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SPECTRAL-LUMINESCENT PROPERTIES OF LAURDAN IN BINARY MIXTURES OF SOLVENTS

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Organic molecules with electron donor and electron acceptor groups belong to fluorescent probes. Such molecules are interesting for intensive experimental and theoretical studies due to their high sensitivity to the microenvironment. They are widely used in biochemical research. The object of investigation – laurdan (6-dodecanoyl-2-dimethylaminonaphthalene). Earlier we carried out optimization of the geometrical structure of molecule and defined structures with a change in the angle of the C–C of the hydrocarbon chain in the ground and excited states [1]. We have noted heterogeneity of fluorescence for some homogeneous solvents.

In the work are registered and discussed electronic fluorescence spectra of laurdan in binary mixtures (cyclohexane + ethylacetate, cyclohexane + acetone, cyclohexane + isopropanol). Wherein the first component relates to a non-polar solvent (cyclohexane), the second - to a polar solvent (ethyl acetate, acetone, isopropanol) with different dielectric constants (6.02, 20.56, 19.92 respectively). For binary mixture (cyclohexane + ethylacetate) linear dependence of the intensity and the nonlinear dependence of the shift of the fluorescence band with increasing concentration of polar components is observed.

Influence a dipole - dipolar interactions and hydrogen bond in shift of a band of fluorescence for binary mixes is considered. Discusses the heterogeneity of fluorescence in binary mixtures.

1. *Zharkova O.M.* Determination of the nature of the emissive state of the fluorescent probe laurdan / O.M. Zharkova, T.Yu. Titova, Y.P. Morozova, V.Ya. Artyukhov, B.V. Korolev // Rus. Phys. J. 2013. V. 56. No. 5. P. 570–580.

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INVESTIGATION OF LIGHT SCATTERING CENTERS IN LASER CERAMIC BASED ON YTTRIUM OXIDE

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It is known that the additives ZrO_2 and HfO_2 in optical ceramics lead to increasing its transparency and line broad. These improvements of the optical properties offer great opportunities for their active use as the active elements of femtosecond lasers. However, zirconium and hafnium oxides doping leads to the appearance optical inhomogeneity of the so-called "orange peel" in yttrium oxide ceramic, which causes strong scattering of radiation [1]. The nature of this undesirable phenomenon has not been yet fully understood, since the optical ceramic scatters radiation also because of other kinds of defects [2].

To investigate the causes of scattering the different wavelength light transition method through ceramic samples was chosen. As radiation sources helium-neon laser – LGN-223-1 with radiation at a wavelength of 633 nm in a TEM_{00} and a single mode semiconductor laser G20-12V-C at a wavelength of 532 nm were used. The distribution of radiation before and after its passage through the test samples was recorded by profilometer BeamStar FX50 with spectral range of 350–1320 nm. Profilometer was installed at varies distances from samples.

It is found that samples with the addition of zirconium and hafnium contain inhomogeneity with characteristic dimensions ranging from several tens to several hundreds of micrometers. Within the profilometer sensitivity and measurement techniques Rayleigh scattering was not revealed. Due to the optical inhomogeneities the laser lasing on samples with additives of zirconium and hafnium oxides is very difficult.

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