FLUOVIEW website

www.olympusfluoview.com

- OLYMPUS CORPORATION is ISO14001 certified.
- OLYMPUS CORPORATION is FM55399/ISO9001 certified.
- Illumination devices are suggested lifetime.
- This device is designed for commercial use. It is not intended for any life support mission where failure or malfunction of the device can cause serious personal injuries or loss of life, such as medical equipment. Periodic inspections are required. Please visit our website for details.
- This device is designed for use in industrial environments. Using it in a residential environment may affect other equipment in the environment.
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FLUOVIEW—More Advanced than Ever

The Olympus FLUOVIEW FV1000 confocal laser scanning microscope delivers efficient and reliable performance together with the high resolution required for multi-dimensional observation of cell and tissue morphology, and precise molecular localization. The FV1000 incorporates the industry’s first dedicated photostimulation scanner to achieve simultaneous targeted laser stimulation and imaging for real-time visualization of rapid cell responses. The FV1000 also measures diffusion coefficients of intracellular molecules, quantifying molecular kinetics. Quite simply, the FLUOVIEW FV1000 represents a new plateau, bringing “imaging to analysis.”

Olympus continues to drive forward the development of FLUOVIEW microscopes, using input from researchers to meet their evolving demands and supplying “robust solutions from imaging to analysis.”
Advanced FLUOVIEW Systems Enhance the Power of Your Research

Superb Optical Systems Set the Standard for Accuracy and Sensitivity.
Two types of detectors deliver enhanced accuracy and sensitivity, and are paired with a new objective with low chromatic aberration, to deliver even better precision for colocalization analysis. These optical advances boost the overall system capabilities and raise performance to a new level.

Imaging, Stimulation and Measurement—Advanced Analytical Methods for Quantification.
Now equipped to measure the diffusion coefficients of intracellular molecules, for quantification of the dynamic interactions of molecules inside live cells. With robust stimulation capabilities for neuroscience, optogenetics, and calcium imaging, FLUOVIEW brings power to your research.

Evolving Systems Meet the Demands of Your Application.
Upgradeable system with optional hardware and software to meet the demands of your research. Your system can grow with your research needs, from routine imaging to the most advanced multiphoton applications.
Excellent Precision, Sensitivity and Stability.

FLUOVIEW Enables Precise, Bright Imaging with Minimum Phototoxicity.

**Laser combiner/Fiber**

**Diode Laser**
Greater stability, longer service life and lower operating cost are achieved using diode lasers.

**Laser Feedback Control**
Scanner unit is equipped with laser power monitor for feedback control enhancing stable laser output.

**Laser Compatibility**
- **Diode laser:** 405 nm, 440 nm, 473 nm, 559 nm, 635 nm
- **Gas laser:** Multi-line Ar laser (458 nm, 488 nm, 515 nm), HeNe(G) laser (543 nm)

**Broadband Fiber**
- Broadband fiber connection for 405–635 nm lasers, to achieve an ideal point light source with minimal color shift and position shift between images.

**Laser Combiner**
- Two versions available.
- Single fiber-type combiner is used for main scanner FV1000 with up to six lasers, ranging from 405 to 635 nm.
- Dual fiber-type combiner is used for photostimulation with main and SIM scanner FV1000.

**High Sensitivity Detection System**
High sensitivity and high S/N ratio optical performance is achieved through the integration of a pupil projection lens, use of a high sensitivity photomultiplier tube and an analog processing circuit with minimal noise. Enables high S/N ratio image acquisition with minimal laser power to reduce phototoxicity.

**Up to Four Simultaneous Confocal Channels**
- Three integrated confocal PMT detectors, and optional module with fourth confocal PMT expandable up to four PMT channels.

**Two Versions of Light Detection System**
- Spectral detection for high-precision spectroscopy with 2 nm resolution.
- Filter detection equipped with high quality filter wheels.

**Optical System**

**Motorized Microscopes**
Olympus UIS2 objectives offer world-leading, infinity-corrected optics that deliver unsurpassed optical performance over a wide range of wavelengths.

**UIS2 Objectives**
Olympus UIS2 objectives with suppressed autofluorescence

**Samples and Specimens**
Supports a Wide Range of Samples and Specimens
- Tissue culture dishes, slide chambers, microplates and glass slides can be used with live cells and fixed specimens.

