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ABSTRACTS

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tell about the molecular composition of the substance without resorting to additional tools. However, most of the substances that must be investigated, have a dull fluorescence, or do not have it at all. For such cases were synthesized fluorescent probes.

The fluorescent probe binds to the molecule under investigation, and after exciting radiation transmits information about the environment in which it is located. Since the medium in which the fluorophore is located strongly affects the intensity of the fluorophore emission, the decay time of the fluorescence and the maximum of the spectrum, we can understand the composition of the solution by changing these parameters. Depending on which probe was used in the study, data on solution viscosity, temperature and polarity can be obtained.

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Y-16

INVESTIGATION OF SHG IN NEW SCANDIUM BORATE WITH THREE CATIONS BY THE KURTZ-PERRY METHOD

A.Y. Jamous[1], D.M. Ezhov[1], A.B. Kuznetsov[2], V.A. Svetlichnyi[1], and A.E. Kokh[2]

[1]Tomsk State University,36 Lenin Ave., 634050, Tomsk, Russia, ammarjamous2@gmail.com;
[2]Institute of Geology and Mineralogy SB RAS, 3 Koptyug Ave., 630090, Novosibirsk, Russia, ku.artemy@gmail.com

Nowadays, lasers are widely used in various technologies from medicine to space. This has created constantly growing needs to improve the efficiency of laser systems, increase their power, and expand their spectral ranges of generation. The development of new materials for converting laser radiation using methods of nonlinear crystal optics is an urgent problem, as well as the study of their optical properties. Much interest is being directed towards the study of oxide crystals, in particular complex borate crystals. Such crystals, which have been intensively studied in recent years, include huntite-type scandium borate with three cations [1].

This work is dedicated to study the optical properties of scandium borates with the general formula $RE_xPr_ySc_{2+z}(BO_3)_4$ ($x + y + z = 2$, RE = Nd, Sm, Tb, Tm, Yb), grown by the TSSG method. The structure, absorption and luminescence of these crystals have been investigated. The efficiency of second harmonic generation (SHG) of a nanosecond Nd:YAG laser radiation (1064 nm, 6 ns) was studied using the Kurtz-Perry powder technique [2]. The effective nonlinear optical coefficient is estimated at deff = 0.34, 0.74, 0.82, 0.85, 0.84 pm/V for R = Nd, Sm, Tb, Tm and Yb respectively. The influence of the composition and linear optical properties on the efficiency of SHG has been discussed.

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Y-17

INDUCED ABSORPTION SPECTRA OF CRYSTAL VIOLET IN VARIOUS SOLVENTS

N.G. Dmitrieva[1,2], O.N. Tchaykovskaya[1], E.N. Bocharnikova[1], and D.M. Ezhov[1]

[1]Tomsk State University, 36 Lenin Ave., Tomsk 634050, Russia;
[2]Siberian State Medical University, 2 Moskovsky Trakt St., Tomsk, 634055 Russia, brjantseva@rambler.ru

The study of the triplet triplet absorption capacity of crystal violet (CV) in various solvents was carried out by the pump probe method. Water, dimethyl sulfoxide, isopropyl alcohol and ethyl alcohol were selected as solvents. The formation of triplet states in various CV solvents was revealed upon excitation by nanosecond radiation of the 4th and 3rd harmonics of a Nd:YAG laser

(wavelengths 266 and 355 nm, average power 25.5 mV, repetition frequency 3 Hz, pulse duration 10 ns, peak power 10–12 mW/cm^2). When CV is exposed to radiation from both the 4th and 3rd harmonics of a Nd:YAG laser (wavelengths of 266 and 355 nm), the formation of triplet states of CV is observed. The maximum triplet triplet absorption is at 460 nm.

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Y-18

NUMERICAL SIMULATION OF THE ZnSe CRYSTAL DOPING PROFILE INFLUENCE ON THE THRESHOLD FOR THE PARASITIC LASING DEVELOPMENT IN A DISK ZnSe:Fe^{2+} LASER

E.E. Alekseev[1], N.M. Andronova[2], S.Y. Kazantsev[2,3], O.V. Kolesnikov[2], and S.V. Podlesnykh[2,4]

[1]NRC "Kurchatov Institute", 1 Kurchatov Ave., 123182, Moscow, Russia, a.e.e.1407@gmail.com;
[2]Moscow Technical University of Communications and Informatics, 8a Aviamotornaya St., Moscow, 111024, Russia, n.m.andronova@mtuci.ru, s.i.kazantsev@mtuci.ru, o.v.kolesnikov@mtuci.ru;
[3]Moscow Polytechnic University, 38 Bolshaya Semyonovskaya St., 107023, Moscow, Russia;
[4]General Physics Institute RAS, 38 Vavilov St., 119991, Moscow, Russia, winrad@yandex.ru

The results of numerical simulation of the parasitic lasing occurrence in a disk laser based on a ZnSe:Fe^{2+} crystal are presented. Similarly to [1], the conditions for the appearance of parasitic lasing in a disk ZnSe:Fe^{2+} laser are analyzed numerically at different doping profiles. Two types of conditions are considered. In the first one iron ions are assumed to be uniformly distributed in one thin layer located either on the surface of the crystal or inside the crystal. In the second one doping is carried out in four parallel inner layers in disconnected regions [2]. The dependences of the maximum pump spot size at which parasitic lasing does not develop in the direction transverse to the optical axis on the pump energy density are obtained. The finite element method is used to investigate thermoelastic deformations arising during optical pumping in ZnSe and ZnS crystals. It is shown that a piecewise-discontinuous doping profile [2] can significantly increase the maximum output energy of ZnSe:Fe^{2+} and ZnSe:Fe^{2+} lasers with disk geometry of the active element due to the increase in the pump spot size and the decrease in optical distortions in the crystal.

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Y-19

DARK CURRENT AND DETECTIVITY OF MULTILAYER Ge/Si PHOTODETECTOR WITH QUANTUM DOTS

R.M.H. Douhan, A.P. Kokhanenko and K.A. Lozovoy

Tomsk State University, 36 Lenin Ave., 634050, Tomsk, Russia, rahaf.douhan@gmail.com

Since the demonstration of molecular beam epitaxy which widened the ability to establish more applications based on semiconductor materials, and after the big success of quantum well structures for infrared detection, a lot of attention has been paid to the quantum discoveries [1], this has stimulated the development of quantum dot structures and its ability for infrared detection. In the past decades the quantum dot structure has proven their efficiency in comparison to other types of semiconductors and they have become an interesting field for research because of their high photoconductive gain, low dark current and the ability to operate under increasing temperature conditions.

Near room temperature semiconductor detectors have become the required optical detection approach in a variety of developing application areas especially in the visible and short-wave infrared spectral regions. QDIPs have been used in a range of quantum photonic applications, including