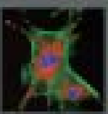
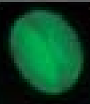
Nikon



Ar

Br

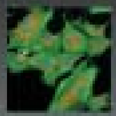
D



Imaging Software

NIS-Elements

Advanced Solutions for your Imaging World



N
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I
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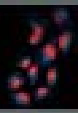


Nikon offers total software solution covering image capture, archiving, and analysis

NIS-Elements is an integrated software imaging platform developed by Nikon to achieve comprehensive microscope control, image capture, documentation, data management and analysis.

NIS-Elements handles multidimensional imaging tasks flawlessly with support for capture, display, peripheral device control, and data management & analysis of images of up to six dimensions. The system also contributes to experiment efficiency with a database building feature developed to handle archiving, searching, and analysis of large numbers of multidimensional image files.

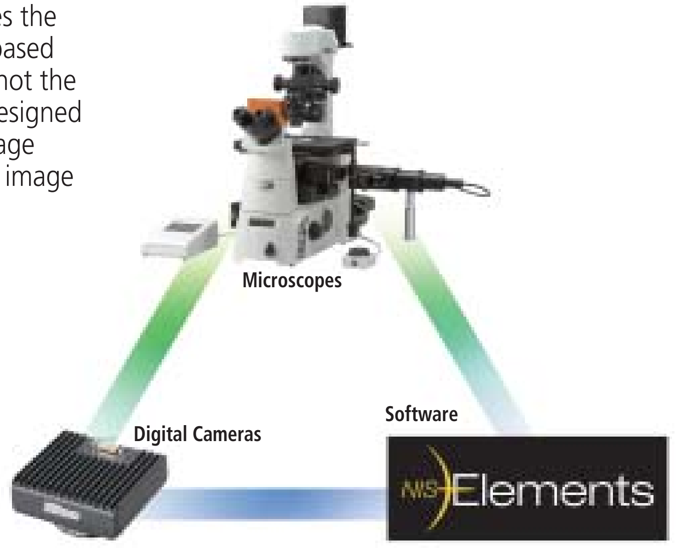
Unified control of the entire imaging system offers significant benefits to users for cutting-edge research, such as live cell imaging.

The NIS-Elements suite is available in three packages scaled to address specific application requirements.

Ar	The most sophisticated of the three packages, NIS-Elements AR is optimized for advanced research applications. It features fully automated acquisition and device control through full 6D (X, Y, Z, Lambda (Wavelength), Time, Multipoint) image acquisition and analysis.
Br	NIS-Elements BR is suited for standard research applications, such as analysis and photodocumentation of fluorescent imaging. It features acquisition and device control through 4D (up to four dimensions can be selected from X, Y, Z, Lambda (Wavelength), Time, Multipoint) acquisition.
D	NIS-Elements D supports color documentation requirements in bioresearch, clinical and industrial applications, with basic measuring and reporting capabilities.

Why NIS-Elements?

As a leading microscope manufacturer, Nikon realizes the importance of providing its customers with system-based solutions to free the user to focus on the work and not the complexities of the microscope. NIS-Elements was designed with this in mind. Never before has a software package achieved such comprehensive control of microscope image capturing and document data management.



Total Imaging Solution

In designing and bringing to market the most technologically advanced optical systems, Nikon has worked very hard to provide a "total imaging solution" that meets the ever-evolving demands of the microscope user.

•Highest Quality Optical Performance

The world-renowned Nikon CFI60 infinity optical system effectively set a new standard for optical quality by providing longer working distances, higher numerical apertures, and the widest magnification range and documentation field sizes.

As a leader in digital imaging technology, Nikon recognized the importance of adapting its optics to optimize the digital image. Nikon's new objectives and accessories are specifically engineered for digital imaging, with exclusive features, such as the Hi S/N System, which eliminates stray light and provides unprecedented signal-to-noise ratios.

Because what you see depends greatly on the quality of your microscope, we strive to power our microscope systems with optical technologies that are nothing but state-of-the-art.

•Diverse Line of Powerful Digital Cameras

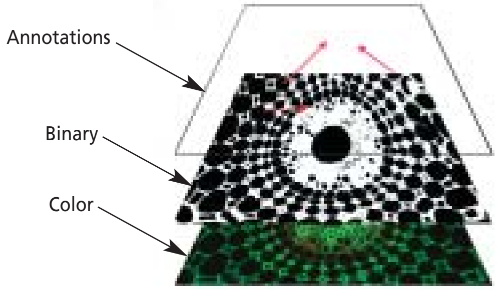
Image capture has become a high priority in microscopy and the demand for products that deliver high quality and versatile functionality has grown considerably in recent years. In accordance, Nikon offers a full line of digital cameras, addressing the varied needs of microscopists in multiple disciplines. Each Nikon digital camera is designed to work seamlessly with Nikon microscopes, peripherals, and software. With Nikon Digital Sight (DS) series cameras, even novice users can take beautiful and accurate microscopic images. For the advanced researcher, hi-resolution image capture and versatile camera control is fast and simple. Together with Nikon's new software solutions, image processing and analysis have reached new levels of ease-of-use and sophistication.

•Intelligent Software Solutions

Designed to serve the needs of advanced bioresearch, clinical, industrial and documentation professionals, NIS-Elements provides a totally integrated solution for users of Nikon and other manufacturers' accessories by delivering automated intelligence to microscopes, cameras, and peripheral components. The software optimizes the imaging process and workflow and provides the critical element of information management for system based microscopy.

Multi-layer Document Structure

NIS-Elements uses a sophisticated image documentation structure making it possible to achieve non-destructive archiving of image data including annotation (arrows, lines, text notes), measurement data, binary data for storing results of threshold or classification processes, and meta-data information for recording acquisition and device conditions at the time of image acquisition.



