OLYMPUS

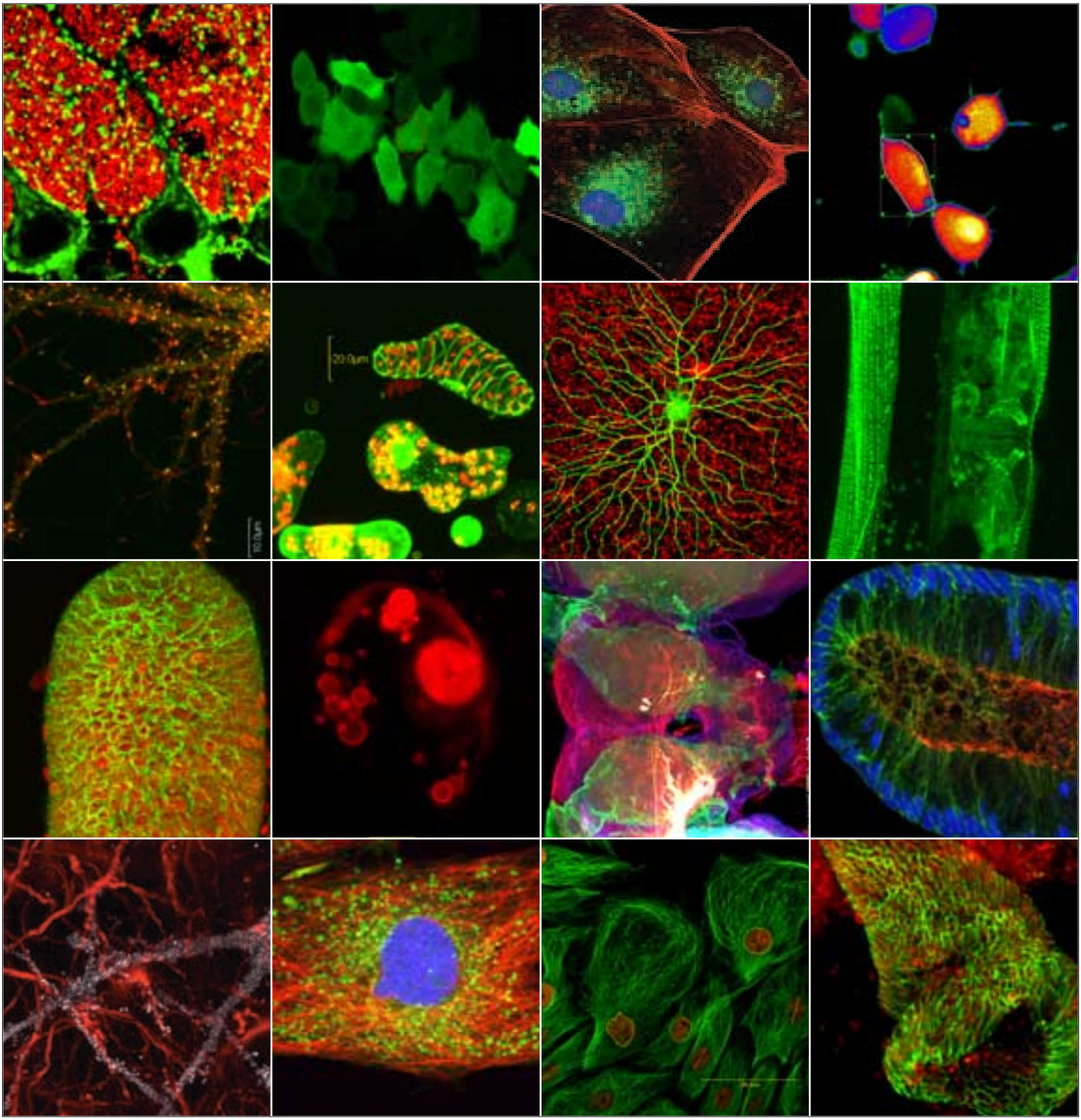
CONFOCAL LASER SCANNING BIOLOGICAL MICROSCOPES

# FLUOVIEW

**FV300/FV500**

## *CONFOCAL SCANNING IMAGES*

UIS
UNIVERSAL
INFINITY SYSTEM



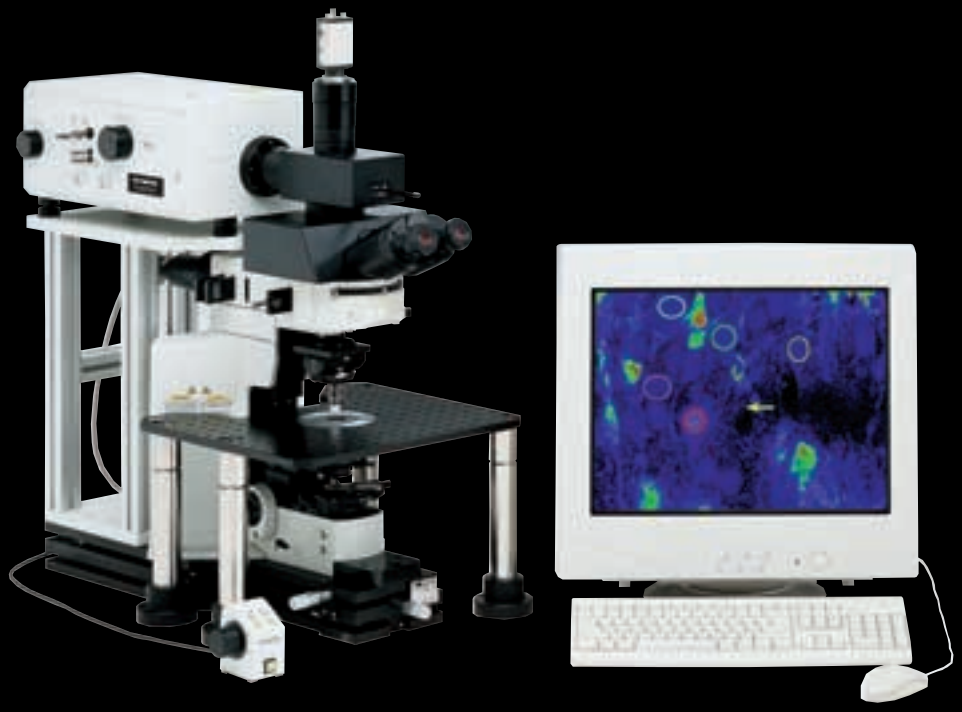
# *The Olympus FLUOVIEW Series — Giving both individual and group users the right solution to match their research needs and budget.*

*The Fluoview FV300/FV500 offers a choice of two systems to meet the needs of an individual researcher or a number of researchers with a variety of differentapplications.*
*Both systems are compatible with the Olympus research range of microscopes offering high resolution confocal sectioning with the ability to conduct time-lapse experiments.*
*The Fluoview FV300/FV500 Series offers a wider number of options with the ability to upgrade the systems for the future.*

## FV300

*2nd generation of personal system offering the highest specification at an affordable price*

- Highest image quality (12 bit, 2048x2048 pixel resolution) with economical cost
- Simultaneous capturing of 2 fluorescence and 1 transmitted light detector images
- Durable for the most demanding task with simple and efficient optical system



FV300+BX61WI+XY mover system:
(BX61WI: fixed stage upright microscope)
Ideal for physiological experiments, offering small enough to be placed in space on both sides

# FV500 *Fully automatic system to meet a wide range of needs*

Complies with wide range of laser light sources from UV to near infrared lasers

Up to 5 detectors (4 fluorescence and 1 transmitted light) available for simultaneous acquisition

Fully motorized compact system when combined with BX61 or IX81

Equipped with 3 laser port systems

FV500+IX81 back port system:
(IX81: motorized system inverted mircroscope)
Allowing the scanner to be placed at the back of the inverted microscope, with ample room on both sides

# Scanning Units

*Superior expandability to accommodate future applications.*

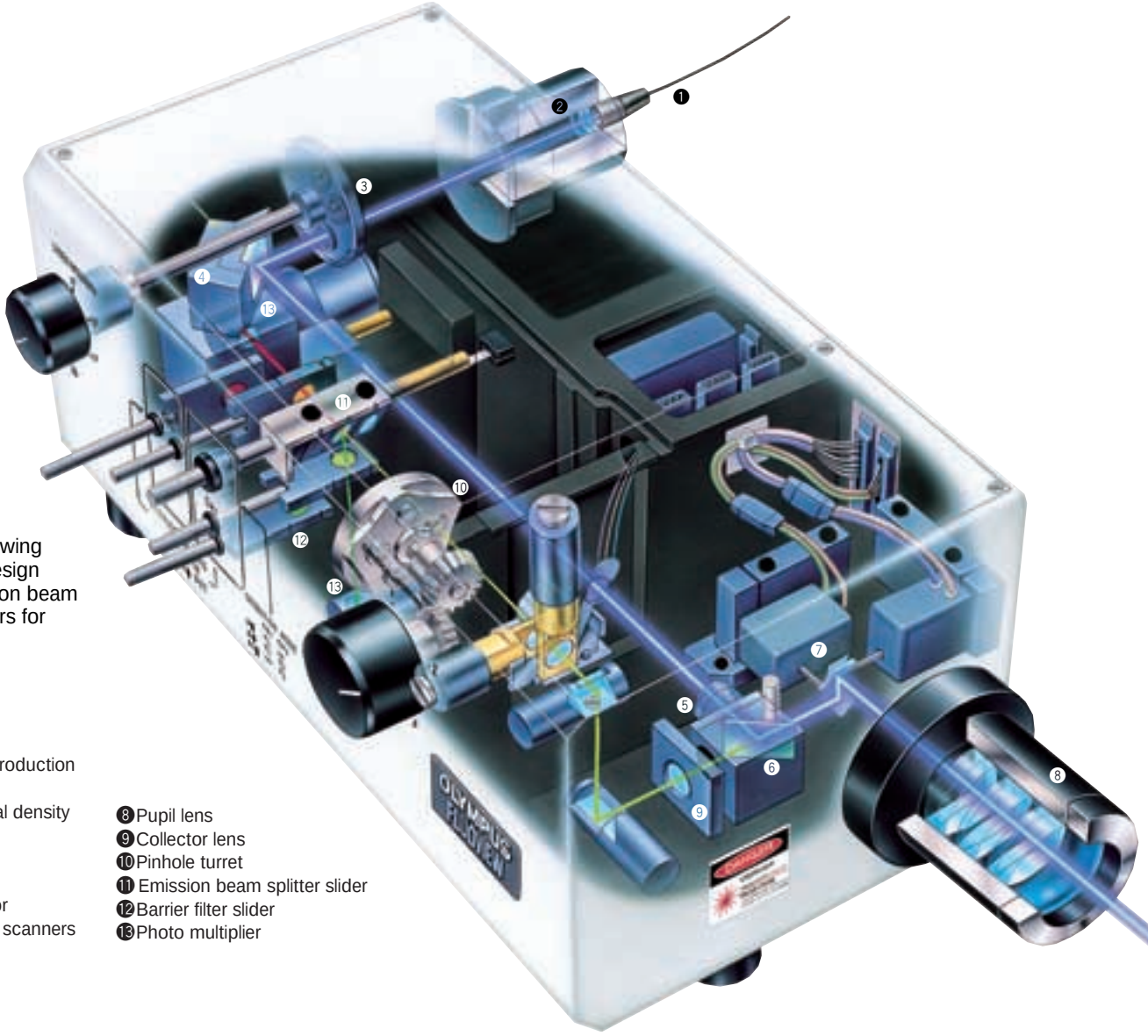
FV300

**Manual operating scanning unit**

The scanning unit combines maximum optical efficiency with easy, one-touch selection of pinholes and filters.
The system corrects aberrations from visible to near-infrared wavelengths, allowing aberration-free imaging for a wide range of applications.

