

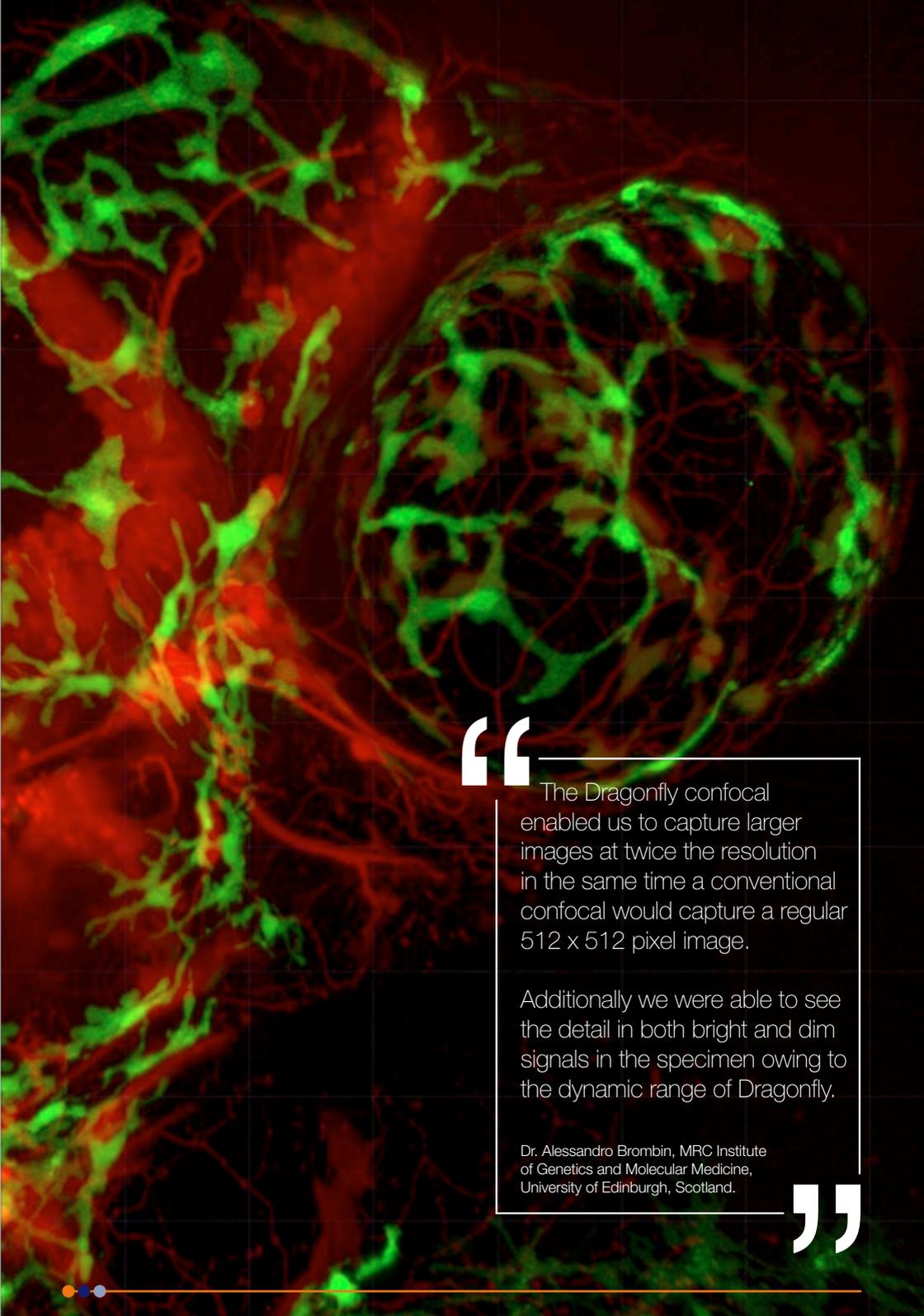
ANDOR
an Oxford Instruments company

Dragonfly

High Speed Confocal Imaging Platform




Dragonfly
200
New series
now for upright
microscopes



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The Dragonfly confocal enabled us to capture larger images at twice the resolution in the same time a conventional confocal would capture a regular 512 x 512 pixel image.