Realizing a smooth flow from image capture to process and measurement

Image Acquisition

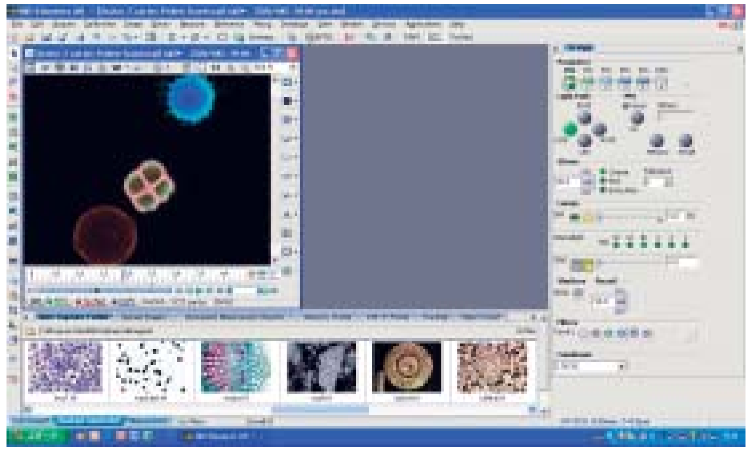
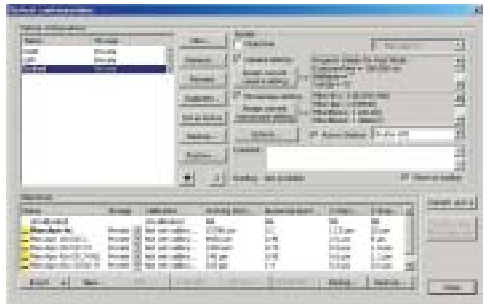


Image acquisition screen

Optical Configuration

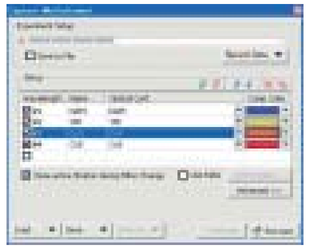
Microscope parameters, such as fluorescence filter and shutter combinations, can be saved and displayed as icons in the tool bar, allowing one-click setup. Setting up a CCD camera, applying shading compensation to each objective lens, and saving calibration data is also possible.

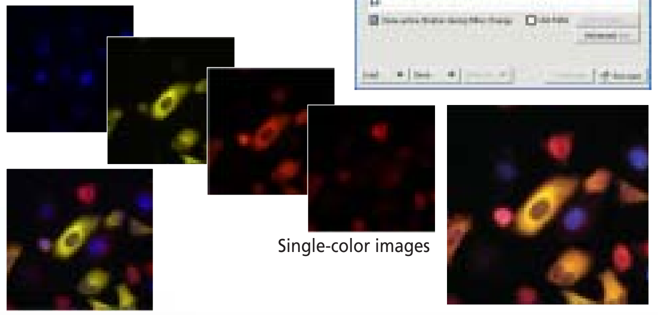


Diverse Dimensional Acquisition

Multichannel Image

Images using defined filters can be captured to view in various light wavelengths. Simply define the color of channels and the optical configuration that is to be used for capturing the set of images.





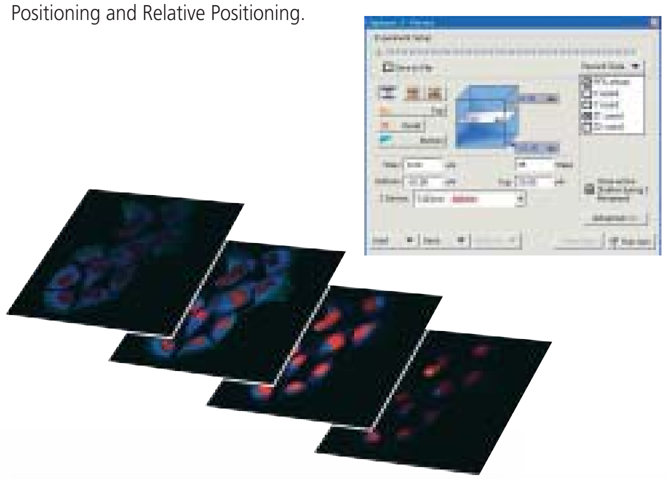
Single-color images

Specified-color merged image

All-color merged image

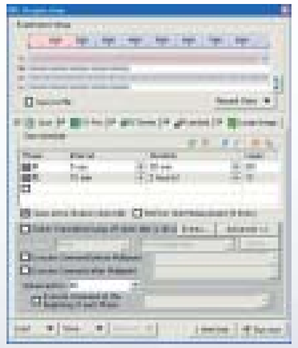
Z-series

Images at different Z-axis planes can be captured with a motorized Z-Focus control. NIS-Elements supports two methods of Z-axis capture: Absolute Positioning and Relative Positioning.



Time Lapse

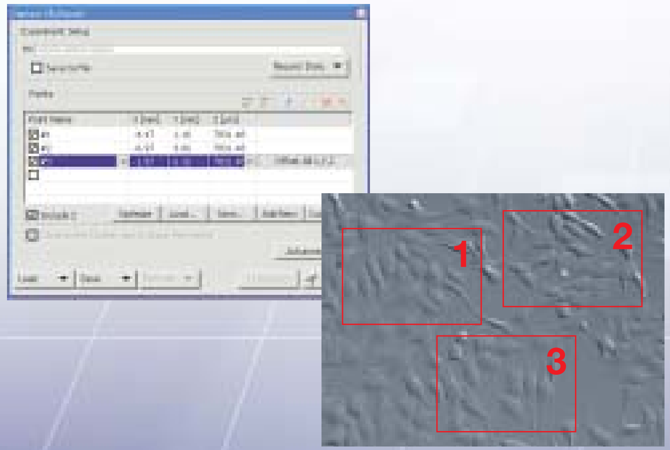
The sophisticated but user-friendly time-lapse process enables the staggering of image capture simply by defining interval, duration, and frequency of capture.



0 sec. 15 sec. 30 sec.

