Diagnostics of nanostructured objects by modular Scanning Near-Field Optical Microscop

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Diploma thesis abstract

Modular Scanning Near-Field Optical Microscop (SNOM) that was built during diploma work is described. This SNOM was developed for investigation of light localization in the vicinity of nanoobjects. The SNOM is capable of operating in two modes: topographic and 3D-scanning in the space area of 1,8 mkm height and 11x11mkm lateral plane.

The structures intended for investigation of light localization after diffraction on nanoobjects have been produced. The structures are the polymer nanoobjects having different geometry shapes with typical sizes about visible light wave length which are placed on polymer substrates.

It was pioneered the registration of forming the intensity optical vortex which occurs when cw polarized laser radiation diffracts on a transparent dielectric isolated nanocylinder.

Using the method of scanning optical microscopy the nonorientated amorphous solid-state azo-dye AD-1 films in the topographic and optical modes have been tested. It has been discovered that the films consist of ensemble of ellipsoidal-shaped domains with typical sizes of about 200-900nm.

It was shown that the most probable reason of polarization anisotropic scattering induced by linear polarized light founded in such films is the “photon dimensional effects” resulting to the strong space localization of the light field inside domains that form the film structure.