Additionally we were able to see the detail in both bright and dim signals in the specimen owing to the dynamic range of Dragonfly.

Dr. Alessandro Brombin, MRC Institute of Genetics and Molecular Medicine, University of Edinburgh, Scotland.

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Dragonfly - High Speed Confocal Platform

The most flexible imaging solution ever!

The game-changer in confocal microscopy: with the Andor Dragonfly you can image at an unrivaled combination of speed, sensitivity and dynamic range in a range of contrast modes. Dragonfly is the all encompassing tool for fixed and live cell imaging.

As a manufacturer of Dragonfly, laser engines, software, and market leading EMCCD and sCMOS cameras, we offer the best choice for your imaging requirements. Confocal, TIRF, super-resolution and high speed widefield applications all benefit from this unique combination of technology.

What can Dragonfly do for you?

Confocal, TIRF, widefield and super-resolution working seamlessly for your imaging experiment.

Having these four modalities in a single solution allows you to investigate, in great detail, the multi-dimensional structure and/or dynamic physiology of a wide range of samples, from bacteria on biofilm to whole zebrafish.

- As an individual researcher you have the imaging tools to investigate from the whole organism down to a subcellular level, using multiple approaches to address a wide range of questions.
- If you run a core facility, you have a cost-effective way to support multiple imaging techniques.

Multi-Point Confocal

At the heart of the Dragonfly Imaging Platform is a newly designed microlens confocal scanner, tightly integrated with our highest sensitivity cameras and presented via our new imaging software, Fusion. The result is speeds of 10 to 20 times faster than a traditional confocal, leaving you with no more waiting for an image to be built up point-by-point and line-by-line. Dragonfly offers the following major benefits:

- Minimal phototoxicity and photobleaching - ideal for live or delicate specimens.
- High speeds for imaging fast dynamic events, or high throughput.
- Large uniform field of view for larger specimens or montage stitching.

Widefield and TIRF

Confocal is not always the best imaging mode. Widefield provides the option to collect more photons for thin or challenging samples such as yeast or bacteria. Dragonfly's patent-pending TIRF option offers chromatically corrected TIRF illumination for dual-color simultaneous imaging at the same penetration depth or extend imaging further into the specimen with HILO (highly inclined laminated optical sheet) mode.

- Ideal for low signal or single molecule imaging
- Maximize emission bandwidth for high S/N ratio with minimal exposure.
- Match penetration depth of two labelled targets. Ideal for intra or extra-cellular imaging.



Key Applications

- Live and fixed cell imaging
- Developmental biology
- Cancer research
- Organoids
- Neuroscience
- Plant biology
- Membrane trafficking
- Single molecule localization imaging

Super-Resolution

NEW

Dragonfly, together with an Andor camera and Fusion software, enable three super-resolution techniques:

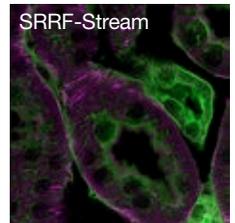
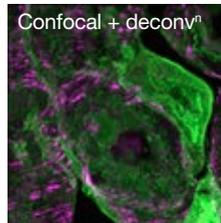
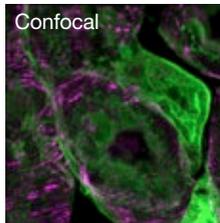
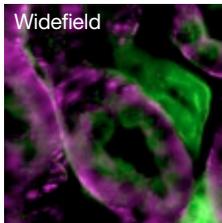
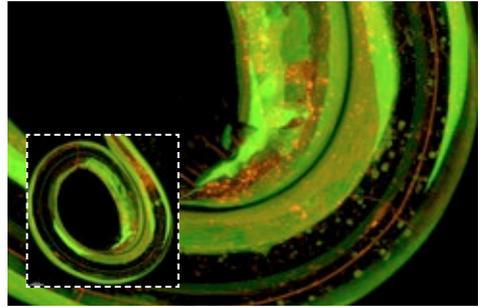
- SRRF-Stream - a camera-based method providing up to six times resolution improvement at live-cell speeds with no special sample preparation.
- GPU-accelerated deconvolution - increase the signal:noise and resolution in all dimensions up to 50x faster than CPU-based methods.
- dSTORM - The Dragonfly 500 series allows optional optics required for this localization technique. Analysis can be performed in most third party software.

