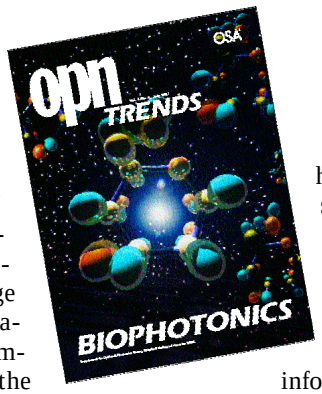
OPN TRENDS

Biomedical Applications of Light



Welcome to another issue of *OPN Trends*, the Optical Society of America's new publication on cutting-edge science, novel applications, and emerging commercial directions in the fast-moving field of optics. A supplement to OSA's widely acclaimed monthly magazine *Optics & Photonics News*, *OPN Trends* gives readers an overview of developments in optics that are making a difference in our research, our industries,and our world.

Following the success of the inaugural issue of *OPN Trends*, devoted to fiber optics (March 2001), this supplement looks at photonics in the life sciences. Although the medical uses of light have a long history going back to the time of the ancient Egyptians, with a few exceptions, the major scientific advances and medical applications have emerged in the past several decades. Recently, the pace of these advances has quickened,partly due to our improved understanding of light-tissue interactions,and partly due to improvements in laser technology, fiber-optic systems, and high-sensitivity optical detectors. As a result,new biophotonics applications can now be designed and refined with foresight and intelligence. Gone are the early days of laser biomedicine, when the common *modus operandi* with which newly available light sources were employed was "let's fire our new laser at this chunk of tissue and see what happens." The technological sector is responding: there are now examples of specific laser systems designed exclusively for biomedical use.

Light's unique characteristics enable it to transmit information, probe molecules,and alter molecules. While the first of these three attributes is central to optical communications and fiber-optic technology, it is the latter two that are usefully exploited in the emerging field of biophotonics. All over the world, scientists and clinicians are harnessing optical energy to investigate tissues (optical dignostics), and to alter tissues in highly controlled ways (optical therapeutics). With photodynamic therapy and interstitial laser photocoagulation for disease treatments, endoscopic fluorescence and optical mammography for early cancer detection, and multiphoton confocal fluorescence microscopy for cellular-level tissue assessment (to name just a few examples), the optical applications in the life sciences are expanding. The articles assembled in this issue of *OPN Trends* offer interested readers a glimpse into this evolving frontier, and convey the sense of excitement felt by researchers in biomedical optics.

— Alex Vitkin
Assistant Professor of Medical Biophysics and Radiation Oncology, University of Toronto; Associate Scientist, Ontario Cancer Institute

OPN Optics & Photonics News,is published monthly by the Optical Society of America, 2010 Massachusetts Ave.,N.W.,Washington,D.C. 20036;202/223-8130; FAX 202/223-1096;opn@osa.org;http://www.osa.org;TELEX 5106003965. OPN was published as Optics News from 1975-1989.(USPS #005-818,ISSN 1047-6938, CODEN OPPHEL;GST #133618991;IPM #0895431).2001 nonmember and library subscription rates (domestic):$99/year. Membership in the Optical Society of America includes $4 from membership dues to be applied to a member subscription. Periodicals postage paid at Washington, D.C. and at additional mailing offices. POSTMASTER: Send address changes to *OPN Optics & Photonics News*, 2010 Massachusetts Ave., N.W., Washington, D.C. 20036;postmaster@osa.org (Internet). Subscriptions, missing copies, change of address: Optical Society of America, Subscription Fulfillment Services, 2010 Massachusetts Ave., N.W., Washington, D.C. 20036;800/582-0416; FAX 202/223-1096. Back numbers, single issue, and foreign rates on request. Printed in the U.S.A. OSA is a registered trademark of the Optical Society of America.©2001.

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