XIII International CONFERENCE

September 10-15, 2017, Tomsk, Russia

AMPL

PULSED LASERS AND LASER APPLICATIONS

2017

CONFERENCE ABSTRACTS

AMPL-2017

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ABSTRACTS

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Special Systems. Photonics, St. Petersburg, Russia

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Atmospheric and Oceanic Optics Journal, Tomsk, Russia
Photonics Journal, Moscow, Russia

Scientific & Technical Translations
STT
PUBLISHING
Tomsk, 2017

UDC 533.9; 621.373.8+621.375.8; 535.14; 535.33:621.373.8;
535.33/.34:621.373.826; 61

P 97

Pulsed Lasers and Laser Applications – "AMPL-2017" :
P 97 Abstracts of XIII International Conference. – Tomsk : STT, 2017.
– 150 p.

ISBN 978-5-93629-597-3

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

**UDC 533.9; 621.373.8+621.375.8; 535.14; 535.33:621.373.8;
535.33/.34:621.373.826; 61**

Edited by
Anton V. Klimkin and Olga V. Lobankova.

Printed from electronic forms presented by the authors.

ISBN 978-5-93629-597-3

D-26

DEPTH DISTRIBUTIONS OF FLUORESCENCE AND CONCENTRATION OF GREEN SULFUR BACTERIA BACTERIOCHLOROPHYLL FROM WHITE SEA RELIC LAKES

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Spectral methods to study natural water bodies play an important role in the research of the Arctic region. Anoxygenic phototrophic bacteria (green or purple sulfur bacteria) which are important for the existence of the microbial ecosystems can inhabit at a certain depth the anaerobic zone of water reservoirs. Different types of bacteriochlorophyll (BChl) are the main photosynthetic pigments of bacteria that have different spectral characteristics [1]. Fluorescence spectra of green sulfur bacteria demonstrate two bands in the IR spectral region: (1) with maximum at wavelengths 740–770 nm depending on the concentrations ratio of two types of bacteria with different pigmentation: green-colored (containing BChl *d* with emission shifted towards longer wavelengths) and brown-colored (containing BChl *e* with emission shifted towards shorter wavelengths); (2) emission band of BChl *a* with maximum at 815 nm [2–3]. Water samples from several reservoirs separated from the White Sea [4] that contain green sulfur bacteria were collected by multisyringe water sampler from layers with maximal concentration of microorganisms with a step of 2.5 cm in depth at the end of July 2016. Fluorescence spectra were registered by luminescence spectrometer Solar CM2203. BChl concentration was calculated according to the technique [5] using absorption

spectra of acetone-methanol (7 : 2) extractions measured with a Solar PB2201 spectrophotometer. Vertical distributions in chemocline were plotted using fluorescence measurement data (fluorescence intensity maxima that correspond to BChl emission at region 740–770 nm) and BChl concentration calculations. It was discovered that vertical distributions of fluorescence intensity and BChl concentration were not similar: the water layer with maximum fluorescence intensity was located 10–15 cm lower than the depth of highest bacteria pigment concentration in all studied water bodies. This fact can be explained by BChl fluorescence quenching in the upper layer of chemocline with insufficient value of redox potential Eh. As normal functioning of anoxygenic phototrophs requires certain conditions (including Eh), the redox-dependent fluorescence quenching index defined as the ratio of BChl fluorescence intensity to pigment concentration, may serve as an indicator of physiological state of phototrophic bacteria in the anaerobic layer.

The reported study was funded by RFBR according to the research Project No. 16-05-00548a.

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