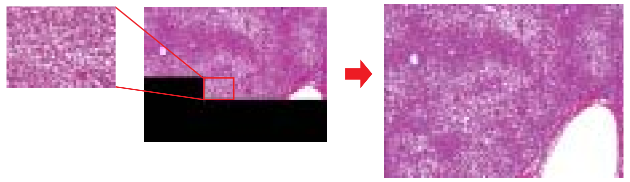
Multipoint Experiments

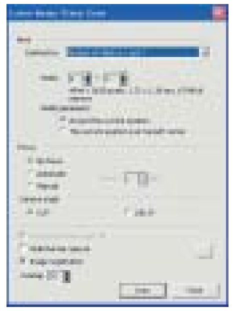
With the motorized stage installed, it is possible to automatically capture images at different XY and Z locations.



Large Image Stitching

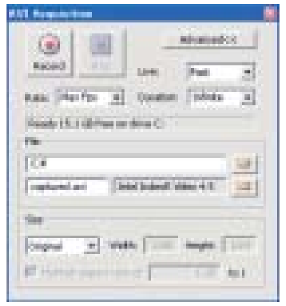
This tool allows composition of large-area images with high magnification. Ultra high-resolution images can be stitched automatically from multiple frames through use of a motorized stage. NIS-Elements uses special algorithms to assure maximal accuracy during stitching. The user can also capture and stitch frames by moving the microscope stage manually.





AVI Capture

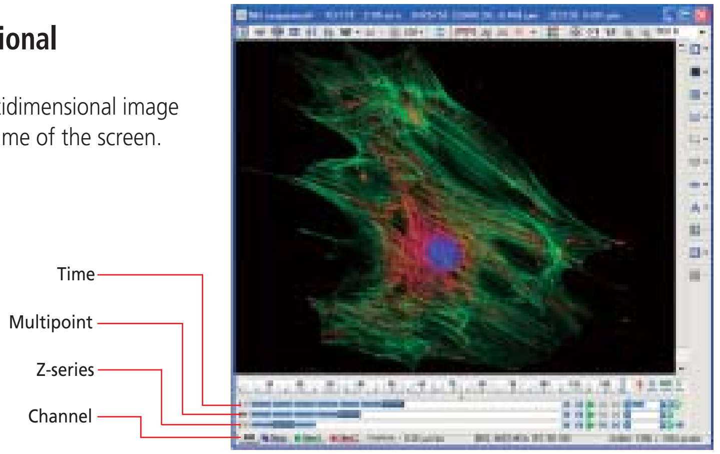
This tool allows acquisition of images in AVI file format.



View

nD Viewer (Multidimensional image display)

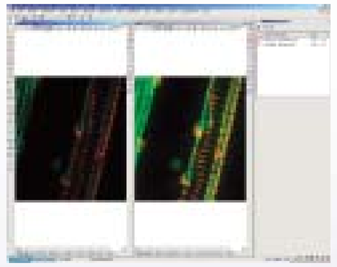
Easy-to-use parameters for multidimensional image operation are located on the frame of the screen.



Experiment data information

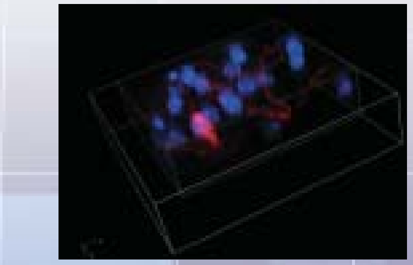
View Synchronizer

The View Synchronizer allows for the comparison of two or more multidimensional image documents. It automatically synchronizes the views of all documents added.

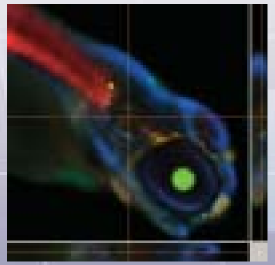


Sequential Data Processing

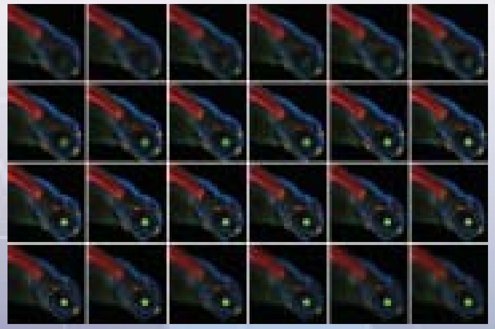
Various image views can be selected to study captured data.



Volume rendering



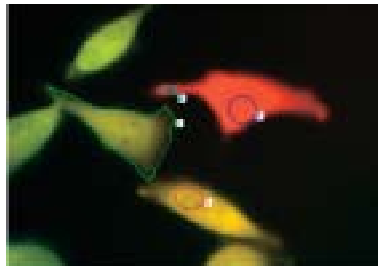
Orthogonal image

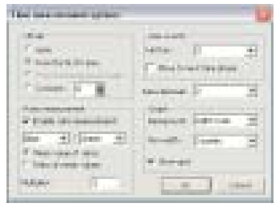


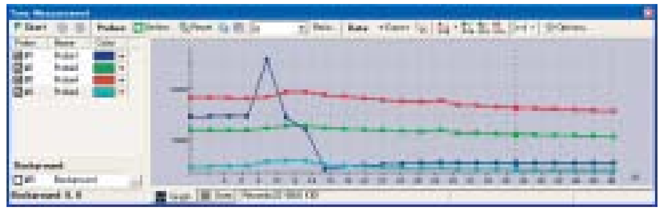
Tiled image

Time Measurement

Time Measurement records the average pixel intensities within defined probes during a time interval and can be performed on live or captured data sets. Time measurement also allows for real-time ratios between two channels.





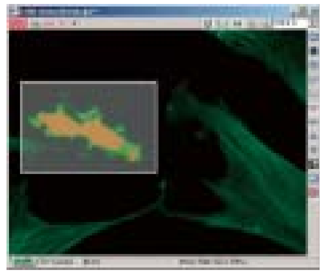


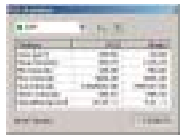
RAM Capturing

RAM Capturing enables the recording of very quick sequences to capture the most rapid biological events by streaming data directly to the computer's video memory.