**Superior flexibility**

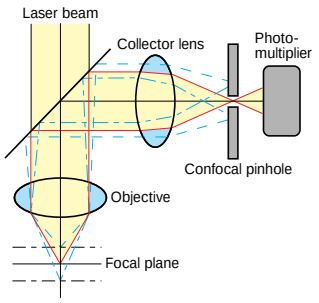
Empty filter holders are optionally available, allowing operators to custom design dichroic mirrors, emission beam splitters and barrier filters for specific applications.



## FV300

❶Optical fiber for laser introduction
❷Beam collimator
❸Laser adjustment neutral density filter turret
❹Dichroic mirror
❺Polarizer
❻Excitation dichroic mirror
❼XY galvanometer mirror scanners
❽Pupil lens
❾Collector lens
❿Pinhole turret
⓫Emission beam splitter slider
⓬Barrier filter slider
⓭Photo multiplier

**Features of confocal optics**
- Deliver flare-free, high-contrast images.
- Allow optical sectioning of a specimen with satisfactory vertical resolution (along optical axis).
- Horizontal resolution (perpendicular to the optical axis) is increased to a much higher level than conventional optical microscopes.

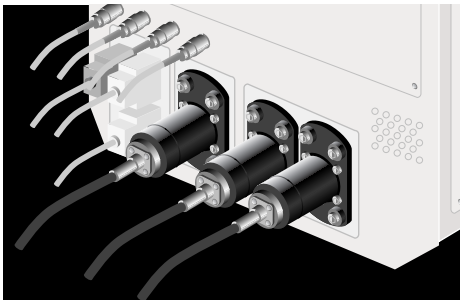



| FV300 | FV500 |
|---|---|
| Up to 3 Channels | Up to 5 Channels |
| Visible Light Lasers — (IR Laser) | UV — Visible Light — IR Lasers |
| 1 Laser Port | 3 Laser Ports |
| Manual Operating Scanning Unit | Fully Automated Scanning Unit |
| 5 Position Single Pinhole Turret | Individual Continuously Adjustable Pinholes |
| Automatic Laser Control (AOTF or ND) / Laser Combiner | |
| Power Supply / Control Unit — PC system | |
| Intuitive User Friendly Software | |
| Wide Range of Microscopes | |

FV500

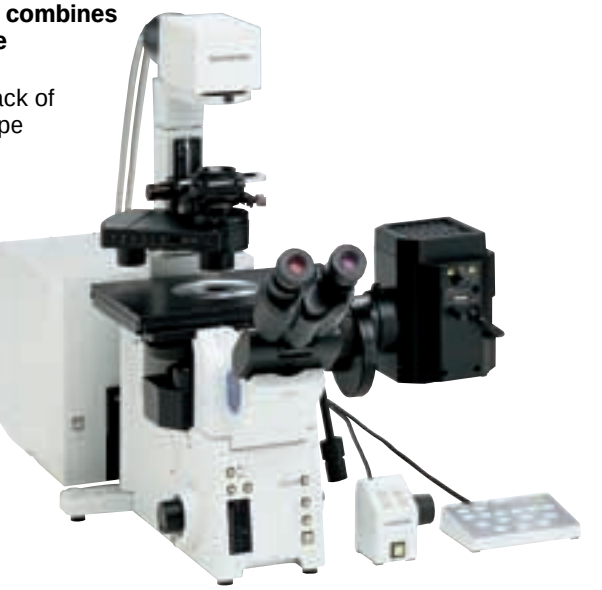
### 3 laser ports / up to 6 lasers

Equipped with 3 fiber optic ports for UV, visible light (up to 4 lasers) and near infrared light lasers, the FV500 provides the variety of laser light sources necessary for imaging the latest generation of fluorescence indicators and fluorescent probes.



### FV500-IX81 back port system combines compact design with versatile performance

Positioning the scanner at the back of the motorized inverted microscope ensures plenty of working space on both sides of the microscope. Connection to the bottom and right-side ports makes it possible to use up to three video devices in addition to the scanner.



### Independent pinholes for each channel

Since the depth of confocal images depends on the fluorescent wavelength and the pinhole diameter, the FV500 employs an independent pinhole for each channel, ensuring the best possible confocal resolution of each fluorochrome.

### Simultaneous 5-channel image acquisition

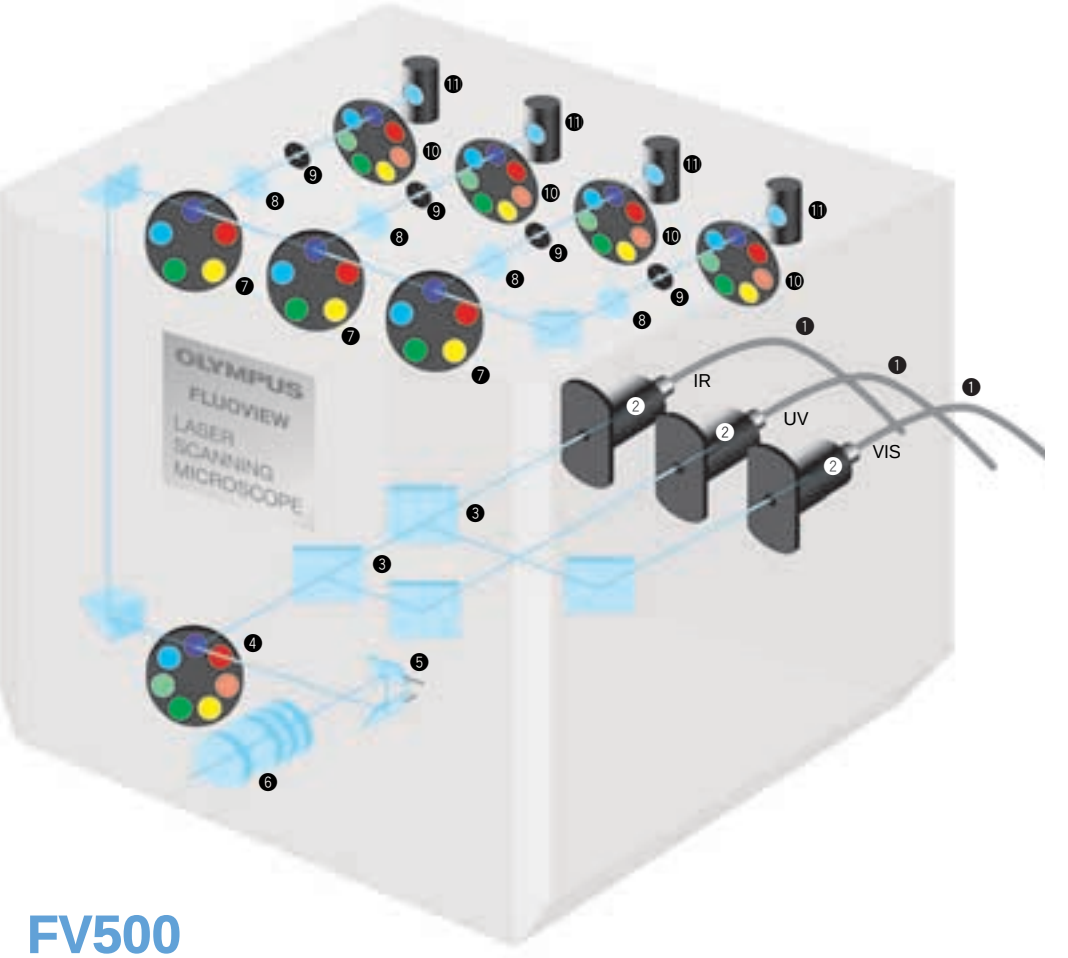
With up to 4 PMT detection channels for confocal fluorescence, plus a separate external PMT for transmitted light detection, the FV500 can record images with up to 5 channels simultaneously.

### Flexibility with dichroic mirrors and barrier filters

Olympus' unique design of barrier filters and dichroic mirrors for excitation and emission beam splitting allows easy exchange to adapt for specific needs of new applications.

### Shockless method

The FV500 scanner and special microscope tube feature a shockless operating method. For even greater effectiveness, they can be combined with the unique fixed stage & nosepiece focusing microscope BX61WI.




## FV500

❶Optical fiber for laser introduction
❷Beam collimator
❸Dichroic mirror
❹Excitation dichroic mirror turret
❺XY galvanometer mirror scanners
❻Pupil lens
❼Emission beam splitter turret
❽Collector lens
❾Adjustable Pinhole
❿Barrier filter turret
⓫Photo multiplier

# *Software Graphical User Interface*

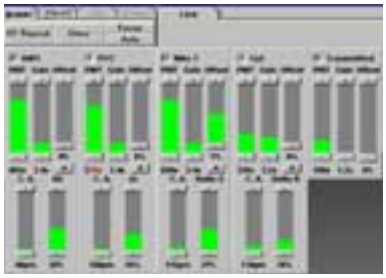
*Ultimate ease of operation and monitor display.*
*The FV500 enables fully automatic image acquisition.*

**Tab-style monitor display**

One-touch tab menu selection makes it easy to handle a multiple range of functions. Multiple images may be displayed and processed by simple, one-touch operations.

**On-line photo detector adjustment**

PMT voltage, gain and offset of each individual channel can be adjusted by easy slider operation while monitoring the on-screen image.

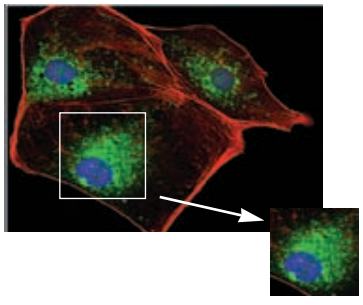


**Scan area:**
**Graphic display, Pan and Zoom**

The observation field and scanning area are both displayed graphically. Zoom magnifications can be increased in 0.5X increments up to 10X. The "pan" function allows the scan area to be moved within the field of view.


**Clip scanning and image cropping**

A clip scan function allows selection of a sub-region of the field of view for faster image acquisition and efficient reduction of the total amount of image data. Applying the image cropping function, selected areas can be cut out of complex image stacks and saved for further detailed analysis.



**Dye selection display**

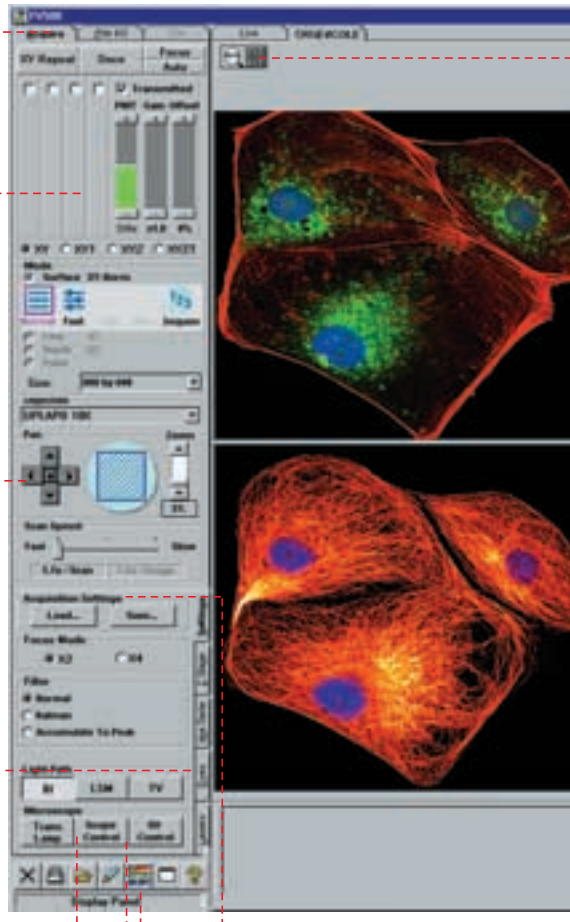
When a fluorescence dye is chosen, the laser and light path settings are done automatically, with each of the selected fluorescence dyes displayed graphically on the monitor.


