

BIOPHOTONICS

BRINGING LIGHT TO THE LIFE SCIENCES®

www.BioPhotonics.com

Monthly newsletter focusing on how light-based technologies are being used in the life sciences. Includes news, features and product developments in lasers, imaging, optics, spectroscopy, microscopy, lighting and more. Manage your Photonics Media membership at Photonics.com/subscribe.



High-Speed Photoacoustic Microscopy Captures Processes Within Tissue

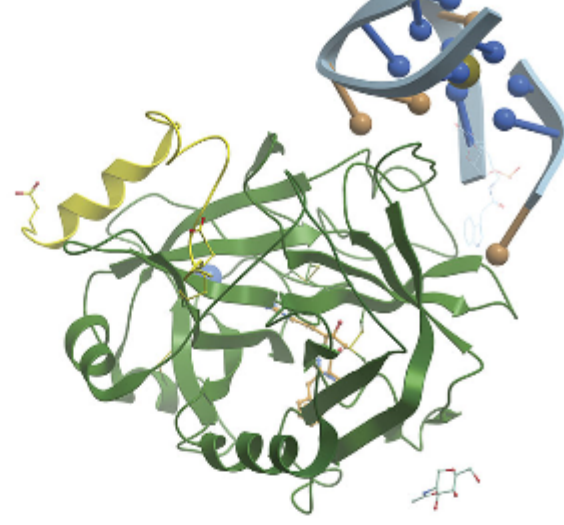
When Alexander Graham Bell discovered the photoacoustic effect in the 1880s, he might not have envisioned that this technology would ultimately be successfully implemented in biomedical imaging applications such as neuroscience, dermatology, and cancer biology. In the photoacoustic effect, the excitation light is absorbed by molecules in a sample, and the absorbed photon energy slightly elevates the local temperature via nonradiative relaxation, which eventually induces a pressure wave propagating as ultrasound.



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Aptamers Provide Instant Photonics-Based Diagnostics

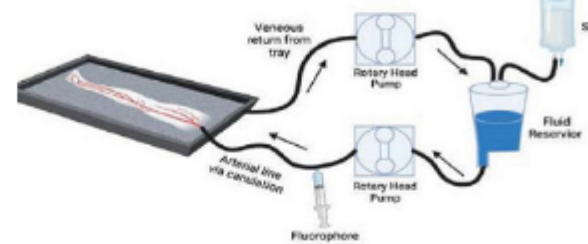
Aptamer-based diagnostics is a new field in the development of technologies for instantly identifying disease. Aptamers are short sequences of DNA or RNA that bind to a specific target molecule. They are typically 20 to 60 nucleotides in length and are equivalent to antibodies in their ability to specifically bind to their targets. Scientists have recently capitalized on these features by creating an aptamer-based photonic beacon that can interface optically with a smartphone or any computing device with an LED and sensor.



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Human Limb Model Could Evaluate Fluorophores for Safety in Surgery

As the popularity of fluorescence-guided surgery grows, so does the demand to design and develop fluorophores, which serves to distinguish the target tissue from other tissues and subsequently guide surgical steps. The current list of FDA-approved fluorophores for clinical use is limited to three: indocyanine green, fluorescein, and methylene blue. Though these agents have several clinical applications, they are untargeted, which limits their specificity. Many candidate fluorophores appear effective in animal models — but their clinical translation necessitates rigorous testing and significant financial investment.



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Featured Products & Services



LS850 Fully Automated Microscope

Etaluma Inc.

The LS850 microscope is the latest generation of our fully automated three-channel flagship model and offers the latest advances in optics, cameras, throughput, and user flexibility delivering image quality, motion speed, illumination, and software flexibility.

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Multi-Immersion Objectives

Applied Scientific Instrumentation Inc.

ASI and Special Optics have developed two dipping objective lenses designed for light sheet microscopy of cleared tissue samples, including ASI's ct-dSPIM. These objectives work in any refractive index media without a correction collar because of a unique curved first surface.