ROI statistics

Statistics pertaining to area and brightness of defined region of interest (ROI) can be easily collected. Results can be saved as an Excel file.
It is also possible to compare ROI analysis data of different channels.





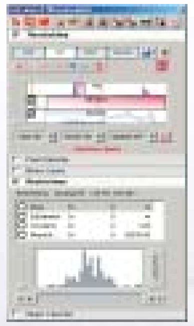
Measurement

Interactive Measurement

NIS-Elements offers all necessary measurement parameters, such as taxonomy, counts, length, semiaxes, area and angle profile. Measurements can be made by drawing the objects directly on the image. All output results can be exported to any spreadsheet editor.

Automatic Measurement

NIS-Elements enables automatic measurement by creating a binary image. It can automatically measure length, area, density and colorimetry parameters sets, etc. About 90 different object and field features can be measured automatically.



Profile

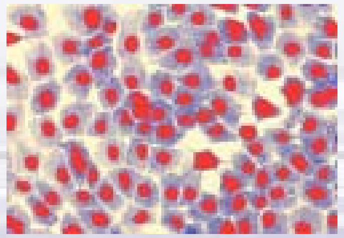
Five possible interactive line profile measurements provide consecutive intensity of a sourced image along an arbitrary path (free line, two-point line, horizontal line, vertical line and polyline).

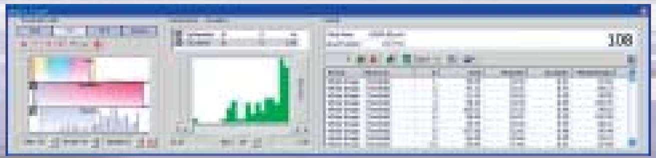
Classifier

Classifier allows segmentation of the image pixels according to different user-defined classes, and is based on different pixel features such as intensity values, RGB values, HSI values, or RGB values ignoring intensity. The classifier enables data to be saved in separate files.

Object counting

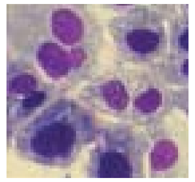
Complicated procedures such as Thresholding, Morphology and Restrictions are pulled into one control window, simplifying the measurement process and boosting ease of use. Settings are applied to measurement results in real time.



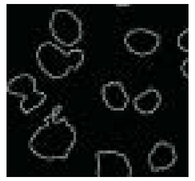


Morphology

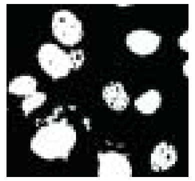
NIS-Elements offers a rich spectrum of mathematical morphology filters for object classification. Morphology filters can be used to segment binary and grayscale images for measurement analysis purposes. Various morphometric parameters mean image processing is easier than ever.



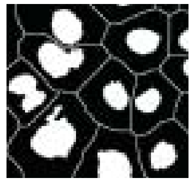
Original



Contour



Threshold



Zones of Influence + Source

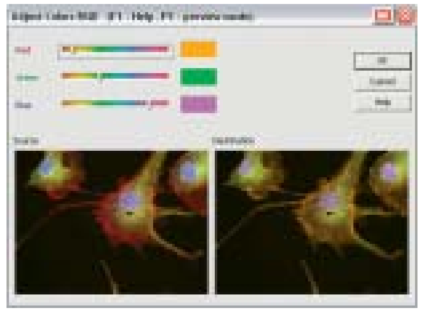
- Basic morphology (erosion, dilatation, open, close)
- Homotopic transformations (clean, fill holes, contour, smooth)
- Skeleton functions (medial axis, skeletonize, pruning)
- Morphological separation and others

Image Processing

Color Adjustment

contrast/background subtraction/component mix

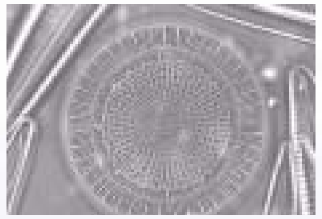
NIS-Elements is suitable for hue adjustment, independently for each color, and converts the color image to an RGB or HSI component.



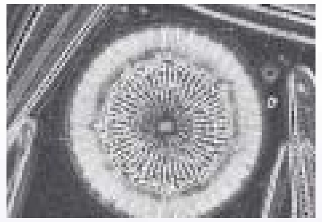
Filters

smoothing/sharpness/edge detection

NIS-Elements contains intelligent masking filters for image smoothing, sharpness, edge detection, etc. These filters not only filter noise, but also are effective in retaining the image's sharpness and detail.



Before using the edge detection filter



After using the edge detection filter

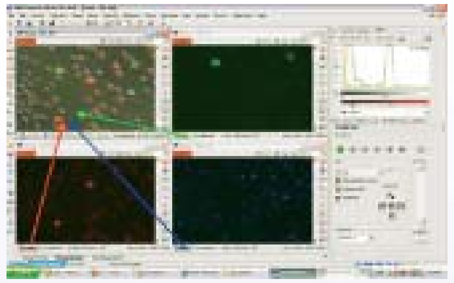
Image Arithmetic

A+B/A-B/Max/Min

NIS-Elements performs arithmetic operations on color images.

Merge Channels

Multiple single channel images (captured with different optical filters or under different camera settings) can be merged together simply by dragging from one image to another. In addition, the combined images can be stored to a file while maintaining their original bit depths or, optionally, can be converted into an RGB image.



Report Generator

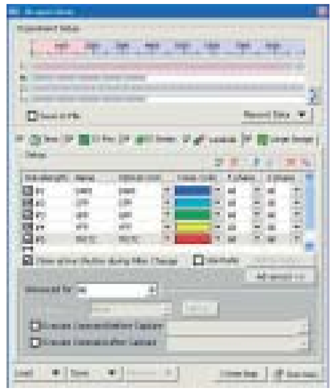
Report Generator enables the user to create customized reports containing images, database descriptions, measured data, user texts, and graphics. PDF files can be created directly from NIS-Elements.

