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B-2

REFLECTION OF LIGHT ON THE BOUNDARY PLANE NONUNIFORM LAYER GYROTROPIC

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When light is reflected by anisotropic media, the energy and ellipsometric parameters of the reflected wave are determined by optical properties of the material and also by the direction of the optical axis. The components of tensor $\varepsilon_{ij}(z)$ depend on the profiles of free charge concentrations of $N(z) = N_0 \cdot f(z)$. They affect the parameters of the reflected light. To calculate the projections of electromagnetic wave fields (EMW) in a medium, amplitude and energy reflection and transmission coefficients, and ellipsometric parameters, matrix methods are convenient [1, p. 71]. Matrix apparatus for anisotropic medium is obtained. The methods of classical electrodynamics consider the case of an oblique incidence of a plane electromagnetic wave on an inhomogeneous gyrotropic layer [2, p. 119] in an external magnetic field whose intensity vector is arbitrarily obliquely directed relative to the plane of incidence of the electromagnetic wave. A Cauchy matrix 4×4 for WKB solution describing the change in the projections of the EMW fields propagating in the planar inhomogeneous anisotropic medium is obtained. The matrix of the amplitude reflectance coefficients 2×2 and the ellipsometric parameters of the reflected light are calculated with a change in the incidence angle for media with profiles in the form of transition layers: $f(z) = 1 - e^{-az}$, $f(z) = a \cdot z$, $f(z) = \text{arctg}(a \cdot z)$.

1. *Born M. and Volf E.* / Principles of Optics. Moscow: "Nauka" Publisher, 1973. 720 p. [In Russian]
2. *Vinogradova* M.B., *Rudenko* O.V. and Sukhorukhov A.P. / Theory of waves. Moscow: "Nauka" Publisher, 1979. 384 p. [In Russian]

B-3

INHERITANCE OF PHOTOCHROMIC PROPERTIES OF NITRO SUBSTITUTED AND HALOGENATED SPIROPYRANS IN COMPOUNDS WITH THE PYRROLIDINOFULLERENE

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The nanophotochromism is associated with the synthesis and investigation of photocontrolled hybrid compounds that are composited from photochromic organic fragments and nanoparticles of different morphologies and sizes in accordance with growing technological requirements of modern molecular electronics and photonics devices.

This research has dealt with photophysical and isomerization properties of hybrid molecular systems which consist of photochromic nitro substituted or halogenated spiropyran derivatives bonded to the surface of the fullerene C60 through the pyrrolidine bridge.

Computational molecular modeling of the photoswitching processes in these systems was applied to analyze the channels and mechanisms for energy dissipation and photochromic conversions from the spiropyran forms to merocyanine phases of these individual photochromic moieties in comparison with the corresponding hybrid compounds.

The role of $n\pi$ states provided by lone pairs of substituents for changing of the electronic structure and photochromic properties of spiropyran derivatives was evaluated. The $S_{\pi\pi}$(spiro) $\rightarrow$ transition $n\pi^*$ states $\rightarrow S_{\pi\pi}$(mero) channel for photo-transformation of the complex with nitro substituted spiropyran moiety is established and compared with the similar hybrid compounds combined with halogenated spiropyran where photoisomerisation doesn't process due to high probability of internal conversion from the absorption state formed on the spiropyran fragment to the singlet system of the pyrrolidinofullerene.