



Bio-Rad's Image Lab™ software for GelDoc XR™ and ChemiDoc XRS™ imaging systems

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Fluoro Power

The power of fluorescence lies in the potpourri of ways in which it can be used—from measuring gene expression to using light to manipulate cells themselves. Likewise, the latest equipment and reagents that leverage this special property are as varied and advanced as their applications.

Microscope Cameras

Selection pressure for higher frame rates and lower noise is directing the evolution of scientific cameras. **QIClick™** from **QImaging®** is a fast, sensitive and versatile 1.3-megapixel CCD camera for fluorescence microscopy. Flexible binning allows the camera to scale from 10 fps at full resolution to 110 fps with 8x8 binning. The CCD sensor's 6.45 x 6.45 micron pixels enable a low read out noise of 8 electrons, with a dark current of 1.5 electrons/pixel/second. Flexible exposure control acquires images as short as 10 microseconds and as long as 17.9 minutes. Connections are available for synchronization with external light sources and microscope stages. The camera is available in both monochrome or color options. Users can easily integrate the monochrome camera with QImaging's RGB color filter to gain both sensitive monochrome imaging and high quality color capability.

Leica's DFC385 FX digital camera's 2-megapixel CCD sensor has 1,000:1 dynamic range for simultaneous imaging of non-labeled and brightly fluorescing specimens. The CCD sensor has 4.4 μm^2 pixels for detailed imaging of the specimen and is Peltier-cooled to suppress background noise. The pixel clock can be switched between 20 MHz for high-quality captures, and 40 MHz for fast image readout. An "overlapping" mode enables temporal overlap of exposure and readout for multidimensional image acquisition at high speed. The camera is integrated with Leica's advanced fluorescence imaging software platform and has Firewire B connectivity.

The latest Fluorescence Recovery After Photobleaching (FRAP) systems shorten experiment time by speeding up image acquisition. The **Olympus cell[^]FRAP** addition to its xcellence live cell fluorescence imaging station, enables

microsecond-fast real-time photobleaching and photomanipulation experiments, including FRAP, iFRAP, FLIP, FLAP, photoactivation, photoconversion, as well as simulated fluorescence speckle microscopy using pattern bleaching. It can house two laser lines or a laser combiner, and uses a separate light path enabling full integration with standard brightfield and fluorescence, TIRFM, and spinning disk confocal modules. Olympus cell[^]FRAP can use region of interest (ROI) targeted scanning algorithms that allow simultaneous photobleaching and imaging of multiple ROIs. Researchers can even use mouse clicks to trigger the FRAP laser at single or multiple points for experiments involving moving targets, such as vesicles.

Automated Image Capture and Analysis Software

Gels and blots can be tedious to image. **Bio-Rad Laboratories' Image Lab™** software for the GelDoc XR™ and ChemiDoc XRS™ imaging systems performs fully automated image capture and analysis. With Image Lab software, instruments are calibrated at installation to produce quality, in-focus images automatically. Furthermore, user defined protocols can be created to automate image capture and analysis with a single click of the mouse, resulting in increased reproducibility from gel to gel, experiment to experiment. "Image acquisition and analysis should be simple, fast, and as automated as possible," said Michael Kissner, an Assistant Specialist at the University of California, San Francisco. "We have been truly impressed with the ease of use and seamless automation that Image Lab software offers. Its addition to our gel documentation system has resulted in excellent reliability and reproducibility in image quality." The software uses proprietary "flat fielding" algorithms to improve image uniformity by 95% for experiments using fluorescence and 45% for chemiluminescent applications.

Olympus cell[^]FRAP
for the Xcellence
live cell fluorescence
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Flow Cytometry

Fluorescence is widely used for many applications beyond prototypical microscopic cellular imaging experiments, such as flow cytometry. The **CyFlow[®] Cube** from **Partec** has four different light sources for fluorescence-based flow cytometric experiments. With this compact flow cytometer, researchers can select among nine different excitation wavelengths between 355 and 785 nm. The equipment exhibits the highest fluorescence sensitivity currently available to fluorochrome-labeled monoclonal antibodies used for cell differentiation, e.g. in multi-parameter immunophenotyping. In addition, the CyFlow Cube offers high precision DNA quantification (CV's less than 1%) and a unique particle size detection limit of less than 50 nm. The CyFlow Cube, with optional cell sorter and multi-well plate reader, is designed for a wide range of applications in fields such as immunology, microbiology and agrosiences.

Imaging Under Shear Flow Conditions

Biologically relevant imaging conditions are critical for researchers studying disease states. The **Fluxion Biosciences' High Shear Microplate** mimics pathological vascular conditions through an add-on with adjustable shear flow to its pre-existing BioFlux live cell imaging workstations. "In the presence of cardiovascular disease, where blood vessels can narrow considerably, shear stress is amplified," explained Michael Schwartz, product manager for Fluxion. "Because shear stress levels affect platelet and endothelial cell morphology and receptor expression, creating flow conditions for cellular assays is an important advantage." Using the High Shear Microplate, assays can be performed under the increased flow characteristic of diseased vasculature. Up to 24 simultaneous experiments can be performed at once, simplifying and speeding the process of identifying cellular

changes occurring in disease states. The High Shear plate is compatible with the BioFlux 200 and BioFlux 1000 systems.

Reporters & Antibodies

Researchers can transfect cells with four super-bright luciferases along with GFP using ready-to-go **LentiGlo[™] lentiviruses** from **Targeting Systems**. The luciferases can track multiple promoters in the same group of transfected cells or the same gene in different co-cultured cell types in vitro or in vivo. LentiGlo vectors are particularly useful for non-invasive in vivo imaging applications wherein luciferases are secreted so growth and survival can be quantitated by measuring luciferase activity in blood without killing cells or animals. Using LentiGlo, stem cells and neurons can be stably transfected to express both luciferases and GFP at almost 100% efficiency. The luciferases include Gaussia luciferase, the brightest known luciferase (482 nm); a red-shifted (617 nm) *Luciola* firefly luciferase that is 1000-fold brighter than the native luciferase for clearer imaging of deep seated tissues; a green-emitting (527 nm) *Renilla* luciferase; and *Cypridina* (460 nm) luciferase.

With **R&D Systems** antibodies and **ELISA kits for Target of Rapamycin (TOR)**, researchers can monitor the control of cell growth and proliferation by manipulating the downstream target of the PI 3-kinase/Akt signal transduction pathway. Antibodies to detect TOR expression are included in R&D Systems' new IHC Products and Protocol Guide, a portfolio of more than 2,300 high quality, IHC/ICC-validated antibodies. This technique-specific mini-catalog is designed to provide an introduction to the techniques, protocols, and troubleshooting methods required to conduct a successful immunohistochemistry (IHC) or immunocytochemistry (ICC) experiment.

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– Michael Kissner,
*Assistant Specialist at the University
of California, San Francisco.*

Companies mentioned in product focus:

Bio-Rad Laboratories — www.bio-rad.com

Fluxion Biosciences — www.fluxionbio.com

Leica Microsystems — www.leica-microsystems.com

Olympus - www.olympusamerica.com

Partec — www.partec.com

QImaging — www.qimaging.com

R&D Systems — www.rndsystems.com

Targeting Systems — www.targetingsystems.net

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