Measurement Protocol

Various convenient plug-ins for advanced imaging and analysis capabilities

Multidimensional Acquisition (4D/6D)

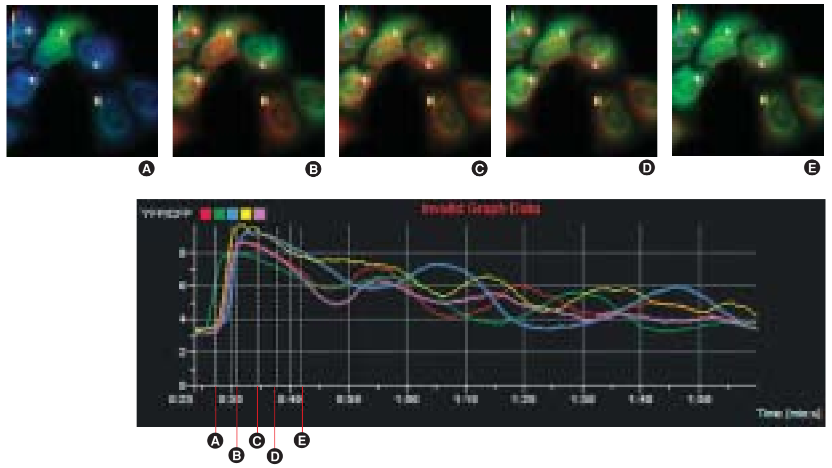
NIS-Elements can combine X, Y, Z, Lambda (wavelength), Time and Multi-Stage points within one integrated platform for multidimensional imaging. All combinations of multidimensional images can be combined together in one ND2 file sequence using an efficient workflow and intuitive GUI. The user can easily choose the proper parameters for each dimension and the software and hardware will work seamlessly together to provide high quality results. Results may be exported into other supported image and video file formats.



T, XY, Z, λ simultaneous acquisition

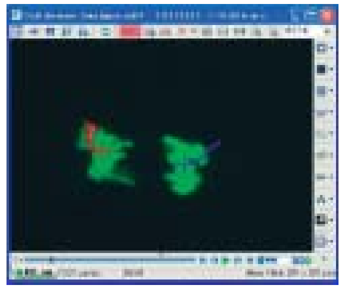
Calcium & FRET

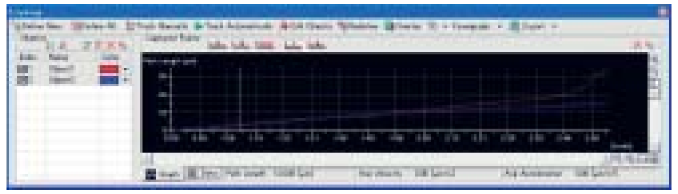
This plug-in allows calcium measurement and FRET analysis. FRET analysis uses the three-filter method and allows calibration of Ca^{2+} concentration. The Gordon method that uses three filter sets allows calculation of FRET efficiency.



Object Tracking

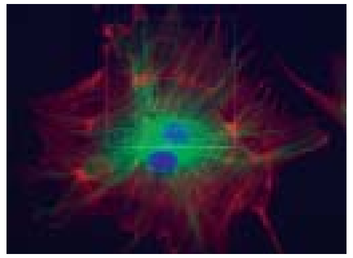
By tracking an object captured by 2D acquisition, speed and distance of its movement can be measured. Exporting acquired data is also possible.

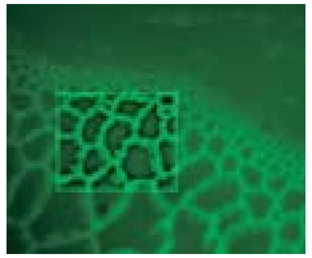




2D Real-time Deconvolution

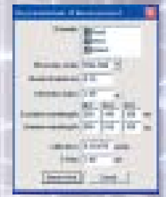
The real-time 2D deconvolution module (from AutoQuant®) allows the user to observe live specimens with less out-of-focus blur. It allows faint biological processes to be observed that may otherwise be missed and increases observed signal-to-noise ratio.

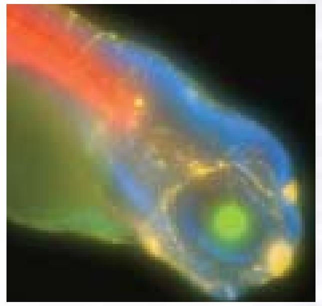




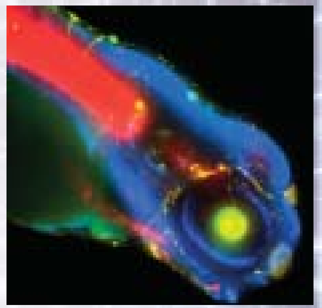
3D AutoQuant® Blind Deconvolution

The haze and blur of the image that can occur when capturing a thick specimen or a fluorescence image can be eliminated from the captured 3D image.





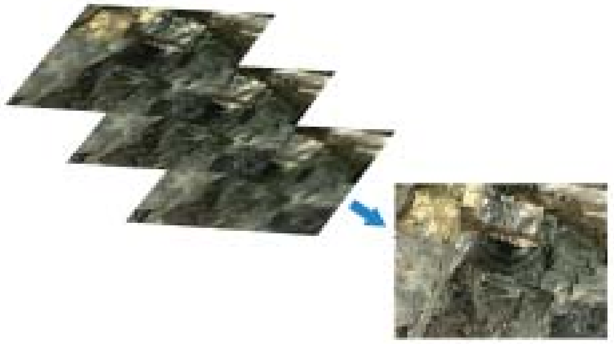
Before deconvolution



After deconvolution

EDF: Extended Depth of Focus

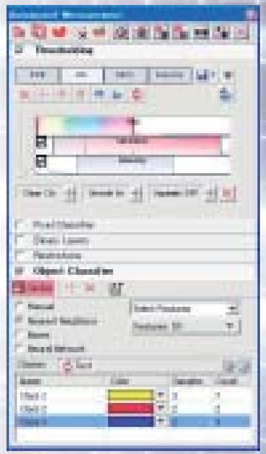
Extended Depth of Focus (EDF) is an additional software plug-in for NIS-Elements. Thanks to the EDF function, images that have been captured in a different Z-axis can be combined to create an all-in-focus image. Also, it is possible to create stereovision image & 3D surface image for a virtual 3D image.



