Wednesday, November 23, 2022

BIOPHOTONICS
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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.

Innovations in the STORM Method Reveal Vital Clues to Disease Formation

Traditional microscopy methods have fallen short in revealing details crucial to advancing disease pathology due to inherent resolution limitations that only allow the imaging of general structural changes, as opposed to resolving their point of origin. Innovations in superresolution technologies such as stochastic optical reconstruction microscopy (STORM) are helping life science researchers to understand how healthy and diseased cells function at their core.

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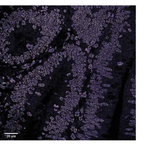

The Evolution of Scientific Cameras Leads to the Advancement of Microscopy

Most people are familiar with standard qualitative cameras and bright high-contrast images, thanks to the prevalence of increasingly powerful smartphone and digital cameras in the marketplace. Scientific-grade cameras, however, are designed to be quantitative, which means the technology can reliably determine photon intensities and detect low signals across large pixel arrays with the smallest degree of error and fewest artifacts, otherwise known as noise.

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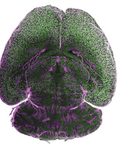

Expansion Microscopy Technique Reveals Hidden Nanostructures

Inside a living cell, proteins and other molecules are often tightly packed together. These dense clusters can be difficult to image because the fluorescent labels used to make them visible can't wedge themselves in between the molecules. Researchers at MIT developed a method to overcome this limitation by expanding a cell or tissue sample prior to labeling, effectively de-crowding the molecules and making them more accessible to fluorescent tags.

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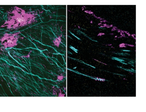

.: Featured Products & Services

Rapid Automated Modular Microscope

Applied Scientific Instrumentation Inc.

Rapid Automated Modular Microscope is a fully functional compact automated imaging platform mounted on the frame with mounting holes and support points. The frame supports the assembly and the stage in a manner that ensures coupling between sample and objective.

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SL160 Slide Loader

Prior Scientific Inc.

The SL160 automated microscope slide loader combines reliability and high capacity with easy set up to provide automated slide scanning to a wide variety of existing upright microscopes or with the use of Prior's OpenStand microscope.

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Keylight™ OEM Microscopy Light Source

Phoseon Technology Inc.

KeyLight™ illumination sources for fluorescence microscopy are the perfect solution to integrate into your equipment. Phoseon's proprietary LED solutions offer intense, broad-spectrum wavelengths for various colors from UV through visible into the infrared.

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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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Award-winning Microscopy Illumination

CoolLED Ltd.

Maximize the potential of your microscope with the popular 3-channel pE-300 Series LED Illumination Systems, enabling high-performance and cost-effective fluorescence microscopy and optogenetics.

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Superresolution Microscopy Poster

Photonics Media

This superresolution microscopy poster features visually stunning, high-resolution images that reveal never-before-seen worlds at the sub-cellular level, illustrating the value of the techniques. Useful, at-a-glance definitions make this poster a great resource.

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.: In Case You Missed It

Nobel Prize-Winning Technique Helps Resolve Imaging Challenge

Using a technique that was awarded the 2022 Nobel Prize in chemistry, researchers at Cornell University used expansion microscopy to study lipids, the water-repellent, dynamic components that comprise the walls of cells and organelles. The technique, called Lipid Expansion Microscopy, will enable closer study of biological membranes, which are the site of critical cell signaling and nutrient exchange. These processes can lead to disease if disrupted.

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Light-Activated Molecular Motors Achieve Fluorescence

In their study of rotary molecular motors, researchers in the laboratory of Ben Feringa at the University of Groningen have combined two light-mediated functions — motion and fluorescence — within a single molecule. The advancement is poised to benefit the construction of advanced molecular machines and, according to the researchers, provide prospects toward photoactive multifunctional systems that perform molecular rotary motion while tracking its location in a complex environment.

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Laser Surface Modification Shields Implanted Ortho Devices from Causing Infection

To help prevent infections caused by orthopedic implants, Purdue University researchers developed a laser-assisted surface modification process that may improve the efficacy of the implanted device.

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.: Upcoming Webinars

Fluorescence Lifetime Microscopy for Label-Free Imaging of Cellular Metabolism and Heterogeneity

Wed, Nov 30, 2022 1:00 PM - 2:00 PM EST

Alex Walsh, of Texas A&M University, shares on how cellular metabolism is dysregulated in many diseases and pathologies. Current biochemical assays for metabolism are limited to either cell-destructive protocols. Fluorescence lifetime imaging of the metabolic coenzymes, reduced nicotinamide adenine (phosphate) dinucleotide (NAD(P)H) and oxidized flavin adenine dinucleotide (FAD), provides a label-free method to interrogate cellular metabolism. Single-cell segmentation and analysis of fluorescence lifetime images allows metabolic measurements at the cellular level. To facilitate cell-level analysis of fluorescence images, researchers are developing automated segmentation algorithms. Additionally, they are creating and testing models for predicting cell phenotypes from fluorescence lifetime metrics.

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Features

Light Sources & Imaging, Laser Scanning Microscopy, Single-Molecule Spectroscopy, and Optogenetics

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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