The 12th International Conference

ATOMIC AND MOLECULAR PULSED LASERS

September 14–18, 2015
Tomsk, Russia

Abstracts

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Tomsk
Publishing House of IAO SB RAS
2015

The 12th International Conference "Atomic and Molecular Pulsed Lasers": Abstracts. – Tomsk: Publishing House of IAO SB RAS, 2015. –138 p.

This book contains the materials on the fundamental and applied problems of pulsed lasers. It may be interesting for researches and engineers working in the sphere of quantum electronics, spectroscopy, plasma physics, medicine, remote sensing and laser technologies.

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Abstracts were printed from the electronic forms presented by the authors.

ISBN 978-5-94458-153-2

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optical conversion (sum- and difference-frequency generation) of CO laser emission only in $ZnGeP_2$ crystal. The wavelength range from 12 to 17 μm was covered due to difference-frequency generation of CO and CO_2 lasers emission in GaSe and $AgGaSe_2$ crystals.

To increase the frequency conversion efficiency in nonlinear crystals a nanosecond CO laser system "master oscillator – power amplifier" (MOPA) was developed. Peak power of the laser system reached 0.8 MW in multi-line mode, 0.1 MW in single-line mode, and 70 kW at synchronously lasing on two spectral lines from different vibrational bands (two-line CO laser). Second harmonic generation efficiency of the CO laser MOPA system emission was up to 37% in $ZnGeP_2$ crystal and up to 5% in GaSe crystal. The two-stage optical conversion (second-harmonic and difference-frequency generation) of the two-line CO laser emission was obtained in $ZnGeP_2$ crystal producing laser radiation with wavelength of 4.7 μm with the conversion efficiency ~ 1.4%.

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THE LASER-INDUCED ELECTRON-HOLE LIQUID IN DIAMONDS: CRITICAL LATTICE TEMPERATURE AND NON-EQUILIBRIUM CARRIER DENSITY

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The photoluminescence (PL) of two diamond samples induced by 222 nm laser radiation with 8 ns pulsewidth (FWHM) was investigated. The diamond samples were made using CVD-method. At the level of laser radiation intensity about 3–7 MW/cm^2 in the PL-spectrum we observed a band with the maximum at 240 nm, corresponding to electron-hole liquid (EHL). Simultaneously we observed a band of free excitons PL at 235 nm.

At the level of laser radiation intensity about 3–7 MW/cm^2 the temperature dependences of the free excitons PL-band intensity had maximums at 150 K for both samples. But with the increasing of the laser radiation intensity these maximums shifted to approximately 190 K. We assume that the reason of this fenomenon was the decreasing the number of excitons in free state because of their condensation to the drops of EHL. Spectral intensity of the EHL PL-band was monotonously decreasing with the increasing of temperature and showed the zero value at the temperature of 195 K. This value of the EHL-condensation critical temperature in diamond is higher than that described in other works [1, 2].

At the level of laser radiation intensity about 13 MW/cm^2 the estimated concentration of charge was 10^{17} cm^3, while the concentration inside the EHL drops was about 10^{20} cm^3.

The research was carried out with the support of Russian Foundation of Basic Research, Project 14-02-31132.

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THE OPTICAL SPECTRA AND THE RADIATIVE RECOMBINATION OF ELECTRON-HOLE LIQUID IN THE DIAMOND

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In our paper we present the results of investigation of optical absorption spectra (in the range 0.2–15 μm), Raman scattering spectra (400–3700 cm^{-1}) and photoluminescence spectra (in the range 200–850 nm) of five diamond samples, irradiated by KrCl* laser (λ = 222 nm). Samles were supposed to be undoped.