Nikon

Ar

Br

D

Imaging Software

NIS Elements

Advanced Solutions for your Imaging World

N
Nikon

I
Imaging

S
Software

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.
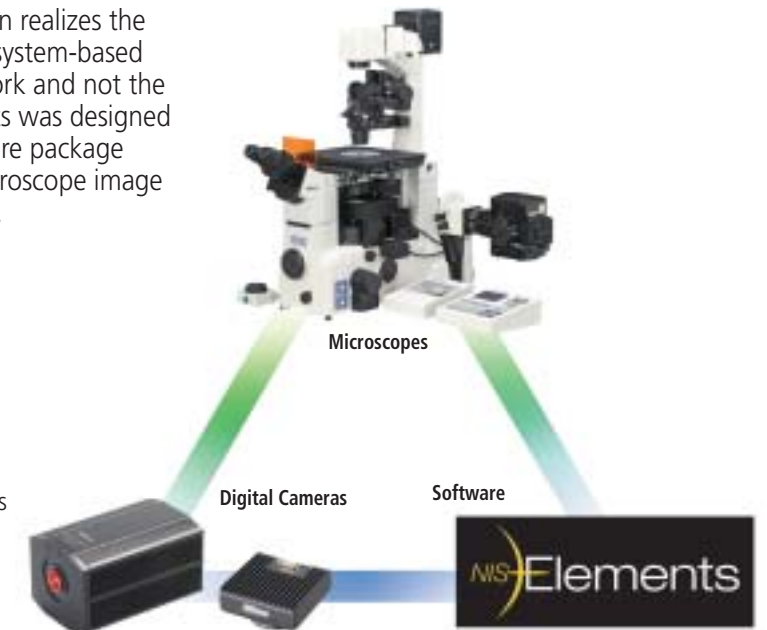
Microscopes

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.

Digital Cameras   Software

•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.

Annotations

Binary

Color
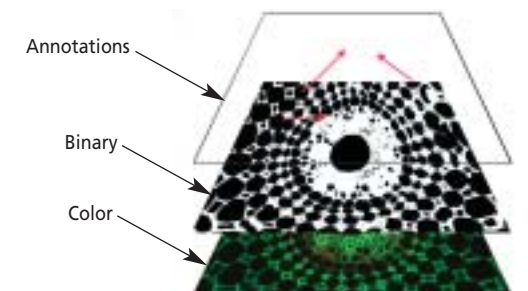
Realizing a smooth flow from image capture to process and measurement
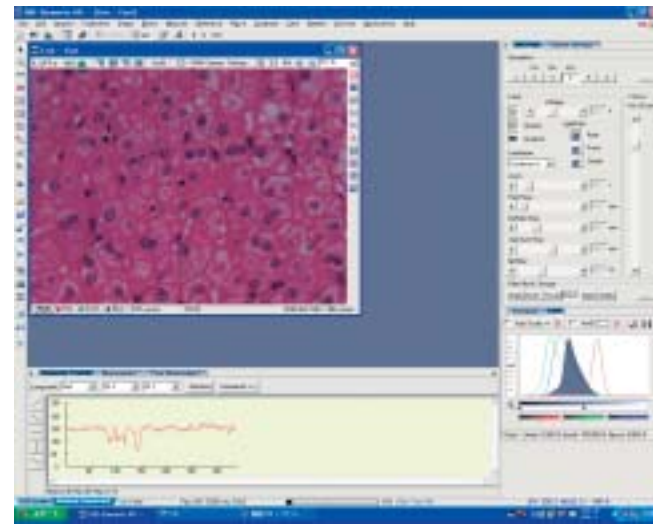
Image Acquisition

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.

