

Special Issue: Optical Technologies for Biomedical Applications

We are pleased to present the fourth issue of JBPE, which focuses on optical technologies for study of biological tissues and fluids. These are selected papers presented at Saratov Fall Meeting 2015 – International Symposium on Optics and Biophotonics - III (September 22-25, 2015, Saratov, Russia). This issue includes 7 representative papers that well characterize the major topics of SFM-15.

Development of non-contact optical methods for detection the pathological alterations in tissues is an urgent problem of biomedical diagnostics. Invited paper of **J. Li and Zh. Chen** presents a novel integrated medical imaging modality IVUS-OCT (Intravascular Ultrasound and Optical Coherence Tomography) that provides opportunities for accurate assessment of vulnerable plaques *in vivo* in patients. The authors reviewed the fundamentals, technical designs, applications and future directions of IVUS-OCT technology. The paper of **J. Li** and co-authors is dedicated to comparison of two methods of noncontact optical elastography: a laser Michelson interferometric vibrometry and a phase-stabilized swept source optical coherence elastography system. The elasticity of tissue-mimicking agar phantoms was estimated from the velocity of air-pulse induced elastic waves as measured by these two techniques.

O. Sindeeva and co-authors used laser speckle-contrast imaging to found mechanisms underlying pathological processes in the cerebral blood flow in newborn rats. In this study, authors utilized a model of sound-stress-induced brain hemorrhages in newborns.

Method based on the optical absorption measurements (285 nm) in the protein fractions of urine received with use of the commercial desalting columns is developed in the paper of **A. Sünter** and co-authors.

The study of molecular diffusion in biological tissues is a research field of high importance with the multiple applications in diagnostics and therapeutics. Diffusion properties and dynamic viscosity of many immersion molecular agents can be evaluated from kinetic optical measurements. **P. Peixoto** and co-authors have developed a software that integrates all processing and calculations, turning the work easier and faster.

Computer program for analysis of the optic disc nerve images is presented by **V. Bakutkin** and co-authors. The goal of the study was to reveal the bounds of the norm for the glaucoma disease using the special “FUNDUS-camera” based on a microscope combined with the photo-camera.

Application of terahertz-frequency electro-magnetic radiation in medicine attracts more and more attention. The study of **S. Kireev** and co-authors demonstrates the possibility of terahertz wave therapy in the correction of microcirculation impairments in bone tissue.

In overall, papers collected in this special issue demonstrate well the exciting potential of optical technologies for biomedical studies and applications aiming medical diagnostics and treatment.

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