Focused image created from a sequence of Z-stack images

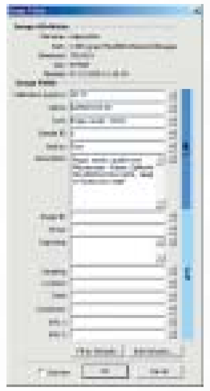
Object Classifier

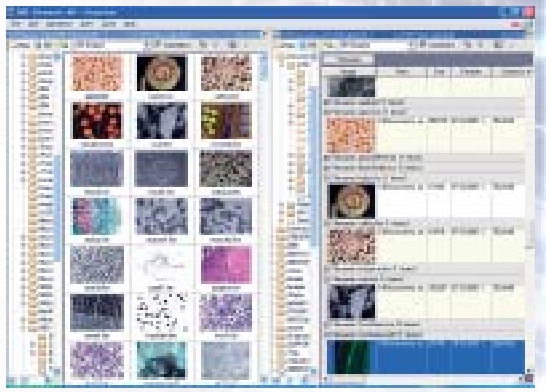
Extracted measurement objects can be classified according to shape, brightness, size and specified characteristics. Measuring and counting by each class can be conducted easily.



Database

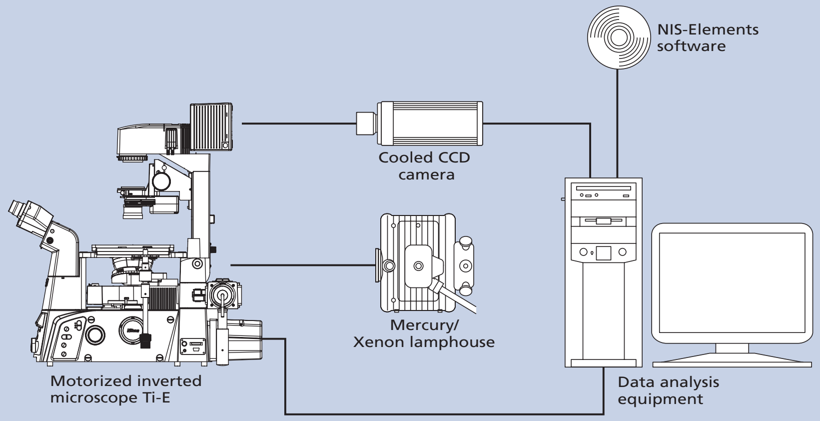
NIS-Elements has a powerful image database module that supports image and meta data. Various databases & tables can easily be created and images can be saved to the database via one simple mouse-click. Filtering, sorting and multiple grouping are also available according to the database field given for each image.



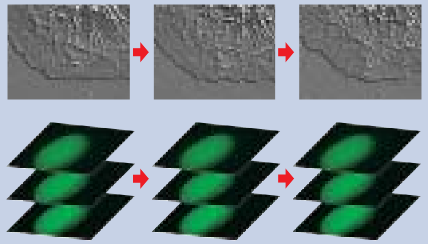


System Configuration Examples

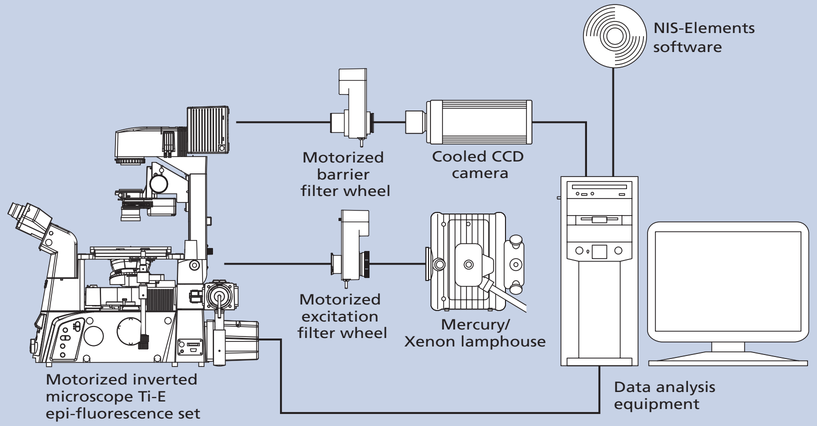
3D (XYt), 4D (XYZt) Time-Lapse Imaging System



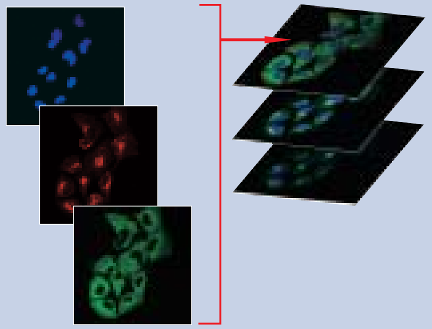
By controlling the shutter attached to a microscope, long-term time-lapse observation is possible. As well as conventional time-lapse acquisition, High-Speed RAM capturing is possible. By controlling the Z focus of a microscope, 4D time-lapse acquisition is also possible, depending on the thickness (Z-axis direction) of the specimen.