**Fluorescence**
- Spectral Scanning Unit
- Filter Scanning Unit
- UIS2 objectives
- Olympus offers a line of high numerical aperture objectives with improved fluorescence S/N ratio, including objectives with exceptional correction for chromatic aberration, oil-, water- and silicone immersion objectives, and total internal reflection fluorescence (TIRF) objectives.
Two Versions of Light Detection System that Set New Standards for Optical Performance.

Spectral Based Detection

**Flexibility and High Sensitivity**

Spectral detection using gratings for 2 nm wavelength resolution and image acquisition matched to fluorescence wavelength peaks. User adjustable bandwidth of emission spectrum for acquiring bright images with minimal cross-talk.

Precise Spectral Imaging

The spectral detection unit uses a grating method that offers linear dispersion compared with prism nonlinear dispersion. The unit provides uniform 2 nm wavelength resolution across the entire detection spectrum and high-sensitivity photomultiplier tube detectors. Fluorescence separation can be achieved through unmixing, even when cross-talk is generated by multiple fluorescent dyes with similar peaks. A standard third filter channel is provided without a grating allowing researchers greater flexibility and sensitivity.

Filter Based Detection

**Enhanced Sensitivity**

Three-channel scan unit with detection system featuring hard coated filter base. High-transmittance and high S/N ratio optical performance is achieved through integration of a pupil projection lens within the optics, the use of a high sensitivity photomultiplier and an analog processing circuit with minimal noise.

**High-Performance Filters Deliver Outstanding Separation**

Special coatings deliver exceptionally sharp transitions to a degree never achieved before, for acquisition of brighter fluorescence images.

SIM Scanner Unit for Simultaneous Photostimulation and Imaging.

**SIM (Simultaneous) Scanner Unit**

Combines the main scanner with a dedicated photostimulation scanner for investigating the trafficking of fluorescent-labeled molecules and marking of specific live cells.

**Simultaneous Photostimulation and Imaging**

Performs simultaneous photostimulation and imaging to acquire images of immediate cell responses to stimulation in photobleaching experiments.

**Modifiable Stimulation Area During Imaging**

The stimulation area can be moved to a different position on the cell during imaging, providing a powerful tool for photoactivation and photoconversion experiments.

Wide Choice of Bleaching Modes

Various scan modes can be used for both the observation area and stimulation area. Enables free-form bleaching of designated points, lines, free lines, rectangles and circles.

Multi-Purpose Laser Combiner

All lasers can be used for both imaging and photostimulation. Laser Sharing with Main Scanner

Dual fiber laser combiner provides laser sharing between the SIM scanner and main scanner, eliminating the need to add a separate laser for stimulation.
Exceptional Resolution for Colocalization Analysis and Imaging of Cytoplasmic Membrane.

Super Corrected Objective

Best Reliability for Colocalization Analysis

A new high NA oil-immersion objective minimizes chromatic aberration in the 405–650 nm region for enhanced imaging performance and image resolution at 405 nm. Delivers a high degree of correction for both lateral and axial chromatic aberration, for acquisition of 2D and 3D images with excellent, reliable accuracy, and improved colocalization analysis. The objective also compensates for chromatic aberration in the near infrared up to 850 nm.

Performance Comparison of PLAPON 60xOSC and UPLSAPO 60xO

<table>
<thead>
<tr>
<th>PLAPON60xOSC</th>
<th>UPLSAPO60xO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Axial chromatic aberration (Z direction)</td>
<td>-0.5 µm</td>
</tr>
<tr>
<td>Lateral chromatic aberration (X, Y direction)</td>
<td>-0.2 µm</td>
</tr>
</tbody>
</table>

1D image

Tubulin in HeLa cells labeled with Alexa Fluor 405 nm, 633 nm and Hoechst 33342.

TIRFM (Total Internal Reflection Fluorescence Microscope) System

Switchable between Confocal and TIRFM Imaging

Switchable between confocal and TIRFM imaging for localization of proteins on the cytoplasmic membrane surface and acquisition of sectioning images within cells.

Software Control of TIRFM Illumination

Built-in laser provides TIRFM illumination. Software can be used to tune the angle of incidence of excitation light and calculates the penetration depth of the evanescent wave based on the TIRFM objective used.