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NAN Open-Design Upright Microscope

Sutter Instrument Company

The Sutter NAN™ — A focusing nosepiece microscope designed for electrophysiology. The microscope frame has been reimaged around highly stable, adjustable manipulator gantry stands. This design allows for many possible configurations to match the ever-expanding applications for upright microscopes.

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Optikos Corporation

Optikos engineering services will help bring your next medical device or diagnostic product from design to market. Optics makes amazing things possible in life sciences, and Optikos makes it happen.

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KeyLight™ by Phoseon Technology

Phoseon Technology Inc.

KeyLight™ is a compact light source that supports 3-7 channel fluorescence microscopy systems. It brilliantly illuminates your results by delivering intense, broad-spectrum UV and visible wavelengths for a wide variety of colors between 340 nm and 760 nm.

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LIGHT: Introduction to Optics and Photonics, Second Edition

Photonics Media

Offering a comprehensive treatment of the subject as well as key applications, and employing minimal math, LIGHT: Introduction to Optics and Photonics was written with readers in mind.

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In Case You Missed It

Light-Activated Molecular Machines Kill Pathogenic Fungi

In the game-turned-TV series, The Last of Us, post-apocalyptic survivors Joel and Ellie make their way across the U.S., outrunning zombie hordes while coping with societal collapse, all caused by a nasty mutation in the parasitic Cordyceps fungus, leading to an even nastier mass infection. Luckily, in everyday life, a stubborn athlete's foot infection cannot turn any of us into mildewy zombies. However, COVID, climate change, and other factors have made invasive fungal infections a growing public health concern, and as fungi become increasingly resistant to existing drugs, new antifungals are urgently needed.



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AI-Aided Spectroscopy Assesses Burn Severity to Improve Recoveries

Researchers at Stony Brook University developed a neural network model that uses terahertz time-domain spectroscopy (THz-TDS) to evaluate burns and predict healing outcomes. The latest work builds on a previous advancement in which the researchers developed a portable, hand-held imaging device for fast THz-TDS imaging of burn injuries, which aims to make the method practical for clinical use.

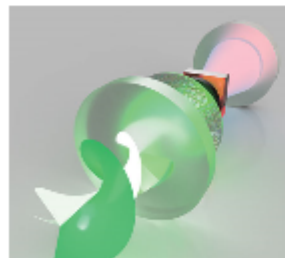
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Nanophotonic Signal Enhancement Enables Label-Free Protein Study

Researchers at Institut Fresnel have developed a technique to detect the ultraviolet-autofluorescence signal in single proteins, opening the way for the label-free study of thousands of proteins whose natural fluorescence cannot be detected using existing technology. Using a combination of plasmonic antennas, antioxidants, and background reduction techniques, the researchers, led by Jérôme Wenger, improved the signal-to-background ratio in UV-autofluorescence proteins by more than one order of magnitude — enough to enable label-free detection.

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Upcoming Webinars



Recent Advancements in Structured-Light Lasers

Thu, Apr 6, 2023 10:00 AM - 11:00 AM EDT

Structured light provides the ability to tailor light within all of its degrees of freedom, including amplitude, phase, and polarization. There are many approaches to tailoring light, from using external tools that include spatial light modulators, geometric phase liquid crystal, and metasurface devices to at-the-source approaches that include bulk, microchip, and fiber lasers. Andrew Forbes, Ph.D., outlines the recent advancements in structuring light at the source, from orbital angular momentum and beyond. From concepts to applications, he highlights the current challenges and possible future trends.

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Next Issue:

Features

Microscopy & Cardiology, OCT & Cardiology, Spectroscopy & Cardiology, and more.

Photonics Media is currently seeking technical feature articles on a variety of topics for publication in our magazine *BioPhotonics*. Please submit an informal 100-word abstract to Senior Editor Doug Farmer at Doug.Farmer@Photonics.com, or use our online submission form www.photonics.com/submitfeature.aspx.

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