S6-O1
Near field imaging of plasmon phonon polaritons launched on n-GaN surface grating

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The field of modern nanophotonics was largely pushed forward by the ability to control light – matter interaction in subwavelength scale, facilitated mainly by plasmon- and phonon-polariton structures in the range from visible to NIR and THz [1-3]. Coherent and directive thermal radiation sources based on surface phonon polaritons (SPhPs) excitation in polar semiconductor were recently developed [4]. While far-field results show promising macroscopic behavior of the emitters, understanding of physics behind as well as proposal for new applications can be obtained by performing near-field studies of the SPPhPs. We report here the results of near field imaging of surface plasmon-phonon polaritons (SPPhPs) excited in n-GaN surface gratings using illumination of quantum cascade laser (QCL) at frequency of 920 cm^{-1}. For the first time coupling and launch of the SPPhP characteristics were measured with the s-SNOM kindly provided by *Attocube systems AG*. Figure 1 demonstrates the polariton launch at the grating edge and propagation through the semiconductor surface in the contour plots of amplitude and phase of s-SNOM signal. The numerical modeling of SPPhP dispersion allowed us to optimize grating designs and propose experimental configurations taking step further in the development of means of improved electromagnetic energy control, emission, and field concentration in the sub-wavelength-structures.

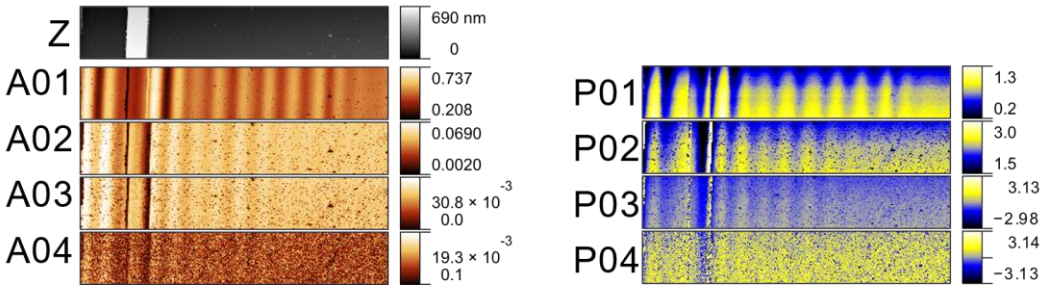

Figure 1. Topography (Z) Amplitude (A) and phase (P) maps of s-SNOM signal harmonics (01-04) measured at the edge of periodic n-GaN surface grating at room temperature using QCL excitation of 920 cm^{-1} frequency.

References:

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