High-Numerical Aperture Objectives for TIRFM Illumination

A line of high numerical aperture (NA) objectives is available for TIRF illumination.

- PLAPON100xOTIRF: NA: 1.4 (oil immersion) W.D.: 0.12 mm
- UPLSAPO100xOTIRF: NA: 1.40 (oil immersion) W.D.: 0.18 mm
- APO100xWHR: NA: 1.55 (oil immersion) W.D.: 0.1 mm
- APO100xWHR: NA: 1.48 (oil immersion) W.D.: 0.08 mm

The World’s First Silicone Immersion Objectives for Live Sample Imaging.

Silicone Immersion Objective

The Superior Choice for Observing Live Samples

The refractive index of silicone oil (ne=1.4) matches very well to most live biological samples (ne≈1.38). Using silicone oil as an immersion medium can minimize spherical aberration caused by refractive index mismatch in brightfield images with a greater signal to noise ratio.

High-resolution Silicone Immersion Objectives

Silicone immersion objectives can be designed with a larger numerical aperture (NA) than water immersion objectives, increasing imaging resolution and brightness.

Silicone Oil is Ideal for Long-term, Time-lapse Observation

The properties of silicone oil make it an excellent choice for long-term, stable time-lapse observation. It remains unchanged in 24°C environments suited to the observation of live samples. Because drying and increase of viscosity are not a problem (unlike with water and glyceral immersion media), the refractive index of silicone oil remains constant and there is no need to add more fluid over time.

Refractive Index is Important with Deep Tissue Observation

When working with a water immersion objective, the difference between the refractive index of the sample and water results in spherical aberration, which can cause resolution to decrease as the focal plane and the refractive index become similar. When working with a silicone immersion objective, the difference between the refractive index of the sample and silicone oil is minimal. So it achieves higher resolution for deep tissue.

UPLSAPO30xS: For Broader View and Greater Depth

This high-magnification, high-NA objective delivers high-resolution imaging over a broad sample area. It enables continuous observation of high-resolution images from low to high magnification, using the zoom function of laser scanning microscopes.

UPLSAPO60xS: For 3D with Superior Resolution

This high-magnification, high-NA objective enables highly detailed imaging of live samples. It is ideally suited for high-resolution 3D imaging.
User-Friendly Software to Support Your Research.

**Technology / Hardware**

**Time Controller**
Precisely synchronizes different experimental protocols including FRAP, FLIP and FRET by acceptor photo-bleaching and time-lapse. Save and open settings for later use.

**Re-Use Function**
Open previously configured scanning conditions and apply them to new or subsequent experiments.

**Help Guide**
Comprehensive help guide describes the functions and usage for each command, and overall sequence of operations.

**Wide Choice of Scanning Modes**
Several available scanning modes including ROI, point and high-speed bidirectional scanning.

**Image Acquisition by Application**
User-friendly icons offer quick access to functions for image acquisition according to the application (XYZ, XY, YT, X, Y).

**Configurable Excitation Laser Power**
Easily adjust the optimum laser power for each specimen (live cells and fixed specimens).

**Configurable Emission Wavelength**
Select the dye name to set the optimal filters and laser lines.

**Multi Stimulation Software**
Configure multiple stimulation points and conditions for photostimulation synchronized with imaging, for detailed analysis of the connectivity of cells within the stimulation area.

**Multi-Area Time-Lapse Software**
Multi-Area Time-Lapse Software control of the motorized XY stage enables multiple measurement points in glass slides, 35 mm dishes or individual microplate wells. Repeated imaging of multiple cells improves the statistical power of time-lapse experiments.

**Mosaic Imaging**
A motorized XY stage is programmed with the use of a high-magnification objective to acquire continuous images from adjacent fields of view, to assemble a single, high resolution image covering a wide area. Three-dimensional images can also be assembled using XYZ acquisition.

**Diffusion Measurement Package**
For analysis of intracellular molecular interactions, signal transduction and other processes, by determining standard diffusion coefficients. Supports a wide range of diffusion analysis using point FCS, ALCs and FRAP.

**Optional Software with Broad Functionality**

**Configurable Emission Wavelength**
Select the dye name to set the optimal filters and laser lines.

**Wide Choice of Scanning Modes**
Several available scanning modes including ROI, point and high-speed bidirectional scanning.