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.
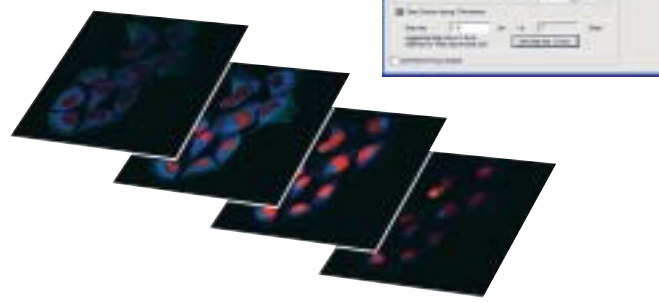
Time Lapse

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.
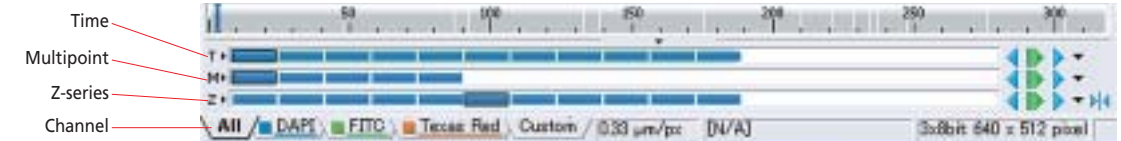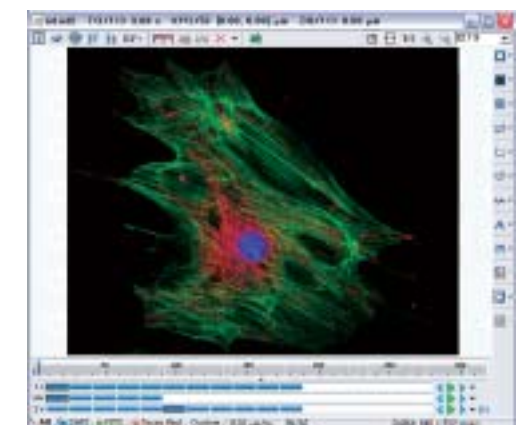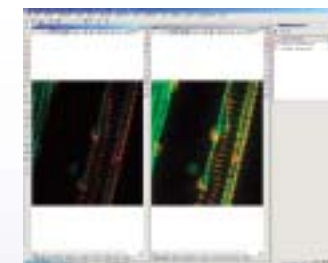
View

Experiment data information

nD Viewer (Multidimensional image display)

Easy-to-use parameters for multidimensional image operation are located on the frame of the screen.
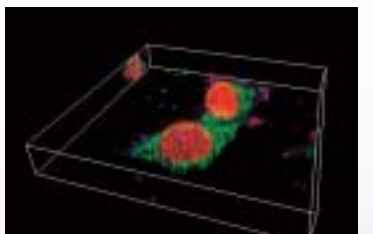
Time
Multipoint
Z-series
Channel

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.
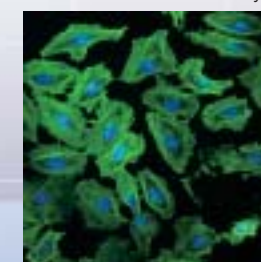
Confocal Image Import

Images acquired with Nikon confocal microscopes C1si and C1plus can be imported. Verified with data created with the latest EZ-C1.

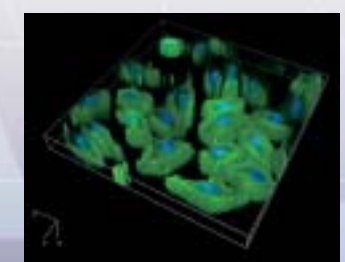## Sequential Data Processing

Various image views can be selected to study captured data.

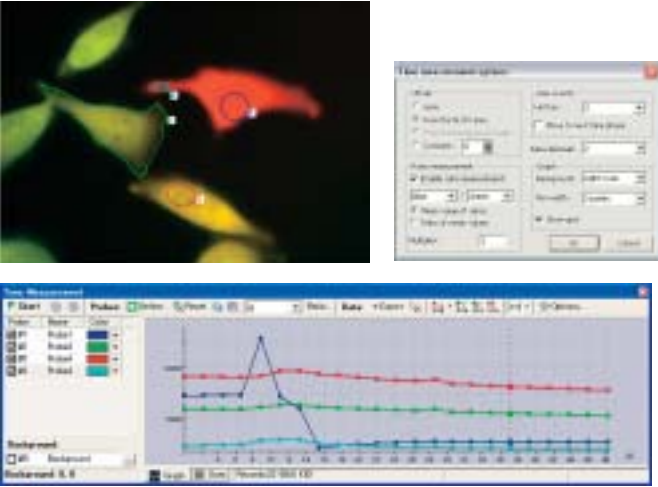Multidimensional image   Orthogonal image   Volume rendering
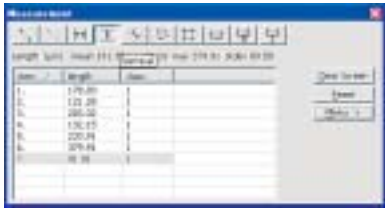
Time Measurement

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.

