The most beautiful data are in your images.

HoKaWo will acquire them …

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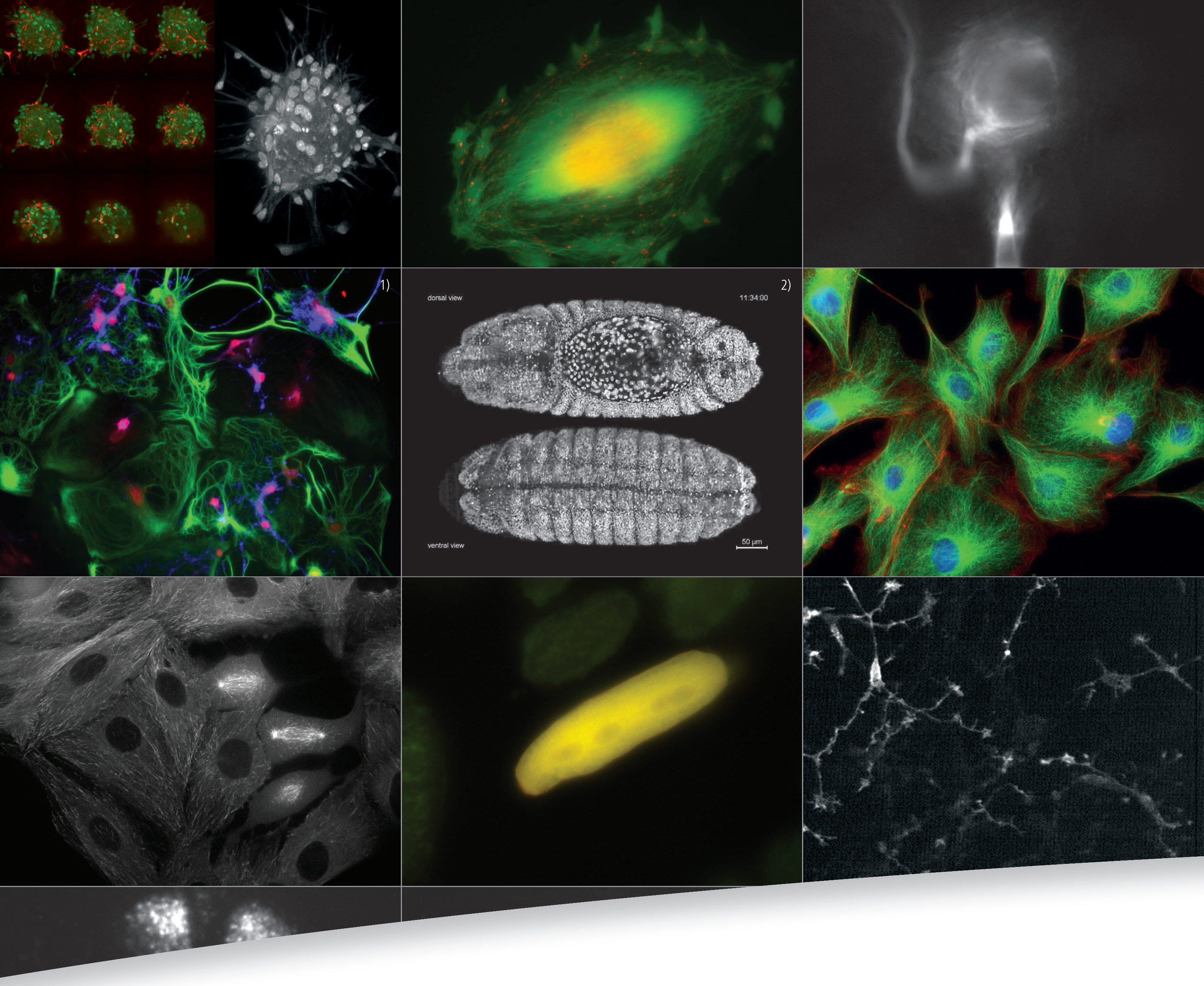

HoKaWo Software, U9304

It truly is a wonderful coincidence that it is possible to have meaningful scientific information embedded within images that we can appreciate as beautiful on a purely aesthetic level.

The art of creating these data-rich images is not simple and requires a unique fusion of biology, physics and engineering. This is why achieving maximum camera performance, whilst simultaneously ensuring quantitative data integrity, is paramount at Hamamatsu. And, the fact is, we enjoy the beauty of the images too.

An important part when creating such pictures is the camera used for the experiment. But without intuitive and powerful software, even the best camera is just an imaging device.