**Automatic operation of laser excitation and emission filters**

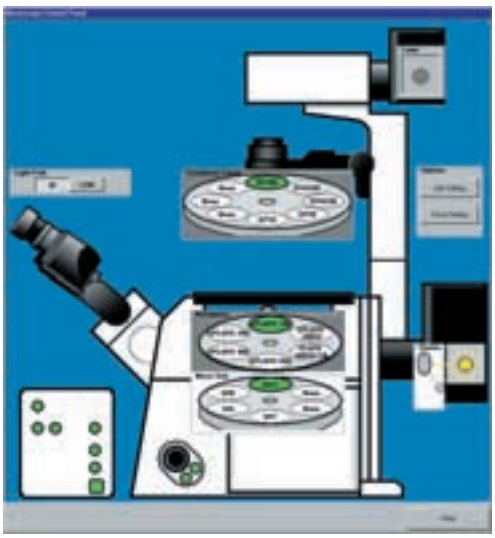
Just choose the appropriate fluorescent dyes and the system will set up suitable filters and dichroic mirrors automatically (FV500). Automated microscopes such as IX81 and BX61 are also controlled by the same software. This automated features allow researchers to concentrate to their work.

**Registering operating conditions for individual researchers**

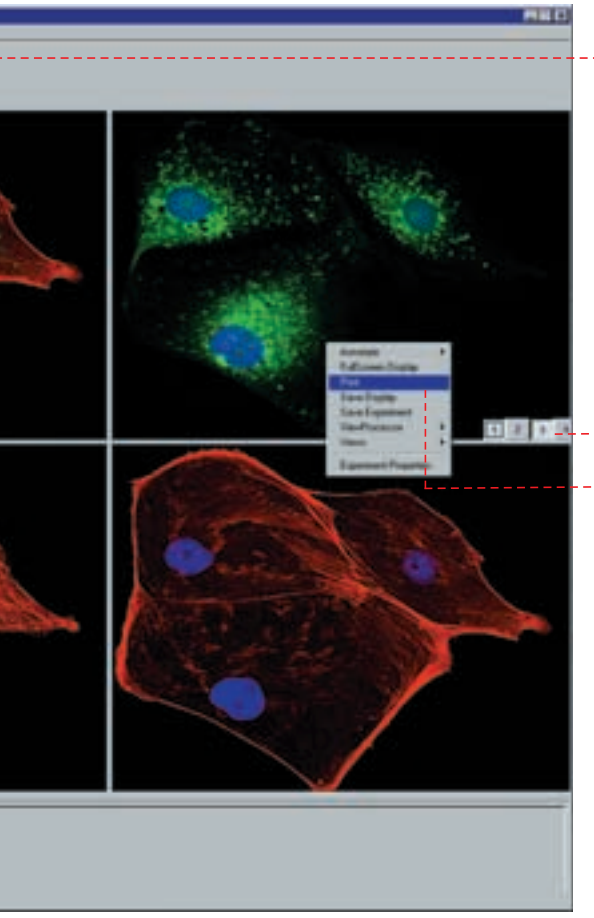
FV500's superior interface not only guarantees easy operation for beginners but also satisfies experienced researchers by its precise manual settings. In addition, each individual researcher's settings can be separately recorded and retrieved instantly — a real convenience when several researchers are using the same laser scanning microscope.



**Microscope set-up monitor display**



FV500



### Image tool bar

X-Y-Z scanning operations and time-lapse observations both produce multiple images, which can be displayed in sequence simply by clicking the sequential mode button. Channel selection and image zooming are also available on the same menu.

### Versatile monitor display

Simple performance of useful functions such as multi-channel image overlay and channel selection options.

### Pop-up menu simplicity

To access frequently used commands, the right mouse click is used.

### Help function

Online help allows the user to refer to individual functions and procedures while operating the applications. Supports are easy to see and understand — for instance, a light path exchange lever indicated by a flashing red light when setting up the microscope.

### Tiling display of multiple images

Observation of a specimen over an extended period of time and sectional imaging result in several separate images. The tiling function provides versatile viewing options including simultaneous multiple or multi-channel image display.

### Macro commands

A series of software commands may be stored as a macro command file so that a particular imaging sequence or analysis may be easily replicated.

### Short-cut key

Scan mode selection and other basic operations can be performed by pressing simple key combinations on the keyboard.

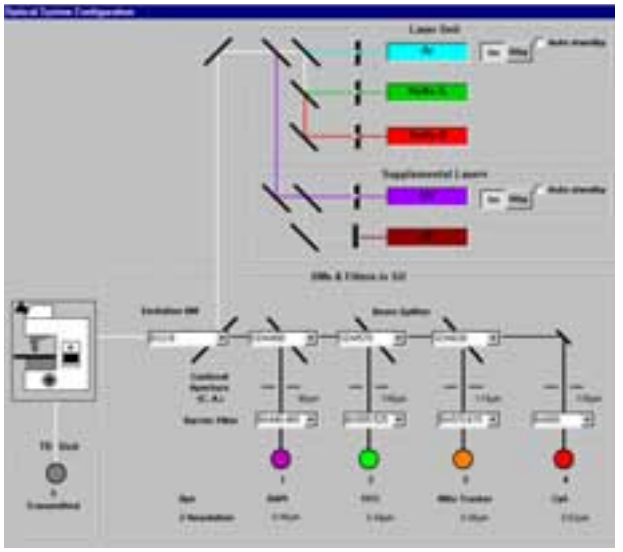
### Preset the conditions for image acquisition and loading

Preset storage and setting on a file of all the relevant image acquisition conditions enables immediate, one-touch recall. Adding new conditions or altering existing ones is quick and easy.

### Toolbar access to frequently-used functions

The most frequently used functions can be accessed via buttons on the horizontal toolbar located at the bottom left of the screen.
Icons simplify function identification: e.g. a color bar for pseudo-color processing through LUT editing, and a pencil for inserting comments on measurements and images.

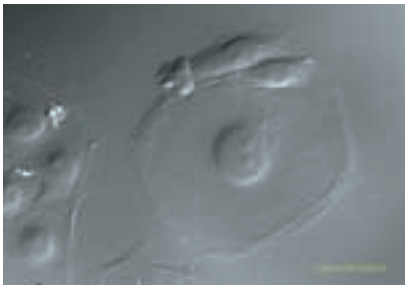
### Scanning unit set-up monitor display



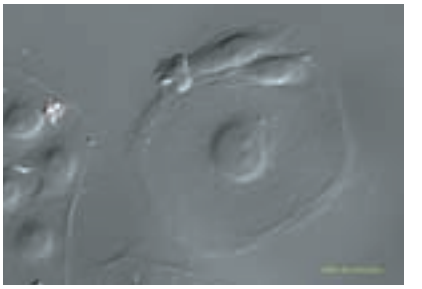
FV500

### Software compensation filter for DIC background

The unevenness of DIC images can be compensated with a single click without any reference image. This function maintains every detail of the image.



Before compensation



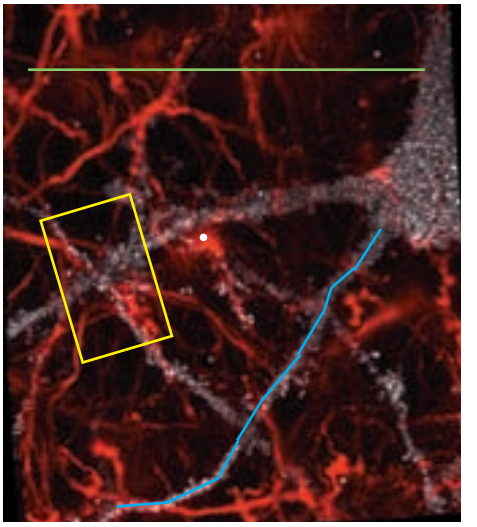
After compensation

# Scanning

*Innovative scanning method for improved performance.*

**Olympus efficient scanning modes**

Point, line, free line and rectangle scanning modes make the FV300/FV500 especially suitable for many time-lapse applications.

Brain slice: Golgi stain (white/black) reflection image, GFAP (Red)
Alexa 594
*Matt Blurton-Jones, Prof. Mark Tuszynski's Laboratory, University of California, San Diego*


X Line


Y Line


SlantLine

**Line scanning**
A single line may be scanned, oriented at any angle in the XY plane. This fast scanning option permits accurate quantitation of physiological events such as Calcium waves or sparks.


Rect

**Rectangle scanning**
The scanned rectangular area can be rotated in the XY plane, enabling efficient sampling of the specimen.


Spot

**Point scanning**
The ultimate in fast scanning, the point scan enables accurate quantitation intensity changes during rapid physiological events.


FreeLine

**Free line scanning**
Intensity changes may be measured over a given period of time along the length of a freely drawn line, such as the trace of an axon or along a cellular junction.

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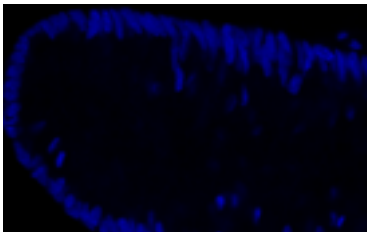
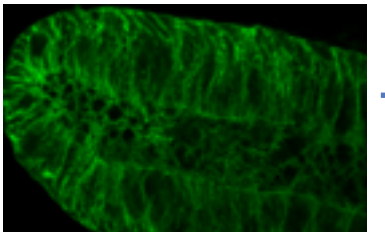
## *Sequential scanning to prevent cross talk*

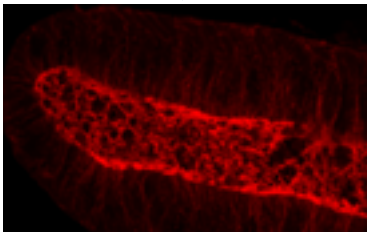
Sequential scanning is the technique to minimize the cross talk of the multi coloured samples between channels, by exciting each dye at a time.

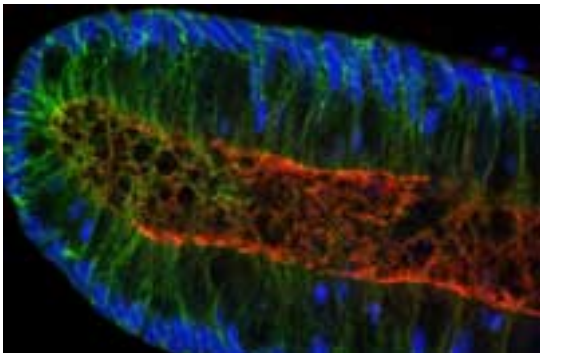
The AOTF function (see page 11) enables line sequential scanning as well.