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.

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

Original   Contour   Threshold   Zones of Influence + Source
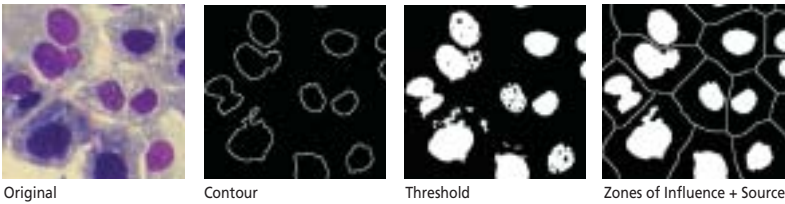
Image Processing

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.

Image Arithmetic
A+B/A-B/Max/Min
NIS-Elements performs arithmetic operations on color images.

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

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.

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.

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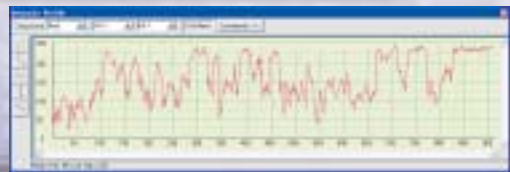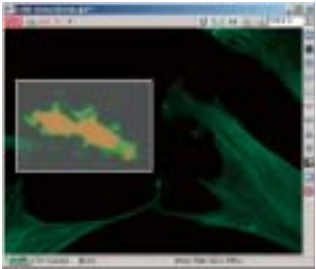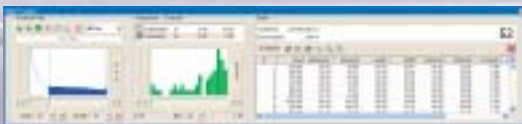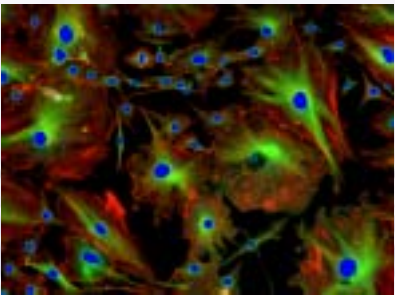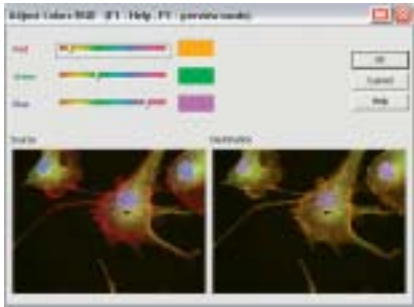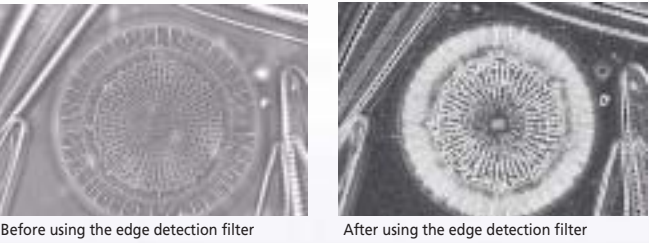
Automatic Measurement
NIS-Elements enables automatic measurement by creating a binary image. It can automatically measure length, area, density and colorimetry parameters sets, etc. About 90 different object and field features can be measured automatically.

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.

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).

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.

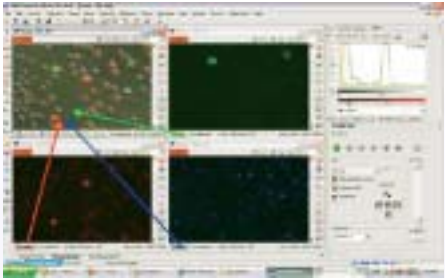# Various convenient plug-ins for advanced imaging and analysis capabilities

## 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

ND documentation exportation

Multidimensional image cropping

Convert sequential images to ND2 file

AVI generation

3D Deconvolution/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. Images acquired with Nikon confocal microscopes C1si and C1plus can be imported to NIS-Elements.