**Image Acquisition by Application**
User-friendly icons offer quick access to functions for image acquisition according to the application (XYZ, XY, YT, X, Y).

**Re-Use Function**
Open previously configured scanning conditions and apply them to new or subsequent experiments.

**Help Guide**
Comprehensive help guide describes the functions and usage for each command, and overall sequence of operations.
Broad Application Support and Sophisticated Experiment Control.

- **Measurement**
  - HDRi (High Dynamic Range imaging)
- **Photostimulation**
  - FRAP/FLIP/Photoactivation/Photoconversion/Uncaging.
- **Multi-Dimensional Time-Lapse**
  - Long-term and multiple point.
- **3D Mosaic Imaging**
  - High resolution images stitched to cover a large area.
- **HDRi (High Dynamic Range imaging)**
  - Multiple images are captured using various acquisition conditions. The acquired image data are processed to create a single high-definition image with increased dynamic range, resulting in reduced saturation and emphasized low intensity signals.
- **3D/4D Volume Rendering**
  - One-click 3D/4D image construction from acquired XYZ/T images. Change the angle of 3D image with a single click.
- **Colocalization**
  - Configurable threshold values for fluorescence intensities on the scatterplot. Accurate colocalization statistics and visualization of colocalized area on image.
- **FRET**
  - Configuration wizard simplifies the setting of FRET experimental procedures. Optimal laser excitation wavelengths for CFP/YFP FRET.

Image of variations in calcium concentration of HeLa cells expressing YC3.60 when stimulated with histamine.

Reference:
Diffusion Measurement Package
This optional software module enables data acquisition and analysis to investigate the molecular interaction and concentrations by calculating the diffusion coefficients of molecules within the cell. Diverse analysis methods (RICS/ccRICS, point FCS/point FCCS and FRAP) cover a wide range of molecular sizes and speeds.

RICS—Raster Image Correlation Spectroscopy
Raster image correlation spectroscopy (RICS) is a new method for analyzing the diffusion and binding dynamics of molecules in an entire, single image. RICS uses a spatial correlation algorithm to calculate diffusion coefficients and the number of molecules in specified regions. Cross correlation RICS (ccRICS) characterizes molecular interactions using fluorescent-labeled molecules in two colors.

Point FCS—Point scan Fluorescence Correlation Spectroscopy
Point scan fluorescence correlation spectroscopy (point FCS) analyzes intensity fluctuations caused by diffusion or binding/unbinding interactions of a protein complex. point FCS uses an auto correlation function to carry out operations on fluorescence signals obtained by continuous scanning of a single pixel on the screen. Point scan fluorescence cross-correlation spectroscopy (point FCCS) analyzes the fluctuation of fluorescent-labeled molecules in two colors. The coincidence of fluctuations occurring in two detection channels shows that the two proteins are part of the same complex. point FCS and point FCCS can now be performed with a standard detector, eliminating the need for a special high-sensitivity detector.

FRAP Analysis
The Axelrod analytical algorithm is installed as a FRAP analysis method. The algorithm is used to calculate diffusion coefficients and the proportions of diffusing molecules.

Analytical methods according to molecule diffusion speeds

<table>
<thead>
<tr>
<th>Molecule in solution</th>
<th>Protein in solution</th>
<th>Diffusion of proteins in cell</th>
<th>Lateral diffusion in cell membranes</th>
<th>Protein trafficking</th>
<th>Molecular complex formation/aggregation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diffusion Coefficient (µm/s)</td>
<td>0.5</td>
<td>0.98</td>
<td>1.5</td>
<td>105</td>
<td></td>
</tr>
<tr>
<td>Capable range of measurement</td>
<td>Point FCS</td>
<td>RICS</td>
<td>FRAP</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

RICS Application and Principles

Comparison of Diffusion Coefficients for EGFP Fusion Proteins Near to Cell Membranes and In Cytoplasm
RICS can be used to designate and analyze regions of interest based on acquired images. EGFP is fused at protein kinase C (PKC) for visualization, using live cells to analyze the localization with RICS. The diffusion coefficient close to cell membranes was confirmed to be lower than in cytoplasm, after stimulation with phorbol myristate acetate (PMA). This is thought to be from the mutual interaction between PKC and cell membrane molecules in cell membranes. In addition to localization of molecules, RICS analysis can simultaneously determine changes in diffusion coefficient for detailed analysis of various intracellular signaling proteins.

