OPEN ACCESS
Journal of Innovative Optical Health Sciences
Vol. 16, No. 1 (2023) 2302001 (4 pages)

DOI: 10.1142/S1793545823020017

Introduction to the special issue on celebrating the 15th anniversary of JIOHS and the 70th anniversary of HUST

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Published 3 February 2023

Since launching in 2008, *Journal of Innovative Optical Health Sciences* (JIOHS) has been published for 15 years until 2022. Supported by the founding advisor Prof. Britton Chance and other founding Editorial Members, JIOHS was quickly embraced by the biomedical optics community, especially in Asia. Authors submitted some of their high quality papers to JIOHS, which led to a constant Impact Factor (IF) increase from the first IF 0.632 to IF 2.396 (Journal Citation Report 2021). JIOHS is now one of the most important journals in the field of biomedical optics and biophotonics. The year 2022 is the 15th Anniversary of JIOHS and also the 70th Anniversary of Huazhong University of Science & Technology (HUST). Naturally, organizing a special issue is certainly the most important way to celebrate these two anniversaries. A brief history of the development of biophotonics and biomedical optics at HUST, associated with the formation of the journal and the development of international relations, including through the regular organization of the international conference PIBM and the Chinese-Russian Workshops, is presented in the photos. This special issue on Celebrating the 15th Anniversary of JIOHS and the 70th Anniversary of HUST consists of eight invited and two regular

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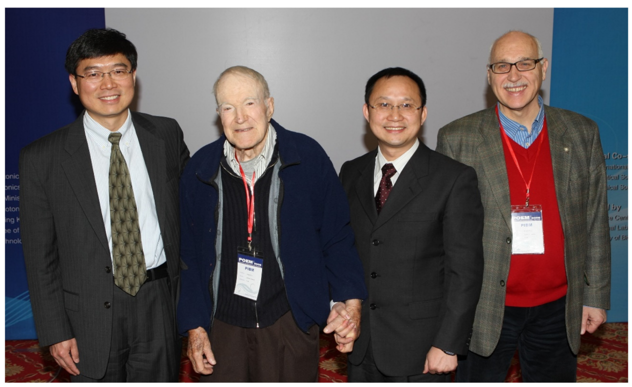
articles. Among them, nine articles are published in January 2023 issue, while the paper from Wei R Chen will be available in the next issue. All these articles are dedicated to highlighting the latest developments in the fields of biomedical optics and biophotonics.

The MINimal emission FLUXes (MINFLUX) technique in optical microscopy, widely recognized as the next innovative fluorescence microscopy method, claims a spatial resolution of 1–3 nm in both dead and living cells. Min Gu *et al.* reviewed recent applications and developments of fluorescence probes and the relevant labeling strategy for MINFLUX microscopy.[1] Moreover, they discussed the deficiencies that need to be addressed in the future and a plan for the possible progression of MINFLUX to help investigators who have been involved in or are just starting in the field of super-resolution imaging microscopy with theoretical support. In the review of *Observing single cells in whole organs with optical imaging*, Qingming Luo *et al.* revisited the principles of optical contrast, the optical techniques, and the optical imaging methods to achieve three-dimensional spatial discrimination for biological tissues.[2] Multi-photon microscopy (MPM) and coherent anti-Stokes Raman scattering (CARS) are two advanced nonlinear optical imaging techniques, which provide complementary information and have great potential in combination for noninvasive *in vivo* biomedical applications. A review from Haishen Zeng *et al.* provided a detailed discussion of the basics, development, and applications of these technologies for *in vivo* skin research.[3] Light field microscopy (LFM) has emerged as a technique of choice for instantaneous volumetric imaging. It enables the encoding of



Organizers of PIBM: Lihong Wang, Britton Chance, Qingming Luo and Valery Tuchin, HUST 2008

Valery Tuchin discusses tissue optics with CBMP students, HUST, September 7, 2005

Valery Tuchin and his colleagues visiting the Dan Zhu group, HUST, October 23, 2011

Best Student Paper Award Ceremonies at PIBM, HUST, 2008, 2009, 2010, 2011, and 2013

First Chinese-Russian Workshop on Biophotonics and Biomedical Optics, HUST, 2006

Chinese-Russian Workshop on Biophotonics and Biomedical Optics, Saratov, Russia, 2012

three-dimensional spatial information in a snapshot manner, permitting high-speed three-dimensional imaging that is only limited by the frame rate of the camera. In the review of *Light field microscopy in biological imaging*, Peng Fei *et al.* firstly introduced the fundamental theory of LFM and current corresponding advanced approaches. Then, they summarized various application of LFM in biological imaging.[4]

Nonlinear optical imaging is a versatile tool that has been proven to be exceptionally useful in various research fields. However, due to the use of photomultiplier tubes (PMTs), the wide application of nonlinear optical imaging is limited by the incapability of imaging under ambient light. Stephen A. Boppart *et al.* proposed and demonstrated a new optical imaging detection method based on optical parametric amplification (OPA). Periodical poled lithium niobate (PPLN) crystals were used in their study as the media for OPA. Their results demonstrated that OPA can be used as a substitute for PMTs in nonlinear optical imaging to adapt it to various applications with complex lighting conditions.[5] Radiation-induced acoustic computed tomography (RACT) is an evolving biomedical imaging modality that aims to reconstruct the radiation energy deposition in tissues. Liangzhong Xiang *et al.* developed a user-friendly MATLAB-based graphical user interface (GUI: RACT2D) that facilitates back projection and model-based image reconstructions for two-dimensional RACT problems.[6] Shuhong Qi *et al.* constructed a mouse glioma cell line stably expressing the large Stokes-shifted yellow fluorescent protein and applied it to the multicolor immunofluorescence imaging analysis of the glioma microenvironment. Their results provided new perspectives for targeting immune regulation cells and developing new immunotherapy strategies for glioma.[7] Cherenkov Luminescence Tomography (CLT) is a novel and potential imaging modality which can display the three-dimensional distribution of radioactive probes. Xin Cao *et al.* presented GCR-Net: three-dimensional graph convolution-based residual network for robust reconstruction in cerenkov luminescence tomography. Compared with the existing methods, the proposed method can achieve efficient and accurate reconstruction in localization and shape recovery by utilizing three-dimensional information.[8] Bioluminescence tomography (BLT) is a promising imaging modality that can provide noninvasive three-dimensional visualization information on tumor distribution. Jingjing Yu *et al.* proposed a hybrid reconstruction framework for model-based multispectral BLT, which has better localization accuracy, spatial resolution, and multi-target resolution.[9]

This issue contains four reviews and five research articles ranging from MINFLUX microscopy, single cells in whole organs with optical imaging, multi-photon microscopy and coherent anti-stokes Raman scattering, light field microscopy, nonlinear optical imaging, radiation-induced acoustic computed tomography, multicolor immunofluorescence imaging, cerenkov luminescence tomography to bioluminescence tomography. As it provides a broad and frontier view about the recent developments in the field of biomedical optics and biophotonics, we strongly recommend this issue. Finally, we thank all the contributing authors for making this issue possible, as well as Dan Zhu and Hua Shi for their help in collecting of historical photos.

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