Sources:
1) Courtesy of Qi Zhang, Ph.D., Vanderbilt University, http://www.mc.vanderbilt.edu/labs/nano-neurosci/
2) Courtesy of Dr. Philipp J. Keller, Howard Hughes Medical Institute, Janelia Farm Research Campus, Ashburn, A 20147, USA

Challenges by Camera Technology

Recently the new sCMOS cameras have revolutionized scientific imaging through their outstanding features. High speed readout coupled with a large field of view and a virtually noiseless imaging sensor even at the highest frame rates make them versatile, high end cameras suitable for many applications. Yet a large number of pixels coupled with high frame rates put new demands to computer hardware and software features, for example the ORCA-Flash4.0 images 4,194,304 pixels (alternatively could say approximately 4 million) with 16 bit data depth, giving a single image of 8.39 MB. To monitor events in such a sample with up to 100 fps and full resolution poses an insurmountable problem to the average PC.

Furthermore digital cameras are often delivered as components of complex imaging systems. Powerful software packages control these systems. This complexity makes it sometimes difficult for the user to achieve the cameras full performance – or even to check if it is reachable. For this purpose he needs a reliable software package is needed, providing easy setup and a self-explanatory user interface – so as to realist the maximum camera performance. HoKaWo meets these requirements, but also extends its use towards automation and multi-camera applications.

What makes HoKaWo your choice:

- Up to 3 cameras can be controlled in parallel
- On-line image processing without speed reduction
- Handling of large/high volume image sequences (e.g. for super-resolution or light sheet microscopy)
- Fast streaming with full camera speed to RAM or hard disk – even for sCMOS cameras
- Programmable time-lapse recording
- Good lab practice (Template based creation of metadata-document about the acquired images, required by GLP).
- ONE software for all Hamamatsu DCAM cameras

The DCAM-API (Digital Camera Application Programming Interface) is designed to standardize control and functionality of all Hamamatsu digital cameras.

For further information please check: www.dcamapi.com

HoKaWo Setup Launcher

DCAM

Modules and Drivers

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- Easy-going
- User friendly installation
- Self-explanatory user interface
- Native 64 bit version (32 bit version still available)
- Comes with every purchased Hamamatsu camera

Features

- 100 % camera performance
- Focus mode for image preview with high frame rate
- Sub-array and Binning
- Sub-array setting in the display window
- External trigger modes
- Automatic or manual exposure time control

Acquisition

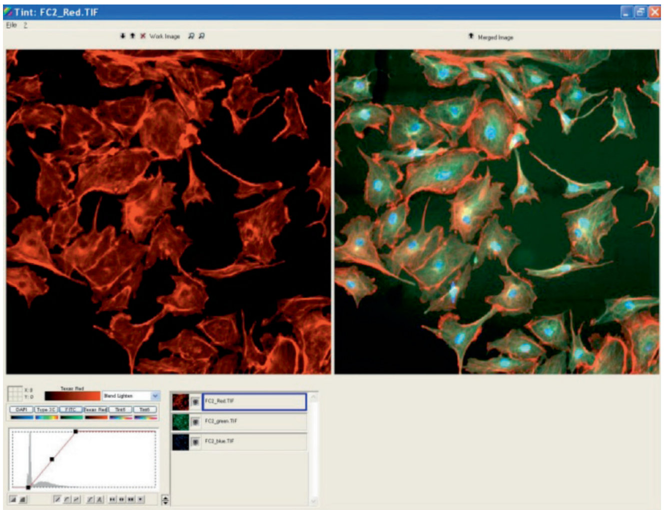
- Acquisition of a single image, sequence or movie

Image Processing

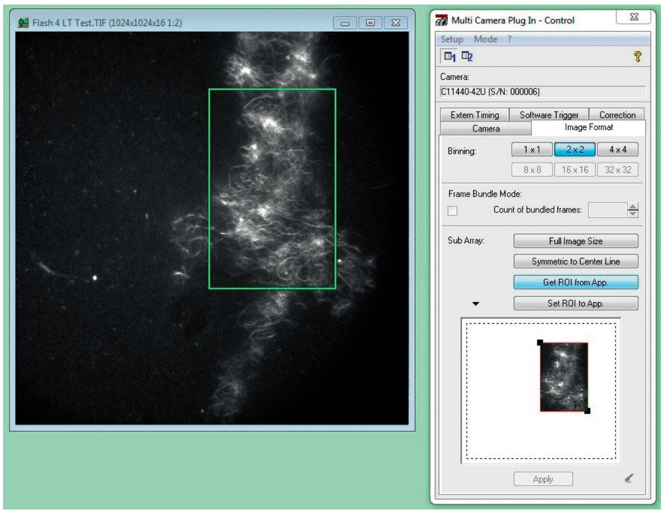
- Online processing (e.g. background subtraction, rolling average,…) at maximum speed
- Offline image processing
- Manual and automatic contrast enhancement
- Filters for image processing
- Mathematical operations

