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Advances in optics for biotechnology, medicine and surgery

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Abstract: The editors introduce the *Biomedical Optics Express* feature issue, "Advances in Optics for Biotechnology, Medicine and Surgery," which includes 12 contributions from attendees of the 2011 conference Advances in Optics for Biotechnology, Medicine and Surgery XII.

OCIS codes: (170.0170) Medical optics and biotechnology; (170.0110) Imaging systems.

References and links

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This feature issue represents topics covered at the 2011 Advances in Optics for Biotechnology, Medicine and Surgery XII conference in Naples, Florida, June 5–8, 2011. This was the 12th in a series of biennial meetings organized by Engineering Conferences International over the past 20 years. The editors of this feature issue were organizing chairs

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and co-chairs of the meeting, and submissions were considered from researchers who attended the meeting.

The cross section of papers within this feature issue demonstrates the great diversity of biophotonic techniques, while highlighting the continuing progress of our field towards providing true clinical value. Papers include new instrumentation approaches to clinical and intrasurgical imaging, including Clancy *et al.* [1], who present a new method to render three-dimensional surfaces during endoscopy using spectral encoding, and Solomon *et al.* [2], who present a system for high-speed diffuse optical tomography for sentinel lymph node resection. Larson *et al.* [3] present evaluation of a confocal microscope system for *in vivo* imaging of human skin and oral mucosa.

Novel microscopy development continues to be an important part of biomedical optics, providing tools for both basic research and clinical diagnostics. In this issue, Singh *et al.* [4] present an approach to improving the performance of structured light microscopy, while Sridharan *et al.* [5] demonstrate the potential of spatial light interference microscopy (SLIM) to allow simultaneous evaluation of the motility and growth of cells for developmental biology research. Lee *et al.* [6] highlight the great potential that optical techniques have for impact in the developing world, with a high-performance, inexpensive, and portable microscope for examination of biological specimens. Lim et al. [7] demonstrate a model of light scattering that could enable simple light scattering-based hematological analysis.

The conference highlighted the continued importance of optics for therapeutic applications, as represented by the work of Gualda *et al.* [8], who utilized two-photon microscopy to explore intrastromal ablation of the cornea, work very relevant to understanding and improving laser eye surgery.

Advances in multimodal photoacoustic methods are presented in Rousseau *et al.* [9], who combine photoacoustics and ultrasonography. Tichauer *et al.* [10] demonstrate an approach for x-ray guided fluorescence tomography for small animal molecular imaging.

The continued importance of both quantitative image analysis and mathematical model development is also highlighted. Garcia-Allende *et al.* [11] use morphological analysis of optical coherence tomography (OCT) images for computer aided diagnosis of gastrointestinal tissues, and Gamm *et al.* [12], developed a model for estimation of absorption and scattering properties from fiber-optic based diffuse reflectance measurements.

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