RICS Principle
Molecules of different sizes diffuse at different speeds within cells. Small molecules move faster, compared with large molecules that move relatively slowly. The FV1000 acquires information about the movement of these diffusing fluorescent-labeled molecules as image data, together with morphological information about the cell. The image data obtained for each pixel was sampled at different times, so the data for each pixel is affected by the passage of time, in addition to its spatial XY information. By analyzing this image data with a new statistical algorithm for spatial correlation, the diffusion coefficients and molecule counts can be calculated for molecules moving within the cell.

Spatial Correlation Algorithm
When the spatial correlation algorithm is applied between pixels, a higher correlation is obtained as the speed of movement of the molecules near the scanning speed. When calculating the spatial correlation in the X-direction, because the scanning speed in the X-direction is slow, a higher correlation is obtained for fast-moving molecules than for slow-moving molecules. When the scanning speed in the Y-direction is slow, a higher correlation is obtained for slow-moving molecules. RICS using LSM images scans in both X- and Y-directions, so it can be used to analyze the movements of a wide range of molecule sizes, both fast and slow.

RICS Application Method

1. LSM Image
2. Spatial Correlation
3. Theoretical Formula Used for Fitting Calculation
4. Results of Analysis (diffusion coefficient and molecule count)
Photostimulation

The SIM scanner system combines the main scanner with a photostimulation scanner. Control of the two independent beams enables simultaneous stimulation and imaging, to capture reactions during stimulation. Multi-stimulation software is used to continuously stimulate multiple points with laser light for simultaneous imaging of the effects of stimulation on the cell.

FLIP—Fluorescence Loss in Photobleaching

Fluorescence loss in photobleaching (FLIP) combines imaging with continuous bleaching of a specific region to observe the diffusion of a target protein within a cell. The changes in the image over time make it possible to observe the location of structural bodies that inhibit the diffusion of the molecule.

FRAP—Fluorescence Recovery after Photobleaching

Exposure of fluorescent-labeled target proteins to strong laser light causes their fluorescence to fade locally. Fluorescence recovery after photobleaching (FRAP) is used to observe the gradual recovery of fluorescence intensity caused by protein diffusion from the area surrounding the bleached region. By examining the resulting images, it is possible to characterize the diffusion speed of the molecule, and the speed of binding and release between the molecule and cell structures.

Uncaging

A 405nm laser is optional for uncaging with the SIM scanner system. Caged compounds can be uncaged point-by-point or within a region of interest, while the main scanner of the FV1000 captures images of the response with no time delay.

Multi-Point Photostimulation

Using multi-stimulation software, the user can configure continuous photostimulation of multiple points with simultaneous imaging, which is effective for applications such as uncaging experiments involving photostimulation of several spines in neurons.
Multi-Point Time-Lapse Software

The FV1000 can be used for ideal multi-dimensional time-lapse imaging during confocal observation, using multi-area time-lapse software to control the motorized XY stage and focus compensation.

Focal Plane 1  Focal Plane 2  Focal Plane 3  Focal Plane 4
Point 1  Point 2  Point 3  Point 4  Point 5  Point 6

Multi-Dimensional Time-Lapse

The FV1000 can be used for ideal multi-dimensional time-lapse imaging during confocal observation, using multi-area time-lapse software to control the motorized XY stage and focus compensation.

Significantly Improved Long Time-Lapse Throughput

Equipped with motorized XY stage for repeated image acquisition from multiple points scattered across a wide area. The system efficiently analyzes changes over time of cells in several different areas capturing large amounts of data during a single experiment to increase the efficiency of experiments. Microplates can be used to run parallel experiments, which significantly improves throughput for experiments that require long-term observation.

Multi-Point Time-Lapse Software

The FV1000 can be used for ideal multi-dimensional time-lapse imaging during confocal observation, using multi-area time-lapse software to control the motorized XY stage and focus compensation.

Focal Drift Compensation for Long Time-Lapse Imaging

The IX81-ZDC Zero Drift Compensation system corrects loss of focus caused by temperature changes around the microscope and other factors during long time-lapse observation. The thermal drift compensation eliminates the need to take images at several Z planes, minimizing live cell exposure to irradiation.

