Editorial for special issue on optical methods for life sciences

Optical methods for life sciences is a very comprehensive subject. Especially in this era, scientific discoveries depend on more and more interdisciplinary cooperation. For example, the discovery of fluorescent proteins and probes helps optical engineers achieve higher contrast and localization images for biological samples. Optical diffraction limitation was eliminated by combining reversible fluorescent probes and super-resolution microscopy. In addition, by means of a novel light-sensitive channel-rhodopsin or voltage sensor, we can generate noninvasive and accurate light to activate or inhibit target neurons for brain function study. In pathology diagnosis, endoscopes serving as very important tools for the surgeon were developed to be much more miniature and higher resolution for the patients. Of course, innovative imaging modalities such as photoacoustic imaging, spectroscopy, and optical coherence tomography (OCT) were also developed for deeper and noninvasive tissue diagnosis. This special issue introduces some new progress in optical methods for life sciences.

To acquire faster high-resolution images, Prof. Chen *et al.* combined a fast beam-shaping digital micromirror device and an electrically tunable lens for simultaneous structure illumination and fast z-axial scanning. They provided an advanced and economic method for biological imaging. Through a customized second-harmonic generation microscopy, Prof. Fu *et al.* could discriminate brain layers and subregions in cerebellum and brain stem slices with a cellular resolution, demonstrating that this label-free imaging technique is helpful for the study of the structure and function of the brain. Prof. Qu *et al.* applied the machine vision scale-invariant feature transform algorithm to analyze the intraoperative margin of glioblastoma captured by fluorescence lifetime imaging microscopy. This is a novel idea for the analysis of biological images. By using methods of laser speckle imaging and wavelet analysis of vascular physiology, Prof. Tuchin's team found that cerebral veins rather than microvessels were sensitive to cerebral blood flow alterations related to the sound-induced opening of the blood-brain barrier.

There were also some influential developments in OCT. Prof. Leahy *et al.* extracted the phase information from conventional multiple reference optical coherence tomography (MR-OCT), which provided another contrast modality for OCT images. Prof. Popp *et al.* combined Raman spectroscopy and OCT for the analysis of atherosclerotic plaque depositions. This work may give us more biochemical information and help doctors with diagnosis. Prof. Wang *et al.* imaged the cranial meninges in *in vivo* brain injured mice by OCT, which explored a new application for OCT.

Of course, there are lots of other new optical methods developed by scientists all over the world day by day. Here, we only serve as a modest spur to induce someone to come forward with their valuable contributions. We sincerely hope our colleagues will submit their talented work to the *Chinese Optics Letters* from time to time.

Sincerely,

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