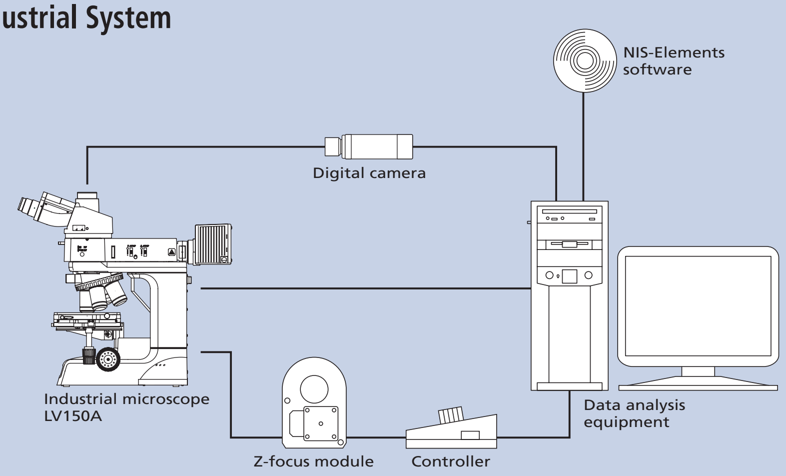
4D (XYZλ) Multicolor Imaging System



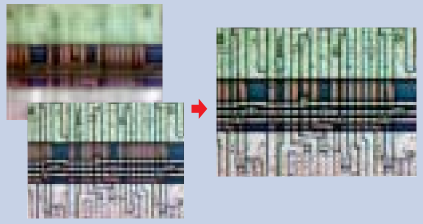
By controlling the fluorescence filter wheel, excitation and absorption lights can be changed to observe a specimen.



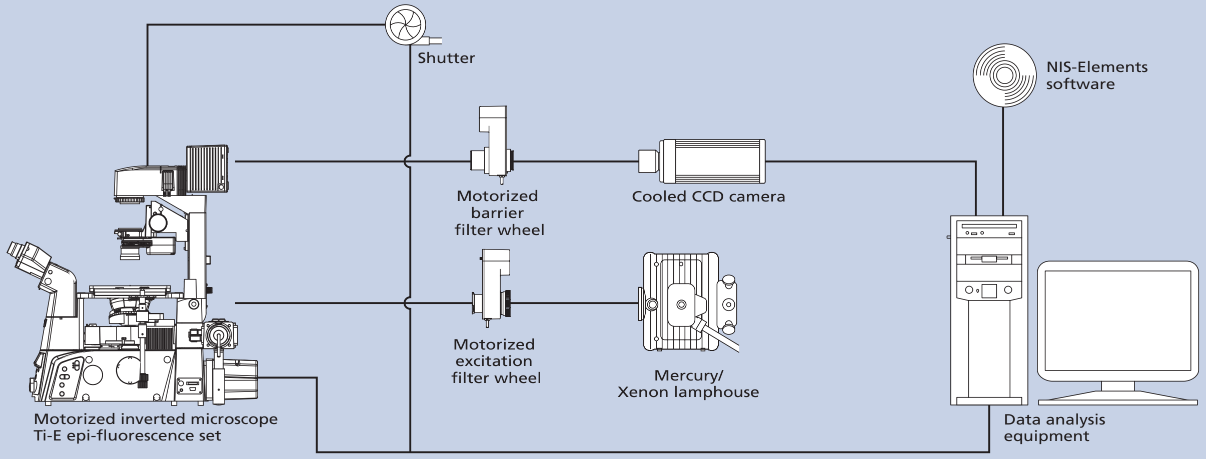
Industrial System



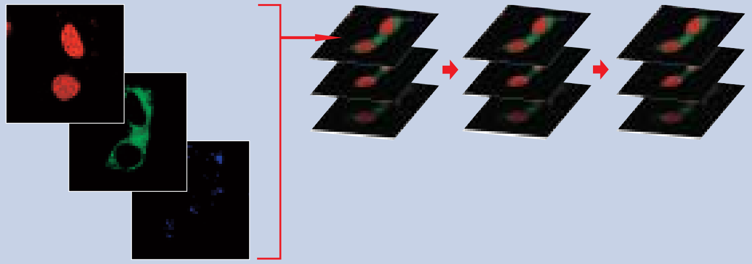
By controlling the Z focus of a microscope, images of the same viewfield with different focus planes are automatically captured with the EDF tool to create an all-in-focus image in the specimen's depth direction.



