

Foreword to the Special Issue

Advanced Photonic Technologies in Biomedicine

We are pleased to present the special issue of JBPE, which focuses on photonic technologies for different biomedical applications. The issue contains selected papers presented at Saratov Fall Meeting 2023 (SFM-23) – XI International Symposium on Optics and Biophotonics (September 25–29, 2023, Saratov, Russia) and includes eight representative papers that well characterize the major topics of SFM-23.

The paper by Alexander A. Sovetsky et al. describes method for generation of realistic “digital phantoms”, which are OCT scans with fairly correct accounting for optical signal attenuation dominated by scattering. Authors present instructive examples demonstrating their usefulness for testing OAC-reconstruction approaches.

The paper by Andrey V. Belikov and Viktor Yu. Chuchin deals with the influence of thermally induced methemoglobin on the human skin optical reflection. The results obtained will allow one optimizing the parameters of laser for improvement of treatment of skin in dermatology and cosmetology.

Dmitry Artemyev and co-authors suggests the method of differential rapid diagnosis of endometrial cancer and its benign pathological conditions using surface-enhanced Raman spectroscopy (SERS) of blood plasma and machine learning. The approach presented has shown a high diagnostic efficiency.

Aleksey R. Krot and co-authors have studied self-assembled porphyrazine nanoparticles photosensitizers in aqueous solutions with and without a polyvinylpyrrolidone carrier. This work is the first to study a set of samples with a wide range of characteristics under passive load conditions.

The paper by Anna A. Doronkina et al. discusses the effects of upconversion nanoparticles on erythrocytes. Authors have shown that such interaction is accompanied by a change in cell shape, increased formation of aggregates, and affect both cell size and membrane viscosity. The results obtained are useful for the development of photodynamic therapy.

The study presented by Peter B. Ermolinskiy and co-authors demonstrates on the relationship between whole blood viscosity and microrheological parameters in the context of blood disorders.

Alexey A. Selifonov et al. have investigated optical properties of healthy and cancer ovarian tissue. The difference in the scattering and absorption properties of healthy and cancer ovaries can serve as

an important and promising marker of pathology in the early stages in clinical applications, as well as in the search and prove of diagnostically significant criteria for assessing the metabolic state of tissues.

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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