* Setting before scanning: steps ❶-❹ can be performed by just one mouse click


❶ Excited by only HeNe633


❷ Excited by only Kr568

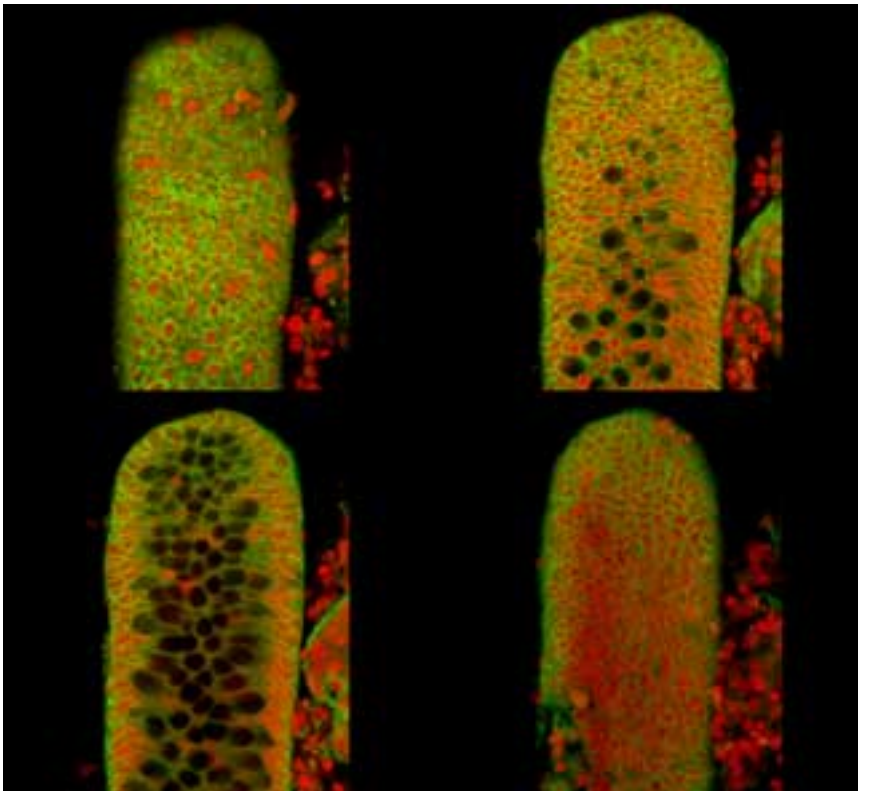

❸ Excited by only Ar488


❹ Composition

Human colon crypt
Nuclei (Blue) TO-PRO-3
Actin (Green) Alexa 488
APC gene product (Red) Alexa 568
*Christine Anderson,*
*Laboratory of Prof. Ray White,*
*Hunstsman Cancer Institute, Utah*

# 3D Imaging

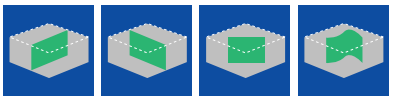
*Using multiple 3D images to obtain accurate 3D Structure analysis.*



X-Y-Z

X-Y-Z
(Tile display)

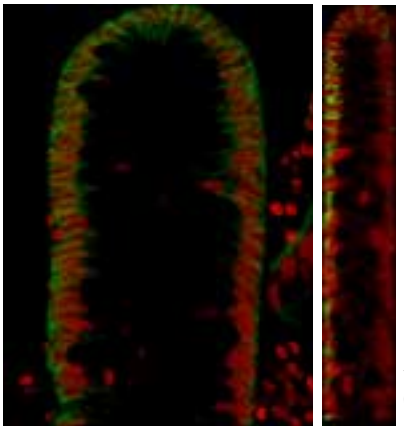
X-Y X-Y-Z Recto-Z



X -Z Y -Z SlantLine-Z FreeLine-Z

**Easy Z axis operation and setting**

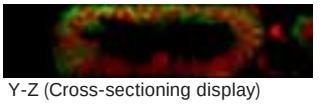
The upper and lower limit of Z scanning can be specified interactively by actually scanning the sample or by direct input of the numerical value.

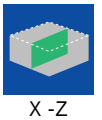


Y -Z

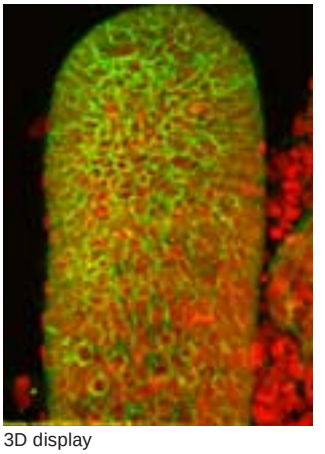
Y-Z
(Cross-sectioning
display)



Y-Z (Cross-sectioning display)



X -Z



3D display

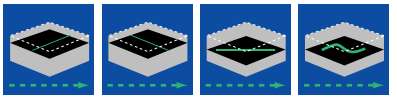
**Acquiring X-Y-Z and display X-Y cross sectional images quickly and continuously in increments of 0.01*µm**

Thank to the precision driving mechanism that enables 0.01µm step control, with motorized microscopes BX61, BX61WI and IX81, high quality continuous cross sectional images can be acquired. 3D function also provides extended focusing image, stereo view and 3D animation to explore the structure of the sample.

* 0.025µm is the smallest increment for other microscope combinations.

# Time Course

*Using different scanning modes to chart time-lapse changes efficiently*



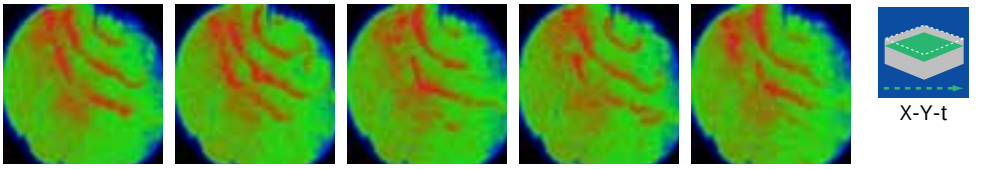



**High-speed (4 frames/sec) image acquisition**

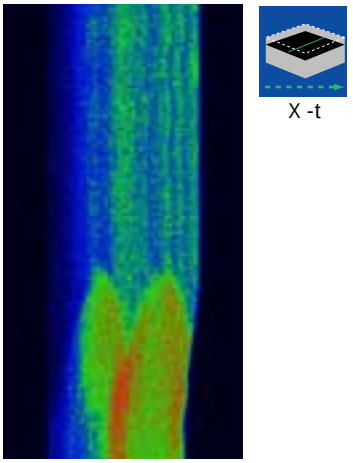
For the high speed observation of the sample, Fluoview is capable of scanning 4 frames per second in a fast scanning mode at an image size of 512X512. By limiting the image size, the frame rate will be even faster. This scanning mode is suitable for living cell observation.

**Versatile line scanning modes has many uses**

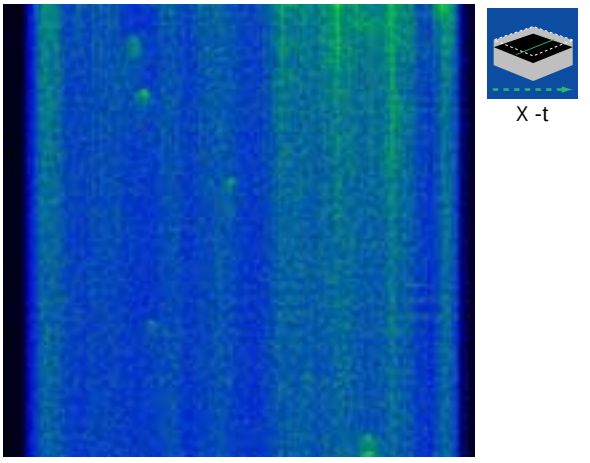
The wide variety of the line scanning modes (linear/oblique/free-line) enables flexible analysis of rapid time-lapse experiment.




Calcium wave in Xenopus oocyte, Calcium Green staining, fluorescence pseudo-colored fluorescence image after injection of inositol 3-trisphospate
*Japan Science and Technology Corporation, Exploratory Research for Advanced Technology, Mikoshiba cell control project, Prof. Aya Muto*




Calcium wave in isolated cardiac myocyte
*Dr. Sandor Gyorke*
*Texas Technical University*




Calcium sparks in isolated cardiac myocyte
*Dr. Sandor Gyorke*
*Texas Technical University*

**Superior slice patching system**

Using the FV300/500 in combination with unique fixed stage & nosepiece focusing upright microscope BX61WI provides a highly effective system for slice patching. This unique set up has small footprint that ensures enough room space limited cage. The remote control function will minimize the danger of accidental touching of the delicate experiment settings. Olympus also offers ideal non-cover glass long working distance water immersion objectives and optional movers that moves entire microscope system while sample and other experiment set up in a fixed position.

**Highly precise time-lapse analysis**

Fluoview's wide dynamic range of 12-bit or 4096 grey levels gives enough precision to detect even slightest changes. The user can designate multiple regions of interest (ROI) by using drawing tools. The intensity or the ratio can be analysed with intuitive GUI driven program.

BX61WI fixed stage upright microscope+mover system

**Immersion-type LUMPLFL objectives**

The 40X water immersion objective in this series has a 3.3mm working distance and an extremely fine tip which is suitable for micromanipulation using a fixed stage upright microscope. It has a large N.A. (0.8) and is also ideal for confocal observations: When using the BX61WI (fixed stage & nosepiece focusing upright microscope) with water immersion objectives confocal imaging can be used to monitor time-lapse fluorescence changes in thick specimens such as brain slices.

Long working distance no cover water immersion objective

Patch clamp

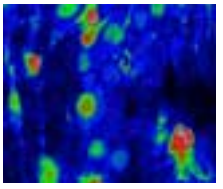
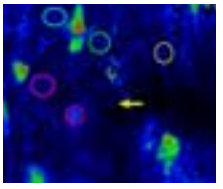
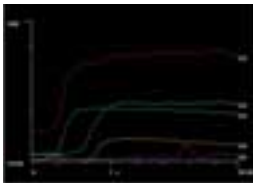


Image acquisition



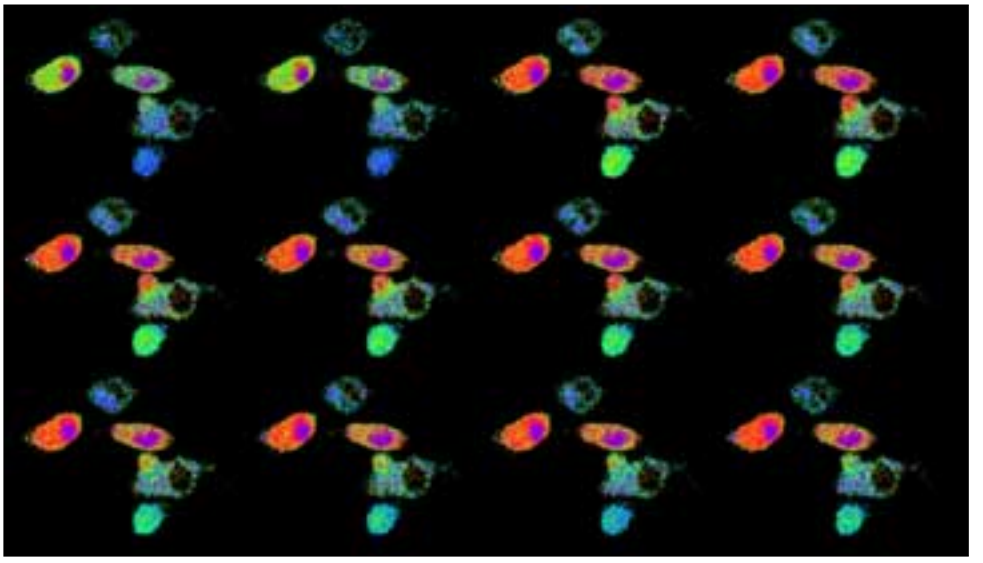
ROI designation



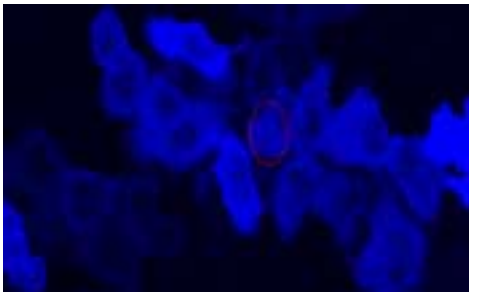
Intensity versus time measurement

# *FRET*

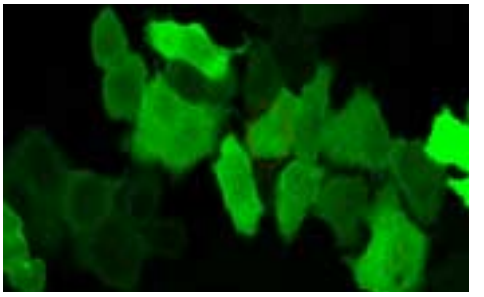
*Hardware and software support to optimize the environment for FRET.*



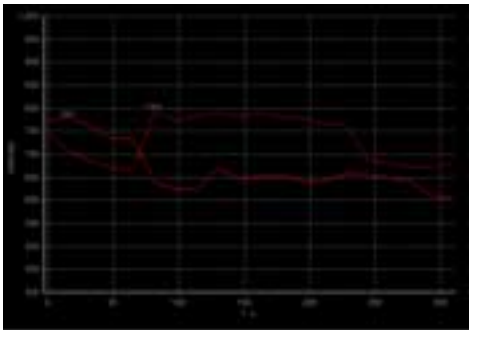
Ratio changes when cameleon is manifested on the HeLa cell and stimulated by histamine then inhibited by cyproheptadine.
Cameleon genes provided by Dr. Miyawaki Atsushi in Brain Research Institute.
Equipment: FV300 and HeCd laser
Time period : 4 seconds.



