

# Journal of Biomedical Optics

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## **Optical Imaging, Sensing, and Light Interactions in Cells and Tissues**

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## Optical Imaging, Sensing, and Light Interactions in Cells and Tissues

Biophotonics is now a major area of activity and growth in Israeli academia, hospitals, and industry. Leading biophotonics companies have been established and operate in Israel. The entrepreneurial nature of the country stimulates translational research in this field, and a large number of Israeli start-up companies are developing cutting-edge biophotonics technologies.

Supported by SPIE, the 1st Biophotonics Meeting in Israel (BPI 2012) was held at Tel Aviv University, Tel Aviv, Israel, from 9–11 December 2012 ([www.spie.org/bpi](http://www.spie.org/bpi)). It brought together Israeli and international scientists and researchers from academia and industry to present and discuss the latest achievements in the field of biophotonics. A special emphasis was put on translational research that can bring those scientific and technological achievements to industry, thereby facilitating better clinical care.

This special section of the *Journal of Biomedical Optics* published 18 papers. Most special section manuscripts were selected from the works presented at the conference in Israel, but also include contributed papers whose subjects fall into the conference scope, including:

- Neurophotonics: imaging, sensing, and stimulation
- Laser–tissue interactions and new treatment modalities
- New optical probes for molecular sensing, including nanoparticles
- Imaging and sensing techniques, including optical coherence tomography (OCT), nonlinear microscopy, fluorescence microscopy, photoacoustic tomography, confocal microscopy, and optical tweezers
- Superresolution microscopy
- Photonic sensing: healthcare solutions for remote and underdeveloped world regions
- Spectroscopic and interferometric optical imaging and sensing, including holography and light scattering–based techniques.

All of these optical technologies were shown to have a strong connection to biomedical applications, as exemplified by these three specific examples:

In [*J. Biomed. Opt.* **18**(11), 111402 (2013)], Yakushenko et al. present a novel opto-electronic device containing an

array of micro-pixelated LEDs coupled to an ultrathin planar microelectrode array for simultaneous on-chip optical stimulation and electrophysiological recording of cells *in vitro*. They then demonstrated using this device to monitor action potentials of individual, spontaneously beating cardiomyocyte-like cells transfected with a light-sensitive protein.

In [*J. Biomed. Opt.* **18**(11), 111413 (2013)], Tychinsky et al. used quantitative phase microscopy to evaluate the functional state of eukaryotic cells. Using this technique, the authors monitored the time-dependent decrease of nucleolar contrast in a single human colon carcinoma cell (see the cover image) when exposed to a transcriptional inhibitor, demonstrating that the monitored functions can be used as general mathematical tools for the analysis of cells.

In [*J. Biomed. Opt.* **18**(11), 111416 (2013)], Gabay et al. presented a laser bonding system based on a single infrared fiber. The system is more compact compared to previous designs and provides more accurate heating, leading to stronger bonding with less thermal damage. The system was examined in the soldering of 15 corneal incisions *ex vivo*.

All authors who contributed papers to this special section bring together their unique views and novel technologies to advance the field of biophotonics. The guest editors are thankful to the editor-in-chief, Lihong Wang, the journal support staff, the contributors, and the reviewers for their invaluable work and dedication.

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**Special Section Guest Editors**