

Title: Study and application of surface plasmons in terahertz spectral range

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Abstract: The goal of this thesis is analytical, numerical and experimental study of surface plasmons in terahertz spectral range

The description of the surface plasmon propagation along metal/dielectric interface can be done purely analytically. Our goal is to obtain the description of the surface plasmon propagating in more complex dielectric layered structures which are in contact with metallic layer. Analysis of the surface plasmon dispersion curves in anisotropic layered structure was done numerically. Existing transmission terahertz spectroscopy experiment was expanded by an arrangement that allows us to excite the surface plasmon on the metallic layer and allows us to measure its characteristics after the transmission of samples, that are in contact with this layer. Obtained theoretical and experimental data were then evaluated, so we could conclude to which extent can the surface plasmon be used for spectroscopic purposes in terahertz range.

We concluded, that we were able to describe surface plasmons in layered structures including anisotropic layers and that we believe the surface plasmons could be applicable in the spectroscopy in the terahertz spectral range for the purposes of the measurement of the out-of-plane response of dielectric materials.

Keywords: Plasmon, Plasmonic frequency, Drude permittivity of metals, Transfer matrix formalism