Objectives

- Set target observation plane as offset.
- Over time, the focal plane drifts from the observation plane.
- Laser detects the glass surface before imaging.
- Immediately returns to initial offset plane for focus and compensation.
- IR Laser to focal plane selection.
- Offset

Maintain Cell Activity Over A Long Period

CO2 incubator control keeps the environment inside the tissue culture dish completely stable. The environment is precisely maintained at 37°C with 90% humidity and 5% CO2 concentration.

3D Mosaic Imaging

Mosaic imaging is performed using a high-magnification objective to acquire continuous 3D (XYZ) images of adjacent fields of view using the motorized stage, utilizing proprietary software to assemble the images. The entire process from image acquisition to tiling can be fully automated.

Mosaic Imaging for 3D XYZ Construction

Composite images are quickly and easily prepared using the stitching function, to form an image over a wide area. 3D construction can also be performed by acquiring images in the X, Y and Z directions. Tiled images can be enlarged in sections without losing resolution. Particularly useful for “Connectome” or “Brain Mapping” type projects requiring large area scanning at high resolution. Tiling functions include true stitching and smoothing options for improved seamless images.

Automated from 3D Image Acquisition to Mosaic Imaging

Multi area time-lapse software automates the process from 3D image acquisition (using the motorized XY stage) to stitching. The software can be used to easily register wide areas, and the thumbnail display provides a view of the entire image acquired during the mosaic imaging process.

CNS markers in normal mice
Objective: PLAPON60x
Zoom: 2x
Image acquisition numbers (XY): 32 x 38, 48 slices for each image.

Courtesy of Dr. Mark Ellisman PhD, Hiroyuki Hakozaki, MS
National Center for Microscopy and Imaging Research (NCMIR),
University of California, San Diego

Human/embryoid cells T65

Courtesy of: Westphal, K.J.;
Biological Safety Research Center Div. of Genetics and Malignancies,
National Institute of Health Sciences
Expandability to Support Diverse Application.

<table>
<thead>
<tr>
<th>Application</th>
<th>Standard Functions</th>
<th>Optional Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Molecular interaction and</td>
<td>Intracellular diffusion measurement</td>
<td>Calculation of diffusion coefficients for intracellular molecules, and analysis of</td>
</tr>
<tr>
<td>molecular concentration analysis</td>
<td></td>
<td>molecular binding and changes in molecular density. Supports a wide range of methods</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(RCS/ARCS, point FCS/point FCS, and FRAP). Software Required: Diffusion measurement</td>
</tr>
<tr>
<td>Photostimulation</td>
<td>SIM scanner system</td>
<td>Performs simultaneous imaging and photostimulation. Provides detailed settings for</td>
</tr>
<tr>
<td></td>
<td></td>
<td>photostimulation including position and timing. Features tomato scanning for high-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>efficiency bleaching using laser light stimulation.</td>
</tr>
<tr>
<td>Multi-dimensional</td>
<td>Long time-lapse system</td>
<td>Microscopes equipped with zero drift compensation (ZDC) acquire each image at a</td>
</tr>
<tr>
<td>time-lapse imaging</td>
<td></td>
<td>set focus plane. The microscope CO2 incubator maintains cell activity for a long</td>
</tr>
<tr>
<td></td>
<td></td>
<td>period for continuous imaging. Equipment Required: SIM scanner, laser combiner (dual</td>
</tr>
<tr>
<td></td>
<td></td>
<td>fiber version)</td>
</tr>
<tr>
<td></td>
<td>Multi-point photostimulation system</td>
<td>Register multiple points for photostimulation, and program the respective stimulation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>order, stimulation time and type of stimulation (continuous laser light or pulsed</td>
</tr>
<tr>
<td></td>
<td>Multi-area time-lapse software, motorized XY stage</td>
<td></td>
</tr>
<tr>
<td>2D mosaic imaging</td>
<td>3D mosaic imaging system</td>
<td>Continuous imaging of adjacent fields of view and mosaic imaging to form a composite</td>
</tr>
<tr>
<td></td>
<td></td>
<td>image. Acquisition of adjacent Z-series images for 3D mosaic imaging. Software</td>
</tr>
<tr>
<td></td>
<td></td>
<td>and Equipment Required: Multi-point time-lapse software, motorized XY stage.</td>
</tr>
<tr>
<td></td>
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<tr>
<td>TIRFM</td>
<td>TIRFM imaging</td>
<td>Uses the laser from the laser combiner to provide evanescent illumination, for</td>
</tr>
<tr>
<td></td>
<td></td>
<td>imaging the movement of molecules near the glass surface, such as cell membranes and</td>
</tr>
<tr>
<td></td>
<td></td>
<td>adhesion factors.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Software and Equipment Required: TIRFM unit, TIRF objective, high-sensitivity CCR</td>
</tr>
<tr>
<td></td>
<td></td>
<td>camera*, CCD camera control software**</td>
</tr>
<tr>
<td>FRET</td>
<td>CFP-YFP FRET Ratio imaging and sensitized emission.</td>
<td>Available 440 nm diode laser is optimized for CFP-YFP FRET experiments methods.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Diode laser offers exceptional stability and long life. Equipment Required: LD 440</td>
</tr>
<tr>
<td></td>
<td></td>
<td>nm Laser</td>
</tr>
<tr>
<td>Multi-color imaging</td>
<td>Three-channel detector for simultaneous acquisition of</td>
<td>Imaging blue dyes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>fluorescence images from three different dyes. Sequential mode for acquisition of</td>
</tr>
<tr>
<td></td>
<td></td>
<td>fluorescence images without cross-talk. Fluorescence can also be separated using</td>
</tr>
<tr>
<td></td>
<td></td>
<td>unmixing lary available on spectral scan until</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Simultaneous four-color imaging Fourth channel detector can be easily added to</td>
</tr>
<tr>
<td></td>
<td></td>
<td>simultaneously acquire images of four colors. Equipment Required: 4-channel detector</td>
</tr>
<tr>
<td>Colocalization analysis</td>
<td>Easily determine if labeled substances are present</td>
<td>High-accuracy colocalization analysis</td>
</tr>
<tr>
<td></td>
<td>currently in the same locations. Calculation of Pearson</td>
<td>New 60x oil-immersion objective offers image acquisition with exceptional</td>
</tr>
<tr>
<td></td>
<td>coefficients, overlap coefficients and colocalization</td>
<td>positional accuracy coefficient. Equipment Required: PLAPON 60x0SC</td>
</tr>
</tbody>
</table>

