

Laser biophotonics

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The first issue of the Quantum Electronics journal for 2021 is dedicated to laser biophotonics and features primarily the papers based on invited reports delivered at the International Symposium 'Optics and Biophotonics 2020' (<https://sfmconference.org/files/20-sfm-program-5-10-20-total.pdf>), which is part of the famous international conference Saratov Fall Meeting (SFM) held annually in Saratov (Russia). All collected papers report on new possibilities of implementation of laser technologies in biomedical applications, and represent the main current research directions in the field of laser biophotonics in our country and partially abroad. These directions include, first of all, laser-induced modification of biological tissues and enhancement of photochemical processes in them. The paper by A.V. Belikov et al. (St. Petersburg, Moscow) considers the application of laser at a wavelength of 1.54 μm operating in the region of generation of microsecond pulse packets for destruction of cataracts. A.G. Shubnyy et al. (Moscow) proposed a novel approach to laser tattoo removal. The paper by N.Yu. Ignatieva et al. (Moscow) studies laser-induced modification of sclera collagen matrix aiming at modification of its hydraulic permeability. The paper by M.E. Shvachkina et al. (Saratov, Tomsk) reports on enhancement of photochemical processes riboflavin/UV photo cross-linking of scleral collagen using tissue optical clearing.

Laser measurements and laser imaging are the traditional directions of laser application in biomedicine. The work by M.E. Darvin et al. (Berlin, Germany) is a mini-review of non-invasive techniques for *in vivo* determination of water content in the human skin stratum corneum using confocal Raman microscopy. The paper by A.V. Skripal et al. (Saratov) reports on analysis of the shape of arterial vessels pulse wave based on autodine signal of the laser interferometer. The paper by P.A. Shilyagin et al. (Nizhny Novgorod) describes the development of a novel customized optical coherence tomography system for non-invasive diagnostics of human middle ear.

Currently, many research groups intensively develop novel diagnostic and therapeutic approaches to imaging and

modification of biological tissues employing micro- and nanoparticles. In the paper by D.D. Yakovlev et al. (Saratov, Tomsk) a fast technique for numerical simulation of luminescence characteristics of multilayer biological tissues with embedded luminescent nanoparticles was proposed. S.V. Zarkov et al. [Saratov, Moscow, Ramat Gan (Israel)] considered the interaction of laser radiation with complexes of plasmon gold nanoparticles and proteins. In the paper by O.I. Sokolovskaya et al. (Moscow, Nizhny Novgorod) the perspectives of silicon nanoparticles fabricated via laser ablation for tumour hyperthermia are discussed.

Publication of a collection of laser biophotonics papers will be continued in the second issue of the journal. The paper by A.V. Khilov et al. (Nizhny Novgorod) presents a new analytical model of the formation of fluorescence signal and demonstrates its application for development of dual-wavelength fluorescence monitoring of photosensitizer accumulation. The paper by D.K. Tuchina et al. (Saratov) discusses the problems of combined use of fluorescence imaging and tomographic modalities in biotissue imaging. The work by V.V. Shupletsov et al. [Orel, Moscow, Oulu (Finland), Birmingham (UK)] describes the development of novel phantoms mimicking the fluorescence properties of human skin.

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The editors of this special issue are sincerely grateful to all authors for contributing interesting papers, and the editorial staff of the Quantum Electronics journal for providing an opportunity to prepare this issue and their assistance at all stages of the issue production. We hope that all submitted papers will be of high interest to a wide readership of the journal, especially to those developing laser and fibre-optic modalities that can find application in biomedical practice.

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