Analysis

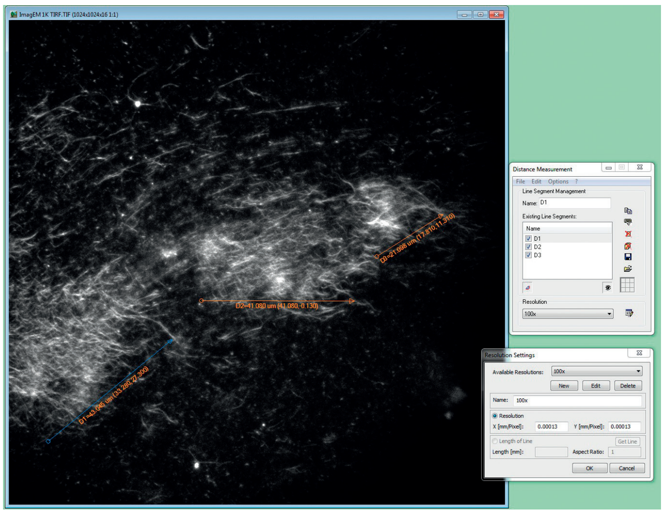
- Support of Multi-Page TIFF and BigTIFF file formats
- Distance measurement Plug-In
- Smart image overlay functions including registration correction
- Intensity scale bar
- ROIs, background subtraction etc.
- Point, line and area intensity analysis
- Data export to Excel
- LUT for 16 bit
- Visual feedback between intensity profile graph, line or ROI display in the image and the respective entry in the list of lines/ROIs
- Intensity histogram analysis functions including the possibility to calculate the readout noise of ORCA-Flash4.0 series in electrons.



