Diploma thesis abstract

«Subwavelength structures influence on plasmon waves propagation in terahertz frequency range»

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In this diploma a propagation of the plasmon waves along metal surface is investigated in the THz frequency range. The metal surface contains the sub-wavelength structures.

To describe the structures response I use a model, which takes into consideration excitation of both localized and propagating surface electromagnetic waves. With this model the optimal geometry and the size of periodically arranged holes on the surface of the metal foil were determined. In addition spectral transmission characteristics of the sub-wavelength structures were predicted.

The method of the laser engraving on the aluminum foil was used to create a set of different samples that have periodical cut-through holes of special shapes. The experiments, which had been done using THz spectrometer for those structures, demonstrated the extraordinary selective transmission of radiation in the broad frequency range. Moreover, it was shown that the spectral and polarized characteristics of those structures can be specified in THz frequency range for a particular size change of the structure.

The comparison of the experimental data with theory and numerical simulation showed the relevance of the used model and its applicability for the prediction of the surface electromagnetic wave behavior, which propagates along the structure surface. It was experimentally shown, that the sub-wavelength structure reduces the velocity of the surface plasmon therefore the localization of plasmon wave enhances.