Organelles to Organoids to Organisms

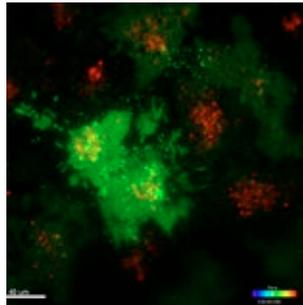
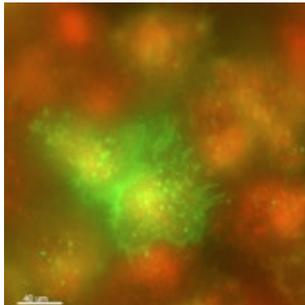
Some specimens and applications require the use of an upright microscope, e.g. cleared tissue, developmental models, electro-physiology, and plant biology. Dragonfly 200 couples to upright microscopes so you don't have to modify your sample preparation.

Image of *C. elegans* stained for muscle (green) and mitochondria (red).

Courtesy of Dr. Laura Mellor and Dr. Alan Whitmarsh, School of Biological Sciences, University of Manchester, UK.

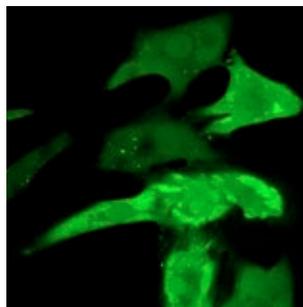
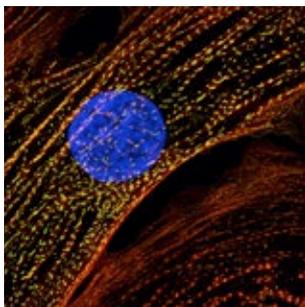


Kidney section showing Alexa Fluor 488 wheat germ agglutinin (green) and Alexa Fluor 568 phalloidin (purple). Widefield (left); confocal; deconvolved; SRRF-Stream (right). Each image is captured with the iXon 888 EMCCD, Dragonfly with 2x zoom lens and a 63x 1.3 NA objective and demonstrates increasing lateral resolution.



HeLa cells expressing GFP fusion protein and labelled with DiI which is retained in the lipid bilayers of the cell membrane. TIRF shows thin optical section and huge enhancement in contrast. Images from same field with Dragonfly – TIRF Penetration ~130 nm.

Courtesy of The Brass Lab, UMASS Medical School, USA.



Left: Confocal image of human ips derived cardiomyocyte stained with dapi, alpha actinin 488 and phalloidin 560.

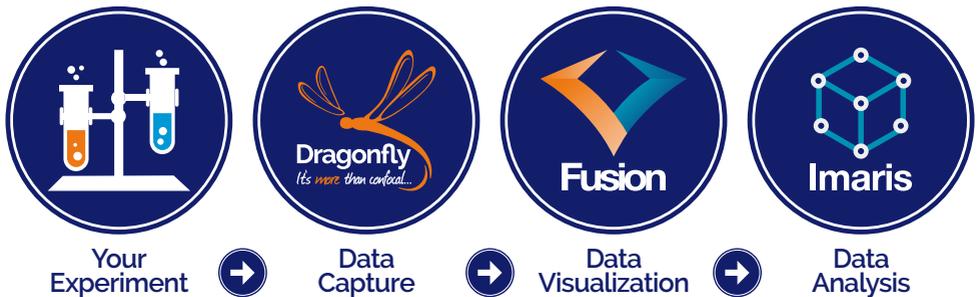
Right: ips derived cardiomyocytes loaded with a calcium sensitive dye. Imaged at 60x magnification with 40 μm pinhole using iXon Ultra 888 (1024 x 1024) capturing at 25 fps.