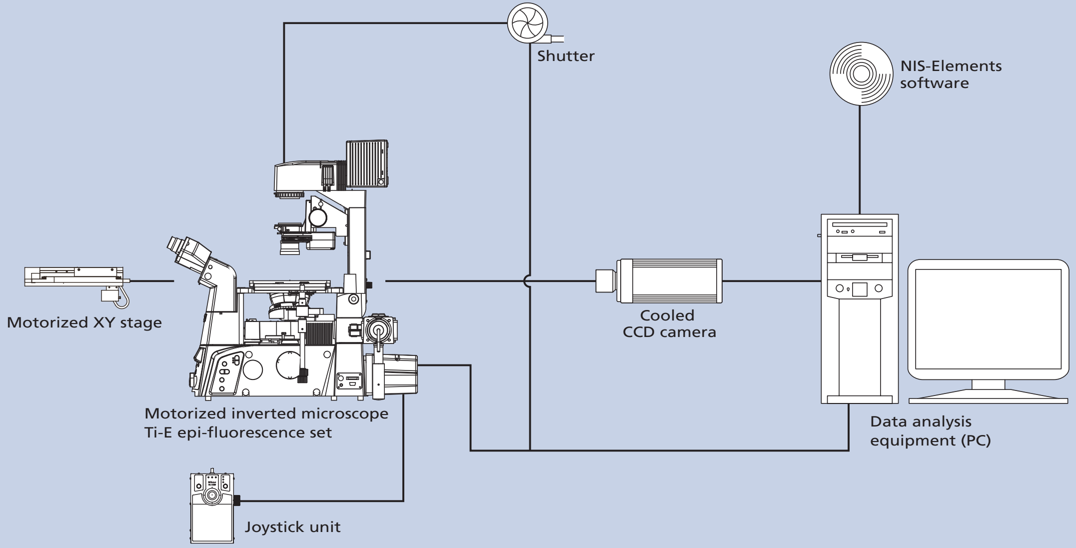
5D (XYZλt) Imaging System



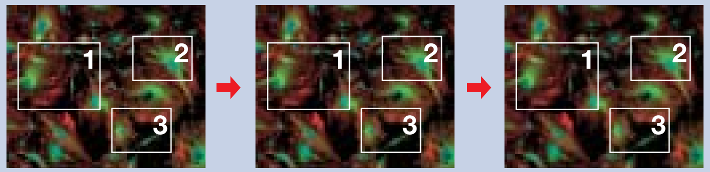
By controlling the motorized microscope, it is possible to change the focus plane (Z focus) and the excitation and absorption lights. The experiment program can be easily set up by selecting the necessary settings without using the special macro.
Moreover, handling of the acquired image data is made easy. Various processes also facilitate analysis and visualization after image acquisition.



6D (XYZλt Multipoint) Imaging System



By controlling the motorized microscope and stage, simultaneous multipoint time lapse and acquisition of Z-axis information of each of these points is possible. For example, when imaging multiple XY and Z locations, wavelength and time can also be acquired in a single experiment.



Features

	AR	BR	D
Window style	MDI (Multiple Document Interface)	MDI (Multiple Document Interface)	SDI (Single Document Interface)
Camera control	○	○	○
Microscope control	○	○	○
Nikon made peripheral device control	○	○	○
Non-Nikon peripheral device control	●	●	●
Live image capture	○	○	○
Time-lapse image capturing (T)	○	○	△
Z-series image capturing (Z)	○	○	○
Multichannel image capturing (λ)	○	○	—
Multipoint image capturing (P)	○	○	○
Multidimensional image capturing	● Up to 6D	● Up to 4D	—
RAM capture	○	—	—
AVI live-stream capture	○	○	○
Objective calibration	○	○	○
Capturing data savings (Meta-data)	○	○	○
Image filtering	○	△	△
Binary	○	△	▲
LUT (look up table)	○	○	○
Histogram	○	○	○
Manual measurement	○	○	○
Auto measurement	○	○	●
Intensity line profile	○	○	○
Time (intensity) measurement	○	●	—
3D measurement	●	▲	▲
Volume measurement	○	—	—
Database	●	●	●
Macro	○	△	△
Advanced interpreter	○	●	●
Report generator	○	○	○
Live compare	○	●	●
ND volume view	○	△	△
EDF	●	●	●
3D surface view	●	●	●
Ratio view	○	—	—
Nikon original deconvolution	●	—	—
AQ blind deconvolution	●	—	—
2D real time deconvolution	●	—	—
Object classifier	●	—	—
Object tracking	●	—	—
FRET & Calcium	●	—	—
Metalogical analysis	—	—	●

○: Full function △: Limited function —: Not available ●/▲ : Option

* Monitor images are simulated.
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Specifications and equipment are subject to change without any notice or obligation on the part of the manufacturer. September 2008

NIS-Elements Supported Devices

Nikon Cameras

- A1/C1 Confocal
- Digital Sight Series
  (1st, 2nd Generation)
- DS-1QM*
- DQC-FS
- DXM1200 Series*

Third-party Cameras

- Roper Scientific
  - QuantEM
  - CoolSNAP Series
- Andor Technology
  - Luca S, Luca R
  - iXON+ 987, 888, 885
- QImaging
  - Retiga 2000R - Mono/Color
  - Retiga SRV + RGB-HM-S Slide
- SONY
  - DFW-X710, SX910
- PixeLINK
  - PL-A662 - Color
- Vosskuhler*
  - 1300B
  - 1300QB
  - 1300F
- Hamamatsu
  - ImagEM C9100-13
  - ORCA 9100-12
  - ORCA (DCAM)
  - C9100-02
- Imaging Source
  - Imaging Source Converter DFG/1394
- Matrox*
  - Matrox Meteor II/Multi-Channel
    (only PAL)
- JVC
  - JVC KY-F75
- TWAIN Device*

*Only compatible with Windows XP

Nikon Microscope Devices

- Inverted Microscope Ti, TE2000 Series
- Upright Microscope 90i, 80i
- Multizoom Microscope AZ100
- Industrial Microscope LV Series
- Measuring Microscope MM-400/800
- Fiber Illuminator Intensilight
- Nikon Remote Z Focus Controller

Third-party Devices

- Prior Scientific
  - ProScan II (H30)
  - Prior PCI
  - ProScan (H29)
  - OptiScan II, OptiScan
  - NZ100, 200, 500 nanoStageZ
  - Lumen Pro
- Ludl Electronic Products
  - MAC5000
- Märzhäuser Wetzlar
  - TANGO Desktop, Tango PCI
  - LSTEP, ECO-STEP, MCL2, MCL3
- Vincent Associates (Uniblitz)
  - VMM-D3 (only via TE2000)
  - VCM-D1
- Sutter Instrument
  - Lambda 10-2, 10-3, SC, 10-B
- Physical Instrument
  - PI E-662, 665 (RS232)
- Optical Insights
  - Dual View
- EXFO
  - EXFO XCite120
- ASI (Applied Scientific Instrumentation)
  - MS-2000
  - FW-1000
  - SC-2000

Supported Operation System

Windows Vista Business (x64) SP1
Windows Vista Business SP1 (32-bit Version)
Windows XP Professional SP2 (32-bit Version)

NIS-Elements is compatible with all common file formats, such as JP2, JPG, TIFF, BMP, GIF, PNG, ND2, JFF, JTF, AVI, ICS/IDS. ND2 is a special format for NIS-Elements. ND2 allows storing sequences of images acquired during nD experiments. It contains information about the hardware settings and the experiment conditions and settings.

⚠ WARNING	TO ENSURE CORRECT USAGE, READ THE CORRESPONDING MANUALS CAREFULLY BEFORE USING YOUR EQUIPMENT.

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