Nanoplasmonics and surface enhanced spectroscopy

Dimensional effects in SnO_2 nano films detected by surface plasmon resonance technique

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The surface plasmon resonance (SPR) phenomena properties are enough effective for the investigation of the nanostructured materials. Such investigations objects are clustered films which are the media where classic and topologic dimension effects display themselves. Therefore, the correlation established by means of SPR between morphology and optical parameters of composite heterosystems which contain metallic and dielectric components seems preferable in comparison with other methods.

In this study, nanostructured tin oxide films are considered as nanocomposites containing clusters of defect nonstoichiometric tin oxide (SnO_x) in the dielectric matrix of stoichiometric SnO_2.

Thus, the aim of this study is interpretation of the variety of the films' properties using SPR experimental data obtained by the polarization modulation technique.

Two type samples of tin dioxide, obtained by means of two principally different technologies were used for the experiments.

Internal reflection features caused by the surface plasmon resonance in nanoscale films containing defect tin dioxide clusters in stoichiometric dielectric matrix are studied by means of polarization modulation of electromagnetic radiation. The obtained experimental angular and spectral characteristics of reflectances of s- and p-polarized radiation and their polarization difference represent the optical property features associated with the film structure and morphology. Surface plasmon polaritons and local plasmons excited by s- and p-polarized radiation are detected; their frequency and relaxation properties are determined. The technique employed for studying surface plasmon resonance in tin dioxide films is appeared to be structurally sensitive.