Both courtesy of Dr. Travis Hinton, The Pat and Jim Calhoun Cardiology Center, University of Connecticut Health Center and The Jackson Laboratory for Genomic Medicine.

Introducing Dragonfly - The high

Simplified Experimental Workflow

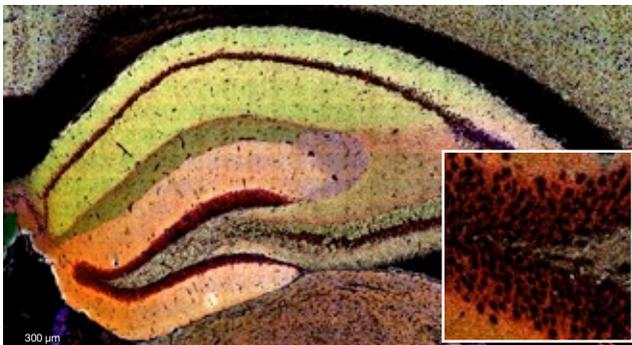
Hypothesis testing is a fundamental part of the scientific method. The Dragonfly workflow is designed for efficiency through instant visual feedback, providing early reassurance on protocol settings, time-saving parallel processing such as deconvolution, and saving in the Imaris file format for one click transfer to comprehensive multi-dimensional image analysis.



Borealis - Perfect Illumination Delivery™ Solution

Key to optimal optical performance in confocal and widefield modalities is our patented Borealis Perfect Illumination Delivery™ solution. Borealis is comprised of several optical elements including the use of multimode fibers, illumination matching to the sensor shape, optimally filling the microlenses in the confocal disk and maintaining telecentricity to the microscope.

The benefits of Borealis are: three times more light to the sample so lower laser powers can be used, higher contrast imaging for better image quality, high cross-field uniformity for seamless image tiling and more accurate cross-field analysis, improved axial geometry, extended imaging range into the NIR for broader fluorophore choice and avoiding autofluorescence.



A demonstration of the cross-field uniformity Borealis illumination confers. This image of synaptome mapping in the hippocampus is comprised of 364 fields captured using a 100x objective, four wavelengths for each tile. Courtesy of Drs. Fei Zhu and Melissa Cizeron, Grant Laboratory, Centre for Clinical Brain Sciences, University of Edinburgh.

speed confocal imaging platform

Features

Large field of view

High-speed multi-point confocal

2 pinhole diameters (25 μm and 40 μm)

Simultaneous dual color TIRF

Laser-illuminated widefield mode

16-bit dynamic range

Zoom illumination optics
Camera Zoom optics (1x, 1.5x, 2x)

Astigmatic lens

Benefits

Capture more in a single image.

Capture up to 400 fps in confocal mode for fast specimen dynamics. Up to 20x faster than conventional confocal for greater productivity.

High contrast imaging for large samples to subcellular imaging.

Matched penetration depth for two simultaneous wavelengths. More accurate co-localization analysis.

Conventional fluorescence imaging modality, offering high power for single molecule localization.

Ability to capture weak and bright signals in one shot.

Higher illumination power density for some applications.

Highest resolution image capture.

For single molecule localization imaging in a volume.