CFP Fluorescence wavelength 485nm



YFP Fluorescence wavelength 530nm



Measurement

CFP/YFP FRET
Calcium ion concentration in a live HeLa cell using a cameleon (split type) indicator. Energy transfer between CFP and YFP is proportional to bound calcium. The time series shows the increase of calcium ion density caused by stimulation of histamine and the effect of blocking by proheputajin.
*Olympus Optical Co. Ltd.*

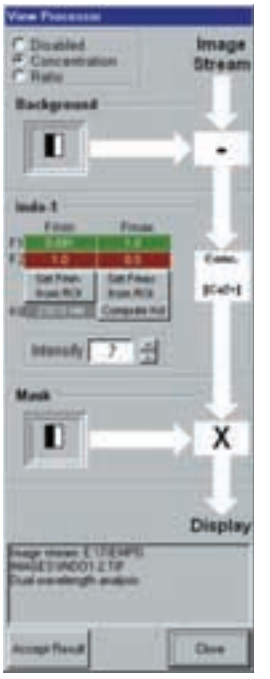
**Helium-Cadmium (HeCd) laser can be added for CFP/YFP FRET imaging**

A Helium-Cadmium laser is optionally available for CFP/YFP imaging. 442nm of an HeCd laser ideally excites CFP, with minimum disturbance to YFP, and is therefore suitable for CFP/YFP FRET experiments.
The high performance LSM objectives, PLAPO40XWLSM and PLAPO60XWLSM, are precisely corrected in this wavelength range, and ensure the highest measuring reliability.

*For simultaneous observation of CFP and YFP (442nm and 515nm are required.)

**Ratio imaging to analyze 2-wavelength images**

Using time course software, the ratio image can be continuously displayed in pseudo-color. At the same time, the intensity of each channel can be monitored graphically. The analyzing processes are presented as an instinctive flow chart. (optioanl time course software: TIEMPO)




**Input/output of external trigger signal**

The optional time course software gives control over the input/output trigger signal by GUI. It is suitable for combined experiments such as those involving patch clamping.

# AOTF

*AOTF: frexible control of the laser intensity to meet the specific demands*

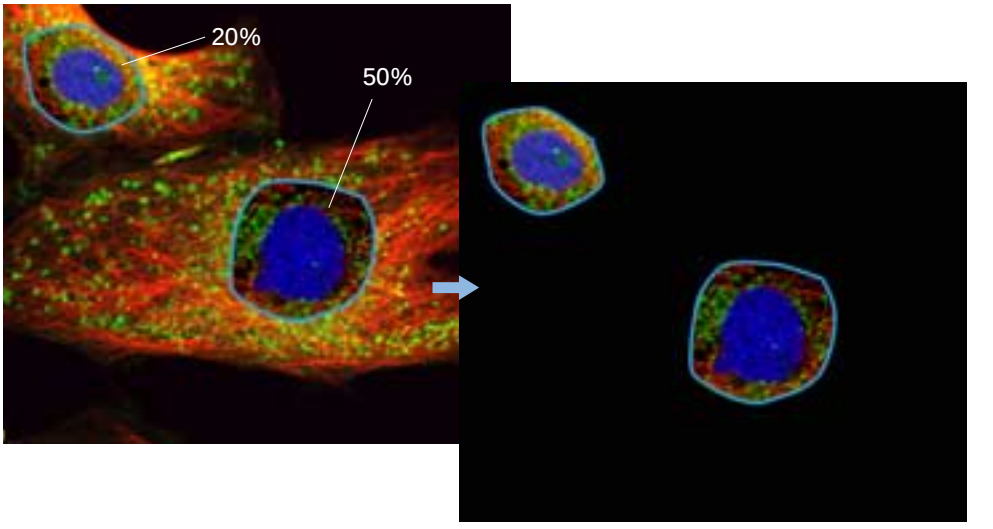
**Minimal specimen fading**
The laser exposure will be limited within the scanning area by default. Also there will be no laser exposure in the fly back motion of the galvanometer mirrors. Those features minimize the unnecessary bleaching of the specimen.

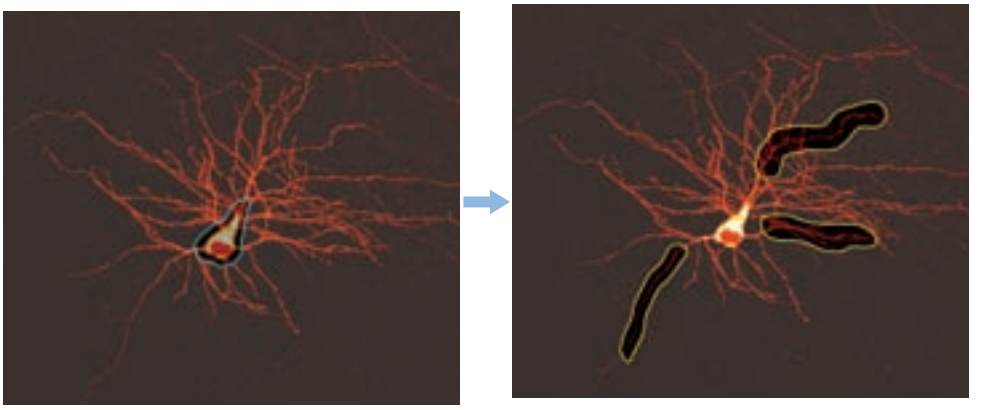
**Sequential line scanning for reduced cross talk**
Individual lines can be scanned sequentially, minimizing the time difference between each wavelength and producing images with less cross talk.

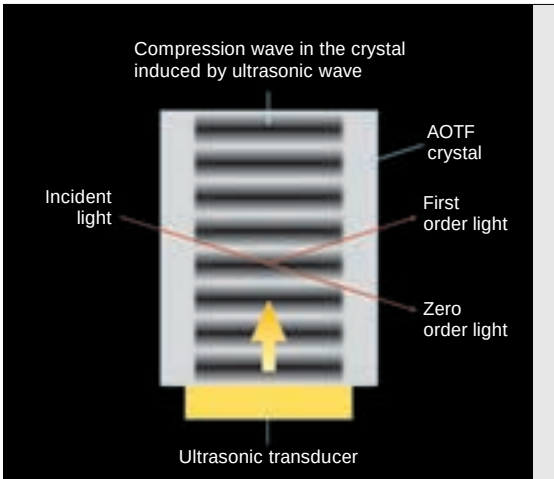
**Any laser intensity for any excitation area ( “Region of Excitation” Mode )**
Users can designate several different areas on the specimen, and apply different laser intensities to each. Laser intensities can be set in 0.1 percent increments for each designated area. There is no limit to the number of areas which can be designated.

**Setting up multiple laser application patterns**
Adding the time course software enables sequential time lapse observations, in which several application area patterns are combined. The freedom of bleaching area and intensity add even more variety to FRAP experiments.

**AOTF controller:**
**easy to link with external equipment**
This controller has input/output trigger terminals on the back and can synchronize laser application with the experiment being performed. It also allows the user to monitor laser intensity levels.



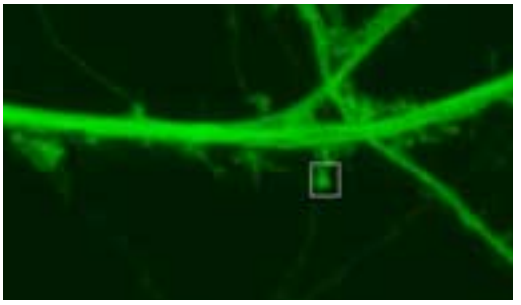



*The ultrasonic wave introduced into the AOTF crystal forms a compression wave and acts as a diffraction grating due to the distribution of the refractive index. The grating separates the incident light into zero order and first order diffraction waves. The first order diffraction is used: its wavelength and intensity are controlled by the frequency and intensity of the ultrasonic wave.

AOTF is an acoustic-optical element which controls light intensity by directing acoustic waves onto special crystals. Its principal feature is its high speed control of the light intensity.
The AOTF system employed in the LSM (Laser Scanning Microscope) uses multiple acoustic frequencies to control each laser wavelength independently.

# *PAPP for FRAP Application*

*PAPP: Programmable Acquisition Protocol Processor*
*Easy, reliable flow of experiments fluorescence recovery after photobleaching.*

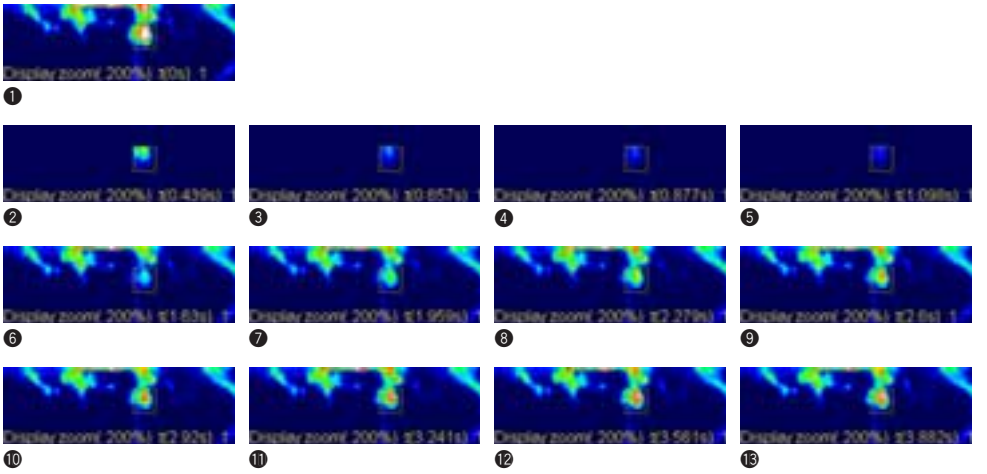


Mouse; hippocampal neurons;
fluorescence of GFP
Living neurons expressing GFP were maintained in culture and fluorescent images were obtained. Subsequently, FRAP analysis was performed on the same cell to determine the diffusion rate of GFP proteins into the dendritic spines. Rapid fluorescence recovery ( within seconds ) was observed.
*Shigeo Okabe*
*Department of Anatomy and Cell Biology*
*Tokyo Medical and Dental University*

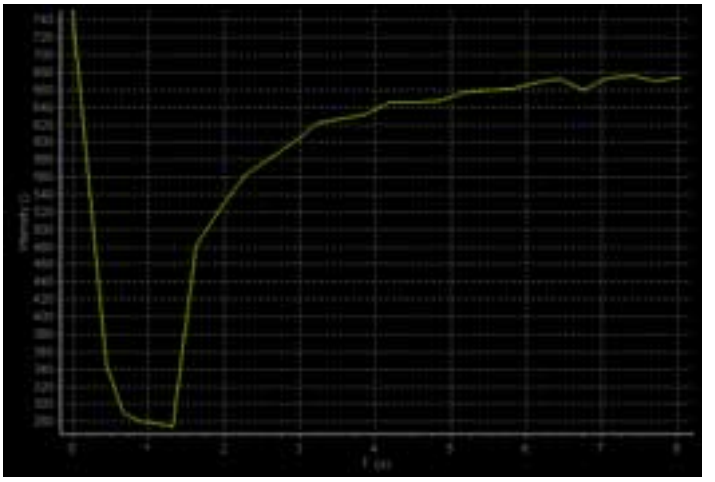
1. Measuring area setting

**Ideal AOTF + time course software for FRAP (Fluorescence Recovery After Photobleaching)**

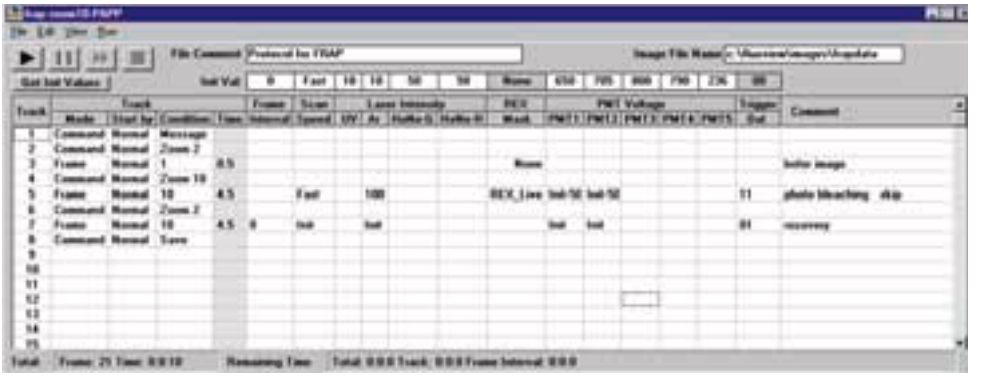
Used together with AOTF, this software analyzes the extent of fluorescence recovery after photobleaching. The time scales of photobleaching and recovery can be altered freely, allowing experiments to be easily programmed to suit different research purposes.