* SIM scanner and TIRFM scanner cannot be installed on the same system.
** For more information about peripheral equipment, contact your Olympus local representative.

*Selected fluorescence dyes, while dot shows the absorption maximum, graphs show the dye emission spectra.
**Scanning Units**

Two types of scanning units, filter-based and spectral detection, are provided. The design is all-in-one, integrating the scanning unit, tube lens and pupil projection lens. Use of the microscope fluorescence illuminator light path ensures that expandability of the microscope itself is not limited. Visible, UV and IR laser introduction ports are provided, as well as a feedback control system.

**Laser Systems**

The multi-combiner enables combinations with all of the following diode lasers: 405 nm, 440 nm, 473 nm, 559 nm and 635 nm. The system can also be equipped with conventional Multi-line Ar laser and HelNeG laser.

**Illumination Units**

Conventional illumination modules are designed for long-duration time-lapse experiments. Since light is introduced through fiber delivery systems, no heat is transferred to the microscope.

**Optional Upgrade Equipments for FV1000**

- 4th Channel Detector Unit
- SIM Scanner
- TRFM Unit
- Fiber Port for Fluorescence Output
- Z-DCC
- Confocal
- C100 Incubator

**FV1000 System Diagram**

![FV1000 System Diagram](image)

**Software**

- Multi Stimulation Software
- Diffusion Measurement Package
- Basic software
- Review station software

**Expandability**

- 4th Channel Detector Unit
- SIM Scanner
- TRFM Unit
- Fiber Port for Fluorescence Output
- 4th channel detector unit
- Optional unit
- Motorized XY stage
- Monitor
- Cover
- SIM Scanner
- FV Power supply
- FU control unit
- FU power supply unit
- Microscope control unit
- FV1000 System Diagram

*Not available in some areas

**CO2 Incubator/High-Precision Motorized Stage**

- CO2 Incubator/High-Precision Motorized Stage
- Monitor
- FU power supply unit
- FU control unit
- Microscope control unit

*Not available in some areas

**Fluorescence Detection**

- Filter-based fluorescence detection unit.
### Main Specifications

<table>
<thead>
<tr>
<th>Laser light</th>
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