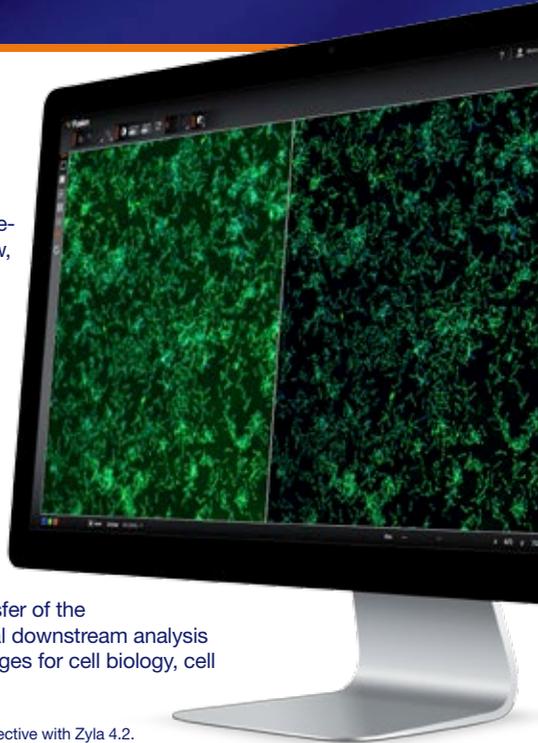
Acquire | Visualize | Analyze

Fusion is a brand new software solution designed to meet the requirements of today's expectations for ease-of-use and immediate visual feedback with data review, whilst fulfilling tomorrow's aspirations for handling multi-modal imaging.

Fusion simplifies the control of the Dragonfly system, with its multiple imaging modes, to both fluorophore and imaging mode selection in very few mouse clicks. Once the sample is on the microscope you can control all hardware, including the x,y stage, with its unique software joystick. Real-time 3D visualization provides a powerful insight to your experiment, and GPU accelerated deconvolution delivers enhanced clarity when required.

Saving files in Imaris format, Fusion permits easy transfer of the data into Imaris software for detailed multi-dimensional downstream analysis including solid surface rendering, measurement packages for cell biology, cell lineage, neuroscience and much more.

* Bacteria on biofilm. Confocal image (left) captured at 40x (0.75 NA) objective with Zyla 4.2. Deconvolved image on right. Dr. Nigel Ternan and Dr. Barry O'Hagan, University of Ulster, UK.



Real-Time Rendering

Real-time rendering within Fusion allows for an on-going verification of the quality of experiment and status of your sample.

Having instantaneous feedback on your data set in multiple dimensions is critical for establishing the correct hardware settings and subsequent progress of your experiment. Fusion gives you access to various ways of displaying your image, enabling efficient setup up of z-volumes, balancing laser and camera settings across different channels and real-time data review with unique 3D rendering.

Deconvolution

Deconvolution is an invaluable tool for bringing clarity to those subtle details of your 3D data set that might otherwise pass unnoticed. This is especially useful for widefield images, but can even benefit the best quality confocal stack.

Fusion employs ClearView™, a GPU accelerated, user-friendly, deconvolution tool for up to 50 times faster processing. The speed benefit means you can run deconvolution whilst an image capture protocol is running, so avoiding post-capture processing time.

Visualize Complex Data

Imaris allows you to compare and contrast experimental groups by visualizing your image data in five dimensions as uni- or multi-variate scatterplots. Along with the use of box + whisker plots, ImarisVantage will help you interpret intrinsically complex and dynamic phenomena.

Vantage enables researchers to dissect their multi-dimensional, multi-object images by creating a series of fully customizable plots for better understanding of hidden relationships and associations between calculated measurements, objects or groups of objects.

Customer Support

Andor products are regularly used in critical applications and we can provide a variety of customer support services to maximize the return on your investment and ensure that your product continues to operate at its optimum performance.

Andor has customer support teams located across North America, Asia and Europe, allowing us to provide local technical assistance and advice. Requests for support can be made at any time by contacting our technical support team at andor.com/support.

Andor offers a variety of support under the following format:

- On-site product specialists can assist you with the installation and commissioning of your chosen product
- Training services can be provided on-site or remotely via the Internet
- A testing service to confirm the integrity and optimize the performance of existing equipment in the field is also available on request.

A range of extended warranty packages are available for Andor products giving you the flexibility to choose one appropriate for your needs. These warranties allow you to obtain additional levels of service and include both on-site and remote support options, and may be purchased on a multi-year basis allowing users to fix their support costs over the operating life cycle of the products.



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