2. Measuring
❶ First stage
❷ - ❺
Photobleaching at 0.22s. interval
❻ - ⓭
Observation of recovery at 0.32s. interval



3 Measurement line graph
Vertical line: average intensity,
horizontal line: time

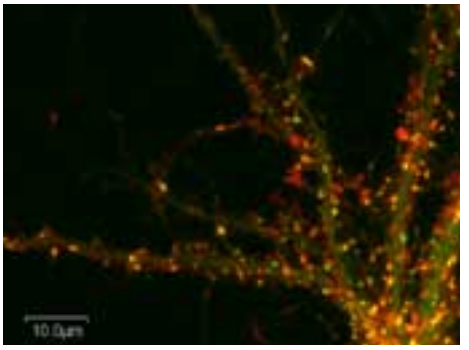


**New PAPP (Programmable Acquisition Protocol Processor) makes it easy to program a wide range of experiments**

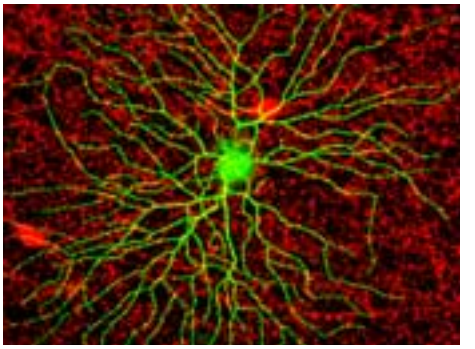
The new PAPP function is included in the optional time course software. The experiment protocol is described by the lines of tracks that express individual steps in the experiment. Users can specify detailed conditions and parameters for each track. This function enables users to construct complex experiment protocols with minimum effort. PAPP is suitable, for example, FRAP experiments that requires more flexibility.

# Applications Gallery

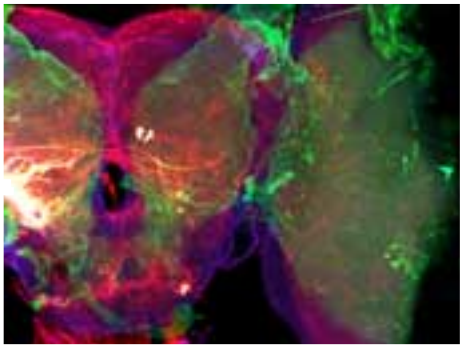
## Neuron



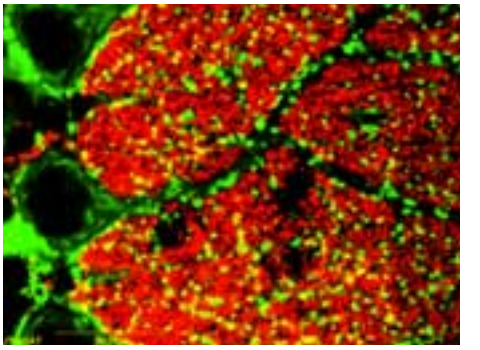
Mouse;hippocampal neurons
green channel: a GFP-tagged postsynaptic density protein, red channel: actin
staining using rhodamine-phalloidin
Hippocampal neurons expressing a GFP-tagged postsynaptic density protein were fixed and stained with rhodamine-phalloidin to visualize the localization of cytoplasmic actin filaments.
In dendrites, actin filaments are concentrated in the postsynaptic sites.
*Shigeo Okabe*
*Department of Anatomy and Cell Biology*
*Tokyo Medical and Dental University*



Lucifer Yellow: retina ganglion cell
TexasRed: dopamine-operated amacrine cell
*Prof. Shigetada Nakanishi*
*Dept. of Biological Sciences,*
*Kyoto Univ. Faculty of Medicine*

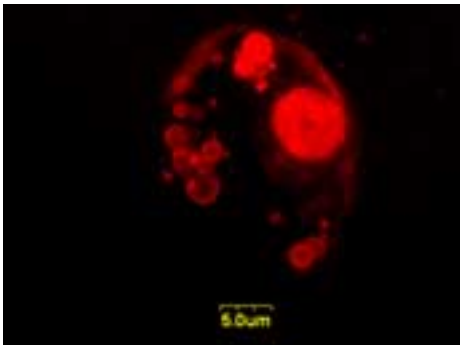


Lucifer yellow injected visual interneurons of swallowtail butterfly
Extended focus is used for every 100µm on 383µm
Z-range image and displayed by overlapping pseudo colors
*Mituyo Kinoshita, Pr. Kentaro Arikawa*
*Laboratory of Neuroethology,Graduate School of Integrated Science, Yokohama City University*

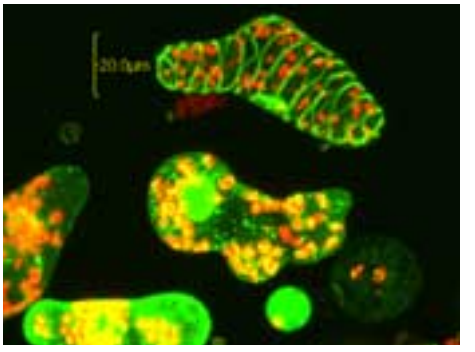


Purkinje cell in the rat cerebellum
FITC: vesicular GABA transporter VGAT
Cy3: vesicular glutamate transporter VGLUT1
*Pr. Masahiko Watanabe*
*Department of Anatomy,*
*Hokkaido University School of Medicine*

## Plant

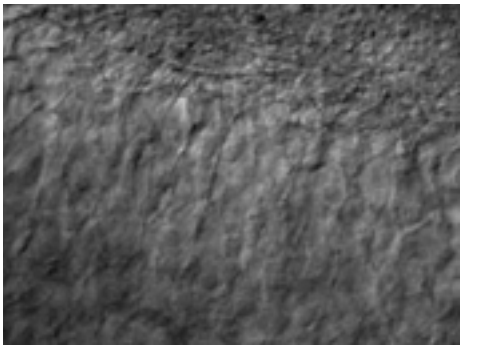


Apoptosis of Tabacco hybrid plant cells
*Dr. Wataru Marubashi*
*Laboratory of Plant Breeding and Cell Engineering,*
*School of Agriculture,*
*Ibaraki University*



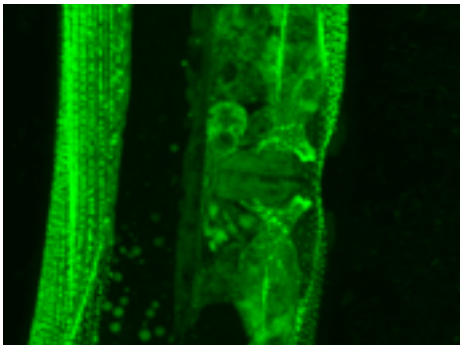
Isolated Zinnia mesophyll cells
*Keisuke Obara*
*Pr. Hiroo Fukuda*
*Department of Biological Sciences,*
*Graduate School of Science,*
*The University of Tokyo*

## IR

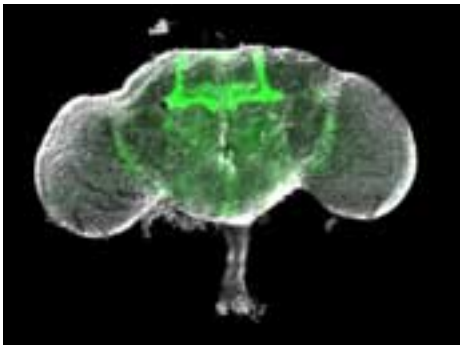


**IR DIC image by 750nm near infrared laser**
Human skin tissue
Depth: Approx. 80µm

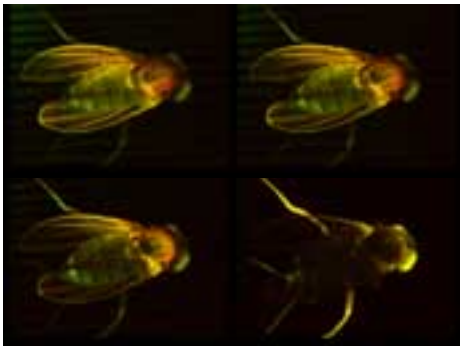
# Fluorescent Proteins



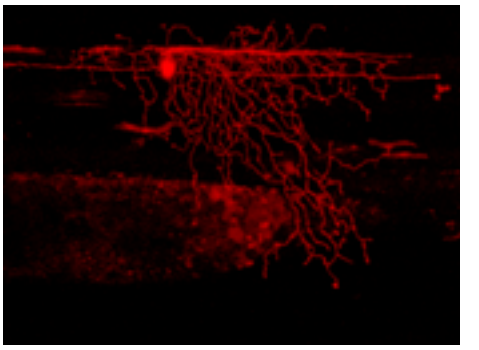
C elegans expressing beta-integrin fused to GFP
*Dr. Xioping Xhu and Dr. John Plenefisch*
*University of Toledo, Dept. of Biology*



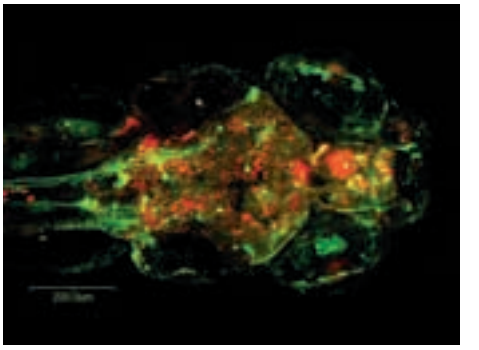
GFP-labeling of Drosophila adult brain with staining of mushroom bodies
*Assistant Prof. Aigaki*
*Cytogenetics*
*Tokyo Metropolitan University, Science Dept.*



GFP-labeling of Drosophila adults

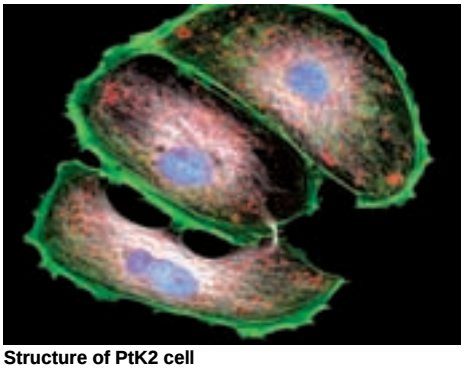


Expression of DsRed in a zebrafish embryo
Extended focus image of 5µmx30 slice
*Pr. Yasuhiro Kamei, Pr. Shunsuke Yumiba*
*Institute for Molecular and Cellular Biology*
*Osaka University*

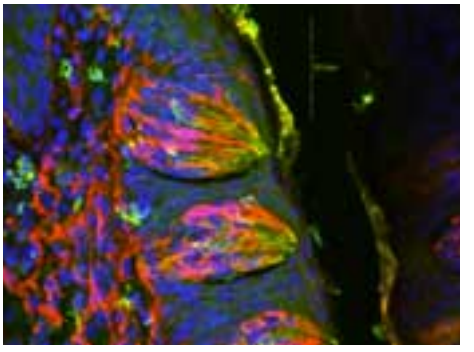


Coexpression of EGFP and DsRed in a zebrafish embryo
Extended focus image of 10µmx28 slice
*Pr. Yasuhiro Kamei, Pr. Shunsuke Yumiba*
*Institute for Molecular and Cellular Biology*
*Osaka University*

