Propagation of Gaussian and singular light beams in photorefractive crystal $Bi_{12}TiO_{20}$

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The paper has been devoted experimental research of spatio-temporal patterns of propagation of gaussian and singular light beams in crystal $Bi_{12}TiO_{20}$. General scenario of redistribution of energy in cross-section of select beams and conditions of self-focusing or defocusing has been described at different intensities of radiation. Dependence of time formation stable structures of research light beams on power of radiation has been determined. There has been showed if power of radiation increases processes of self-focusing and defocusing would be faster. At that time product of power of radiation and time of attainment of stable structures (exposure) remains constant and makes up several millijoules at characteristic dimension of light beam about several tens of microns at the input in crystal.

Spectroscopy of carbon nanotube complexes with oligonucleotides and DNA in thin LB-films

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In the paper effective, novel self-assembled multi-walled carbon nanotube (MWCNT) complexes with oligonucleotides or DNA have been fabricated by Langmuir-Blodgett (LB) technology. The complexification which represents itself a wrapping of DNA- or oligonucleotide on MWCNTs in thin LB-films were successfully performed from inverse stearic-acid-based micelles. The micelles contain both MWCNTs and DNA- or oligonucleotides and are obtained by a simple sonication treatment method. Effects of CNT-enhanced micellar oligonucleotides compactification in Raman and dielectric spectroscopy have been investigated. The obtained complexes of MWCNTs with DNA or oligonucleotides were characterized in detail by fluorescent-probe spectroscopy, and scanning electron microscopy (SEM). An SEM image showed that MWCNTs were dispersed sufficiently and covered entirely with DNA or oligonucleotides. To test the interaction mechanisms of the oligonucleotide or DNA with MWCNTs, thermodynamic analysis and fluorescence intensity and

electrophysical measurements were applied. Our results show that the interaction between DNA or oligonucleotides and MWCNTs was ascribed to the strong π - π -- interactions between the backbones of DNA or oligonucleotides and the surface of carbon nanotubes.
The binding of nanotubes with fluorescent oligonucleotides allows the MWCNT to function as a "nanoquencher" of the fluorophore FAM. This functionality of MWCNT-oligonucleotide complex is demonstrate by agarose gel electrophoresis assay. It is proposed to use the thin LB-films of oligonucleotide/MWCNT complexes as a biosensing nanocovering based on nucleic acids.

Dielectric behavior of C6 rat glioma cell monolayer growing on CNT- and Ce-contained nanostructurezed LB-films

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Capacity characteristics of C6 rat glioma cell monolayer growing on the surface of interdigital sensors has been investigated. Sensor electrodes have biosensitive dielectric nonostructurized coating which contains cerium ions (Ce) and modified by carboxyl groups multiwall carbon nanotubes (CNT) and has been formed utilizing Langmuir-Blodgett technology. Dielectric analysis of the structure of electrically and functionally active near-electrodes medium with C6 rat glioma cells has been performed. Pulse oscillations of capacity of sensors with cellular monolayer according to non-zero capacity level Ce have been found using method of impedance dielectric spectroscopy. Observed capacity oscillations are due to changes of transmembrane potential following a functioning of ion channels. In the frequency range from 5 to 45 kHz a dependence of sensor capacity oscillation amplitude on the frequency of applied field is of a bell-shaped form with a maximum being closed to 20 kHz. But frequency of capacity oscillations does not dependent on the frequency of applied field. It has been established that amplitude and frequency of oscillations and a value of the level Ce depend on a phase of cellular growth and composition of buffer medium.

Miniaturized conformal printed antennas for wireless communication based on chaotic transceiver: design and comparative analysis

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Current trend for miniaturization of wireless communication devices imposes more and more stringent restrictions on dimensions of the antennas. In this paper the concept of using conformal printed antennas for wireless communication