Tint and blend with preview filter



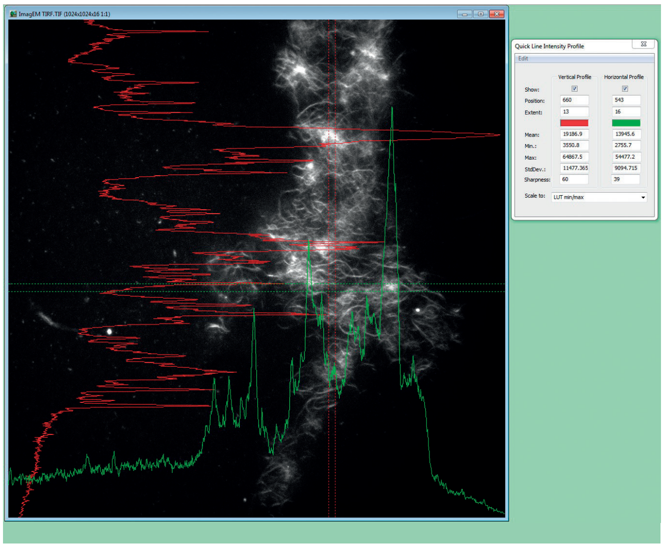
Subarray setting



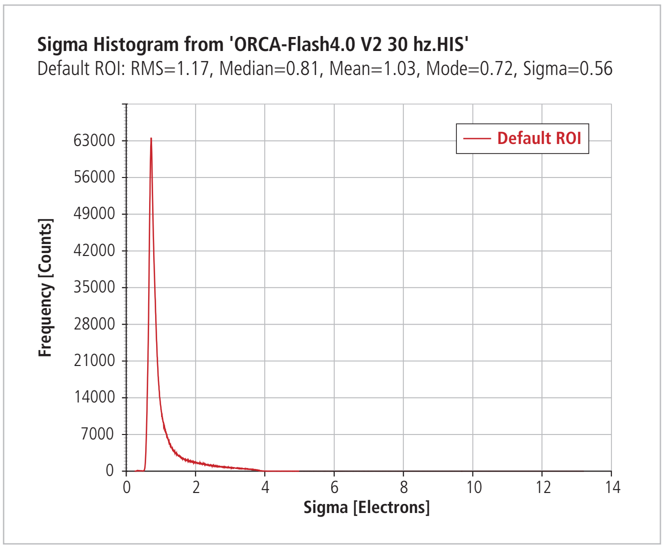
Distance measurements

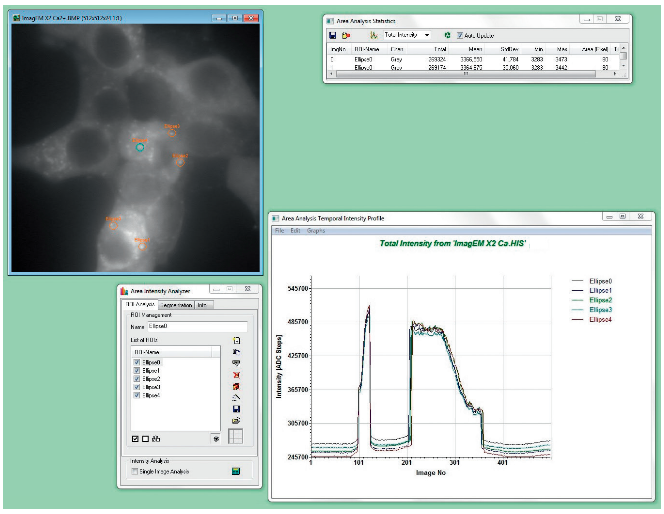
Example for analysis

- Calculation of ORCA-Flash4.0 V2 readout noise



Quick line profile





Area analysis tool

Control of external devices

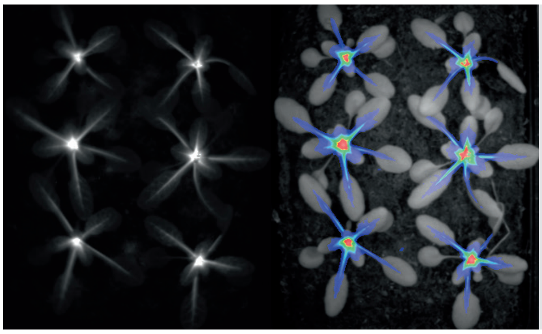
- Via RS232 interface
- Via I/O interface

Correction functions

- Pixel correction
  - For hot pixel
  - For defective pixel
- Tint and scale filter

Applications

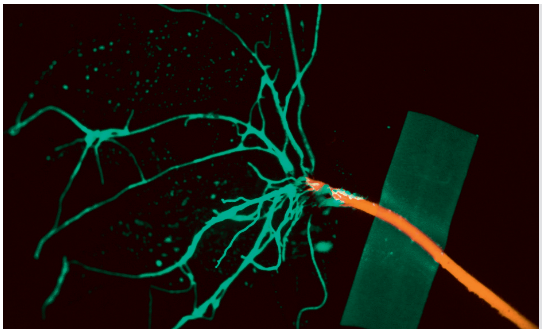
Example for luminescence optical imaging:
Transgenic Arabidopsis plants expressing Firefly luciferase are placed under the control of a 100 bp promoter element of the CATALASE 3 gene. The LUC signal is emitted mostly from the main vasculature of the leaves, with a signal of lower intensity coming from the remaining leaf tissue.



Images were acquired with an ORCAII camera.

Courtesy of Dr. Patrice Salome, Department Molecular Biology, Max Planck Institute for Developmental Biology, Tubingen, Germany.

Example for fluorescence optical imaging:
Bacteria that are immobilized on roots of a tomato plant. The bacteria are stained with a fluorescent green marker. Auto-fluorescence of the plant cells is tinted red.



Images were acquired with an ImagEM camera.

Courtesy of Dr. Massimiliano Cardinale and Prof. Gabriele Berg, Institute for Environmental Biotechnology, TU Graz, Austria

Example for multi-color imaging:
Rat retina triple labeled with GFAP-Cy3 / S-100-FITC / DAPI.

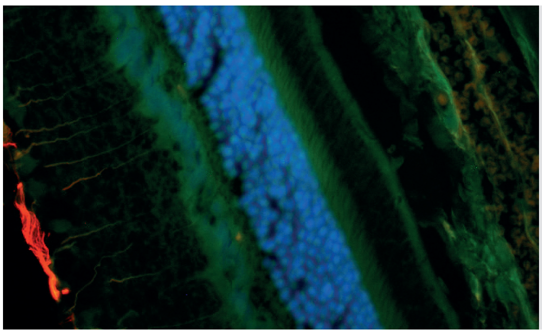


Image was acquired with an ORCA-3CCD color camera.

Courtesy of Ward Peterson Inspire Pharmaceuticals, Durham, NC.

- Gene Expression
- Live streaming (full speed at full resolution)
- Fluorescence imaging
- Luminescence imaging
- Dual View imaging with a W-Viewer

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