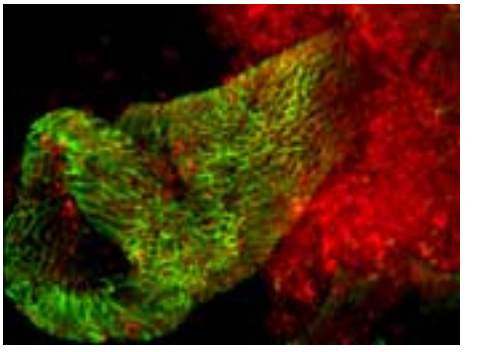
# Morphology



**Structure of PtK2 cell**
Nucleus: DAPI (Blue)
Actin: FITC (Green)
Mitochondria: Mito Tracker (Red)
Microtubules: Cy5 (White)



Rat tongue taste bud
DAPI: Nuclei
FITC: TrkB, high-affinity receptor for brain-derived neurotrophic factor
Texas Red: Protein Gene Products
*Pr. Shigeru Takami*
*Department of Anatomy,*
*School of Health Science,*
*Kyorin University*



Human Colon Crypt
Alexa 488 and To-Pro 3
*Christine Anderson,Prof. Ray White's Laboratory,*
*Huntsman Cancer Institute, U. Utah*

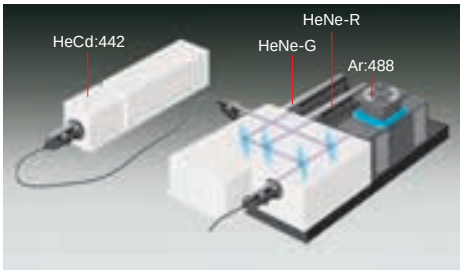
# System components

**Different types of laser combiners**

Selectable from ND filter or AOTF combiner. The shutters and light intensity can be controlled via a the Fluoview system computer.

* Laser combiner for AOTF is indispensable with multi-Ar laser.

Laser combiner with Ar+HeNe (Red) / (Green) lasers
Laser combiner with Multi Ar+HeNe (Red) / (Green) lasers




Combiner for CFP/YFP FRET

Laser combiner with Ar+HeNe (Red)+Kr laser systems

Laser combiner with UV laser system

* Please consult your Olympus dealer for other combinable lasers.

**External transmitted light detector system and fluorescence illumination system**

The former consists of the external PMT for transmitted light detection and transmitted light illumination, both adapted to the microscope frame via dual fiber system (patent pending). The latter is the fluorescence illumination unit using a fiber.

External transmitted light detector system

Fluorescence illumination system

* Standard equipment with FV500-BX61/BX61WI, FV300-BX51, BX61 and BX61WI combination

# Objectives

**Special objectives for LSM (visible area)**

Changes in refractive index adversely affect the intensity and apparent distance during deep confocal imaging. Water immersion type objectives are recommended for observation of biological samples because the refractive index of the objective is the same as the specimen. The PLAPO40XWLSM and PLAPO60XWLSM objectives perfectly correct spherical and chromatic aberrations in the 400-750nm wavelength range.

| Objectives | N.A. | W.D. (mm) |
|---|---|---|
| PLAPO40xWLSM | 0.9 | 0.15 |
| PLAPO60xWLSM | 1.0 | 0.15 |
| PLAPO60xOLSM | 1.1 | 0.13 |

Cover glass thickness range: 0.17±0.01mm

**New unique objective for UV confocal imaging (UV area)**

Olympus unique UV-corrected apochromatic objective allows superior confocal imaging of UV excited fluoro-chromes. The objective is corrected from 350-650 nm to acquire superior quality multi-channel confocal images. The infinity-corrected water immersion 40X objective brings both the UV excitation and the blue emission to the same focal point as visible light. Therefore it enables true confocal imaging throughout the field of view.

| Objective | N.A. | W.D. (mm) |
|---|---|---|
| UVAPO20xWLSM | 0.4 | 0.14mm |
| UVAPO40xWLSM | 0.9 | 0.12mm |

Cover glass thickness range: 0.17±0.01mm

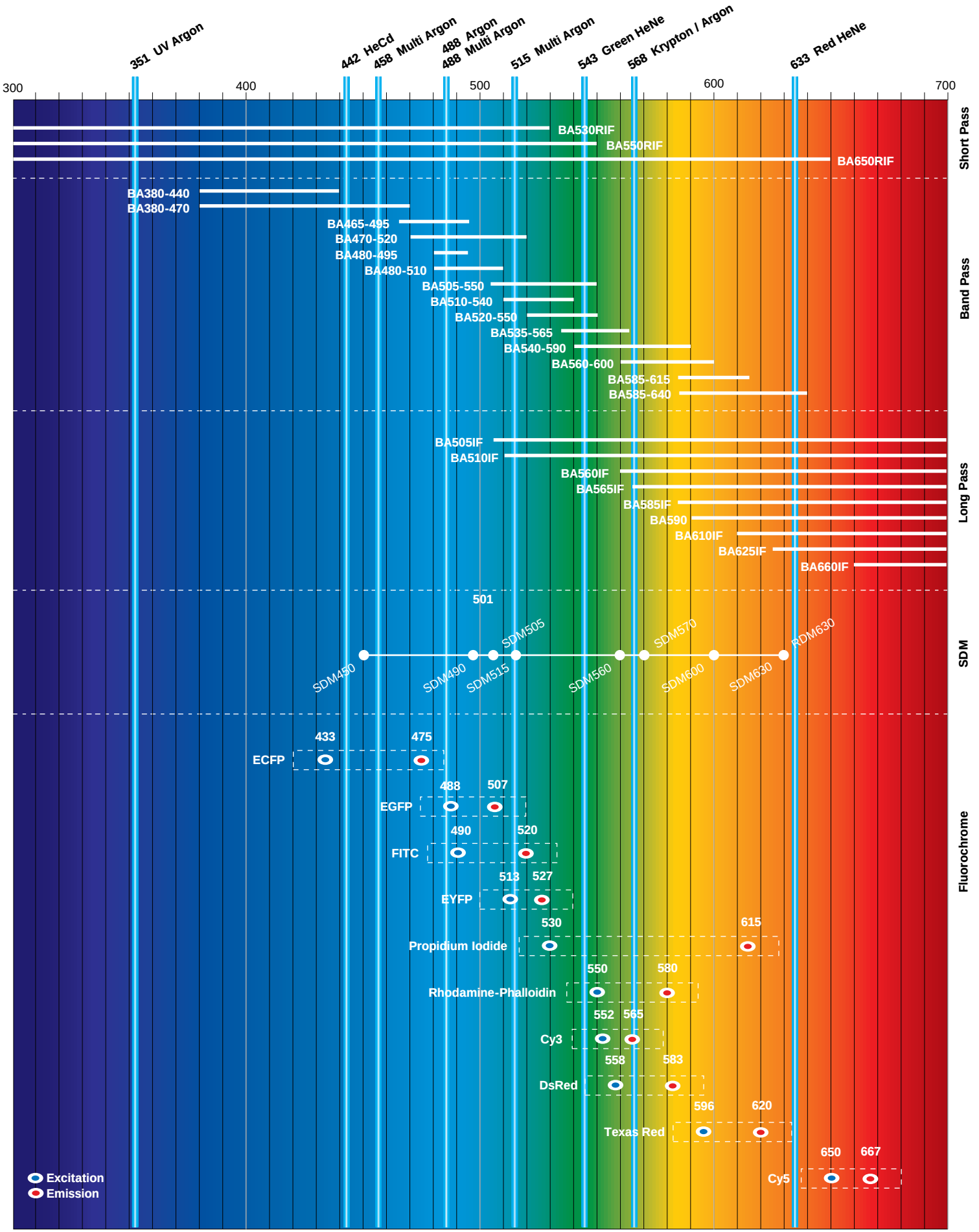
**Clear depth observation by using special near-infrared objectives with IR laser light (Visible-Infrared area)**

The UPLAPO60XW/IR water immersion objective is corrected for wavelengths from 450nm to 1,100nm. Simultaneous IR-DIC observation is obtained, with no chromatic aberration between the visible fluorescence and IR DIC images. The IR laser port of the FV500 has a straight optical feature without reflection.

| Objective | N.A. | W.D. (mm) |
|---|---|---|
| UPLAPO60xW/IR | 1.2 | 0.28 |

Cover glass thickness: 0.13-0.21mm

# Fluorescence Dyes



## Specifications

| | | FV300 | FV500 |
|---|---|---|---|
| ① Laser light source | Visible light laser source | Select from the following laser and to be mounted on laser combiner:<br>Multi Ar laser (458nm, 488nm, 515nm, Total 40mW), Ar laser (488nm,10mW), Kr laser (568nm, 10mW),<br>HeNe (G) laser (543nm,1mW), HeNe (R) laser (633nm,10mW), HeCd (Helium cadmium) Laser (442nm 6mW) | |
| | UV laser | — | Connect UV-Ar laser (351nm,40mW) to the special port via fiber system |
| | IR laser | — | Connect IR diode laser (CW750nm,2mW) to the special port via fiber system |
| | Laser combiner | Each laser light path is equipped with a continuously variable neutral density filter or AOTF<br>All laser lines are combined to apsis along the same fiber optic | |
| ② Scanning unit | Scanning method | Galvanometer mirror scanners (both X and Y) | |
| | Field number (N.A.) | 20 | 18 |
| | Pinhole | 5-position pinhole turret | Continuously adjustable pinhole for each individual detection channel |
| | Image memory and scanning speed | Standard scanning mode: 256 x 256 (0.45s) - 2048 x 2048 (10.835s) (Simultaneous scanning up to 5 channels)<br>Bi-directional high-speed scanning mode: 512 x 512 (0.25s) (Simultaneous scanning of up to 2 channels) | |
| | Image channel | Selectable from 2-channel (fluorescence) or<br>2-channel (fluorescence) + 1-channel (transmitted light) | Selectable from 2-channel (fluorescence) + 1-channel (transmitted light);<br>3-channel (fluorescence) + 1-channel (transmitted light);<br>or 4-channel (fluorescence) + 1-channel(transmitted light) |
| | Selection of filters according to staining | Manual selection | Automatic selection |
| | Scanning modes | 1-dimension: Point scanning<br>2-dimension (space): X-Y, rect, X-Z, linear line-Z and free line-Z<br>2-dimension (time): X-t, linear line-t and free line-t<br>3-dimension (space): X-Y-Z and rect-Z<br>3-dimension (time): X-Y-t, X-Z-t and rect-t<br>4-dimension: X-Y-Z-t and rect-Z-t | |
| | Image depth resolution | 12-bit (=4096 grey levels) per channel | |
| | Zoom | 1X-10X (0.5X-step) | |
| | Z-drive | Step motor/Minimum step 10nm (BX61, BX61WI and IX81 combination), 25nm (other microscope combination) | |
| ③ Microscopes | Upright | BX51, BX61, BX61WI | |
| | Inverted (special laser safe frame) | IX81FVSF, IX71FVSF (side port) | IX81FVBF/IX81FVBFUV (back port), IX81FVSF/IX71FVSF (side port) |
| ④ External trans-mitted light unit | Transmitted light illumination unit | External halogen light source connected to microscope via fiber cable | |
| | Transmitted light detector | External detector unit with built-in photomultiplier Connected to microscope frame via fiber cable<br>Standard equipment of FV500-BX61, FV500-BX61WI, FV300-BX51, FV-300-BX61, FV300-BX61WI | |
| ⑤ Fluorescence illumination unit | | Connect to external mercury light source and microscope via fiber cable | |
| ⑥ PC with system control boards | | IBM PC-AT compatible, OS: Windows® NT4.0, Windows 2000/Memory: 1GB RAM or larger,<br>CPU: Pentium® 4 1GHz or higher, Hard disk: 40GB or larger, Special I/F board, Image acquisition: PCI bus,<br>Monitor: Selectable from 21, 19, 17-inch, 1280 x 1024, Full color (16.77million colors) | |
| ⑦ Fluoview application software | Image acquisition | Scanning condition setting: image size, scanning speed, zoom, panning etc.<br>Real-time image calculation: Kalman filtering, peak integration,<br>PAPP (Programmable Acquisition Protocol Processor) | |
| | Hardware control | Laser, scanning unit, microscope | |
| | Image display | Each image display: Single-channel side-by- side, merge, cropping, tiling, series (Z/T) pass and continuous<br>LUT: Individual color setting, pseudo-color<br>Overlay: Lines, text, scale bar, etc | |
| | Image processing | Individual filter: Average, Low-pass, High-pass, Sobel, Median, Prewitt, 2D Laplacian, edge enhancement etc.<br>Calculations: Inter-image, mathematical and logical,<br>DIC back ground leveling | |
| | Image analysis | Overview of fluorescence intensity within an area, histogram, perimeter measurement for user-assigned area, time-lapse measurement , etc.<br>TIEMPO (Time course software) | |
| | 3D visualization | 3D animation, left / right stereo pairs, red / green stereoscopic images and cross section | |
| | Others | Graphic-based help, time course software (optional), trigger IN/OUT function (optional), 3D software / LSM viewer (optional) | |
| Power consumption | | Microscope (115V 6A/230V 3A), scanning unit+PSU (115V 3.5A/230V 2A), computer & monitor (115V 4.5A/230V 10A), Ar laser (115V 10A/230V 5A),<br>Multi Ar laser (115V 10A/230V 5A), Kr laser (230V 20A), HeNe laser each (115V 0.4A/230V 0.2A), UV laser (230V 30A), IR laser (115V 1A/230V 0.5A),<br>HeCd laser (115V 5A/230V 3A) | |

