

ELLIPSOMETRY OF CUSCN/STILBAZOLIUM DYE HYBRID THIN FILMS

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Hybrid organic-inorganic films are a promising material for use in dye-sensitized solar cells. The purpose of investigation was to study the optical properties of hybrid organic-inorganic films of CuSCN copper thiocyanate with stilbazolium dye of different concentration.

As a method of research the multiple-angle-of-incidence ellipsometry implemented in the device LEF-3M-1 with a wavelength of light incidence nm was used. The ellipsometric parameters of the samples such as a phase shift between the orthohonal components of polarization vector and an azimuth of the restored linear polarization were measured. To characterize the optical anisotropy of samples of CuSCN/stilbazolium dye films azimuthal measurements of the ellipsometric parameters were performed when the studied samples rotated in their own plane. The effective refractive and absorption indices as well as the optical conductivity for the samples were determined from the data of the ellipsometric measurements.

It was found that the first increase of the concentration of the dye in hybrid organic-inorganic films leads to the increase in both the refractive index and the optical conductivity. However, for the films with maximum dye concentration of $1000 \mu\text{mol}/\text{dm}^3$ the optical conductivity decreases significantly. The behavior of ellipsometric parameters for this sample is significantly different from the behavior of ellipsometric parameters for samples with dye concentrations of 25 and $250 \mu\text{mol}/\text{dm}^3$ namely it is similar to the ideal dielectric. Such behavior of the optical properties of the films is explained by structural phase transition in CuSCN at certain dye concentrations. It was found that investigated samples are optically isotropic.

Topics

Session A. Physics of condensed matter and spectroscopy

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