### Objectives for AX/BX (using U-UCD8, U-DICTS)

| Objective | N.A. | W.D. | DIC prism | U-DICTS position |
|---|---|---|---|---|
| UPLFL10X | 0.30 | 10.00 | U-DP10 | Normal |
| UPLAPO10X | 0.40 | 3.10 | U-DP10 | Normal |
| UPLFL20X | 0.50 | 1.60 | U-DP20 | Normal |
| UPLFL40XO | 1.3 | 0.10 | U-DPO40S | BFP1 |
| UPLAPO20X | 0.70 | 0.65 | U-DPA20 | Normal |
| UPLAPO40XOI2 | 0.50 -1.00 | 0.12 | U-DPO40S | BFP1 |
| UPLAPO40X | 0.85 | 0.20 | U-DPA40 | Normal |
| UPLFL60XO | 0.65 -1.25 | 0.10 | U-DPO60S | Normal |
| PLAPO60XO2 | 1.40 | 0.15 | U-DPO60S | BFP1 |
| UPLAPO100XOI | 0.50 -1.35 | 0.10 | U-DP100 | Normal |
| PLAPO40XWLSM | 0.90 | 0.15 | U-DPAW40 LSM | Normal |
| PLAPO60XWLSM | 1.00 | 0.15 | U-DPAW60 LSM | Normal |
| APO20XWLSM/UV | 0.4 | 0.14 | – | Normal |
| APO40XWLSM/UV | 0.9 | 0.12 | – | Normal |
| UPLAPO60XW | 1.2 | 0.31 -0.25 | U-DPO60S | Normal |
| UPLAPO60XW/IR | 1.2 | 0.31 -0.25 | U-DPO60S | Normal |

### Objectives for IX (using IX-LWUCD, U-DICTS)

| Objective | N.A. | W.D. | DIC prism | U-DICTS position |
|---|---|---|---|---|
| UPLFL10X | 0.30 | 10.00 | IX-DP10 | Normal |
| UPLAPO10X | 0.40 | 3.10 | IX-DP10 | Normal |
| UPLFL20X | 0.50 | 1.60 | – | Normal |
| UPLAPO20X | 0.70 | 0.65 | IX-DPA20 | Normal |
| UPLFL40XO | 1.3 | 0.10 | IX-DPO40S | BFP1 |
| UPLAPO40X | 0.85 | 0.20 | IX-DP40 | Normal |
| UPLAPO40XOI2 | 0.50 -1.00 | 0.12 | IX-DPO40S | BFPI |
| UPLFL60XOI | 0.65 -1.25 | 0.10 | IX-DPO60S | Normal |
| PLAPO60XO2 | 1.40 | 0.15 | IX-DPO60S | BFPI |
| UPLAPO100XOI | 0.50 -1.35 | 0.10 | IX-DPO100 | Normal |
| UPLAPO60XW | 1.2 | 0.31 -0.25 | IX-DPO60S | Normal |
| PLAPO40XWLSM | 0.90 | 0.15 | IX-DPAW40 LSM* | Normal |
| PLAPO60XWLSM | 1.00 | 0.15 | IX-DPAW60 LSM* | Normal |
| APO20XWLSM/UV | 0.4 | 0.14 | – | Normal |
| APO40XWLSM/UV | 0.9 | 0.12 | – | Normal |
| UPLAPO60XW/IR | 1.2 | 0.31x0.25 | IX-DPO60S | Normal |

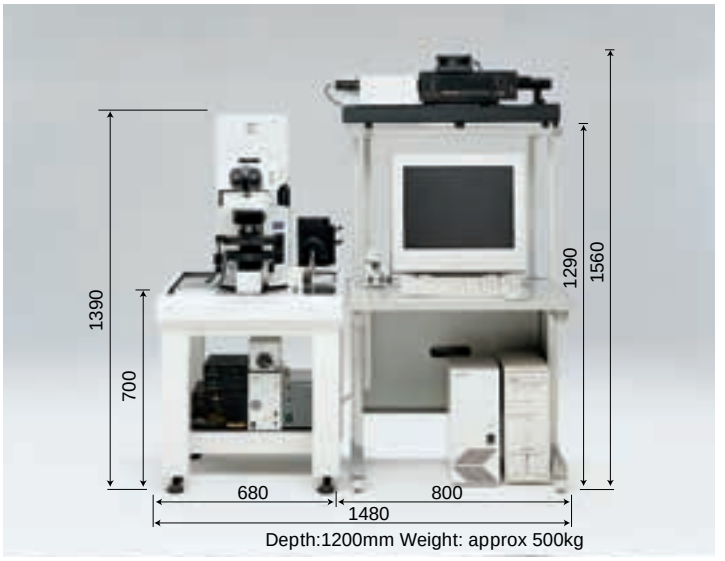
* Custom-made product

### Objectives for fixed stage upright microscopes (using WI-UCD, WI-DICTHRA)

| Objective | N.A. | W.D. | DIC prism | Revolving nosepiece |
|---|---|---|---|---|
| MPL5X | 0.1 | 19.60 | – | WI-SSNP, WI-SRE2 |
| UMPLFL10XW | 0.30 | 3.30 | U-LDPW10H | WI-SSNP, WI-SRE2 |
| UMPLFL20XW | 0.50 | 3.30 | U-LDPW20H | WI-SSNP, WI-SRE2 |
| LUMPLFL40XW | 0.80 | 3.30 | U-LDPW40H | WI-SSNP, WI-SRE2 |
| LUMPLFL60XW | 0.90 | 2.00 | U-LDPW60H | WI-SSNP, WI-SRE2 |
| LUMPLFL40XW/IR | 0.80 | 3.30 | U-LDPW40H | WI-SSNP, WI-SRE2 |
| LUMPLFL60XW/IR | 0.90 | 2.00 | U-LDPW60H | WI-SSNP, WI-SRE2 |
| LUMPLFL100XW | 1.00 | 1.50 | U-LDPW60H | WI-SSNP, WI-SRE2 |
| XLUMPLFL20XW | 0.95* | 2.00 | U-LDPXLU20 HR | WI-SNPXLU |

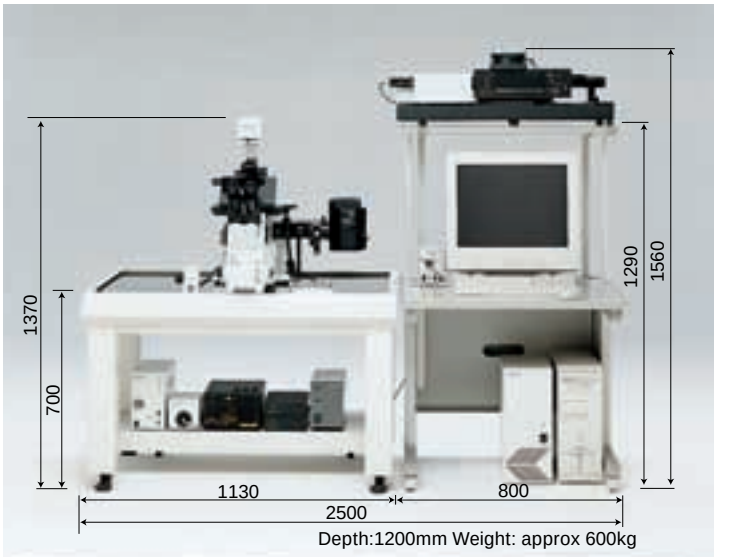
* Note: These conditions are not met in confocal microscopy

FV500-BX dimensions




Depth:1200mm Weight: approx 500kg

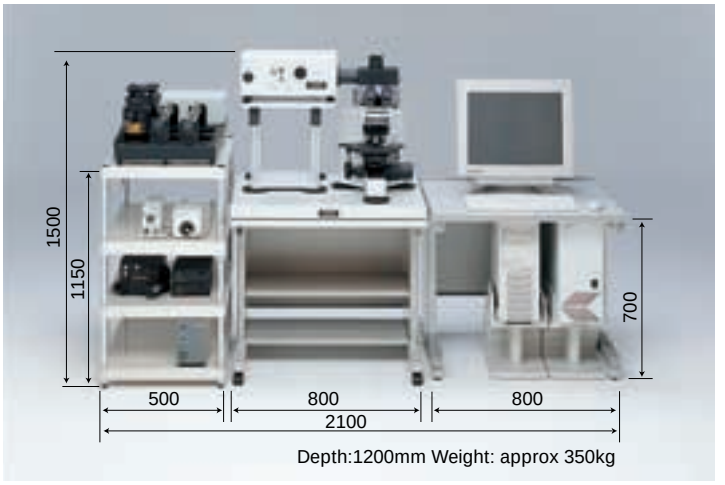
FV500-IX dimensions




Depth:1200mm Weight: approx 600kg

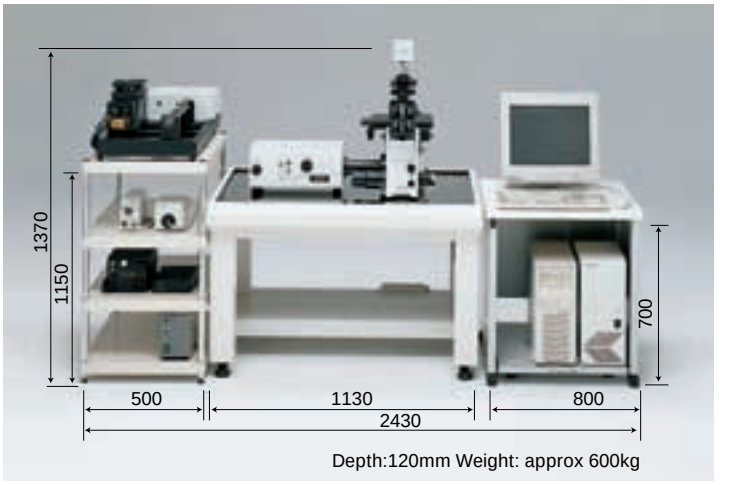
● Photos shown above are setting example using custom-made laser rack. Standard laser rack is shown below.

FV300-BX dimensions




Depth:1200mm Weight: approx 350kg

FV300-IX dimensions




Depth:120mm Weight: approx 600kg



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