Before deconvolution

After deconvolution

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.
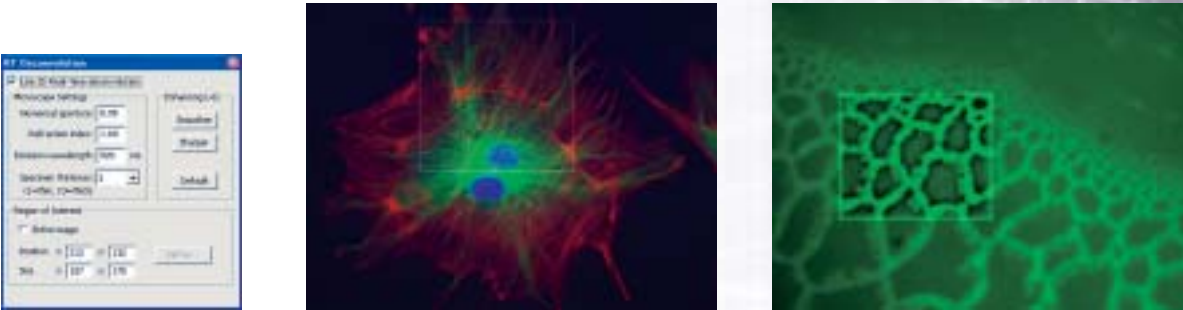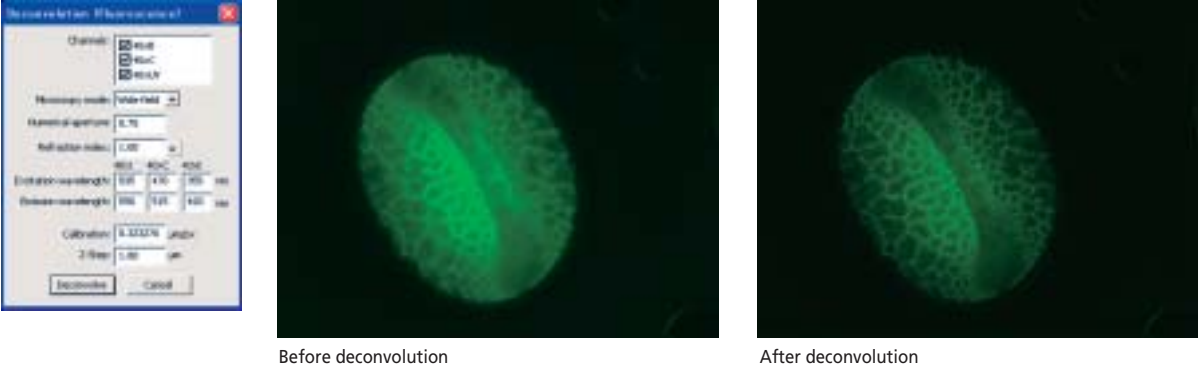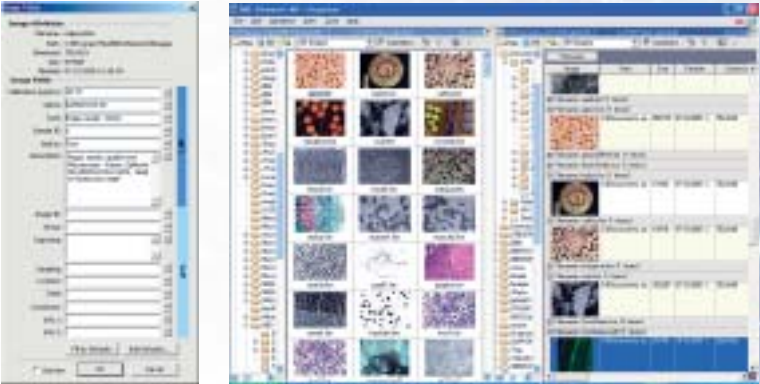

EDF: Extended Depth of Focus
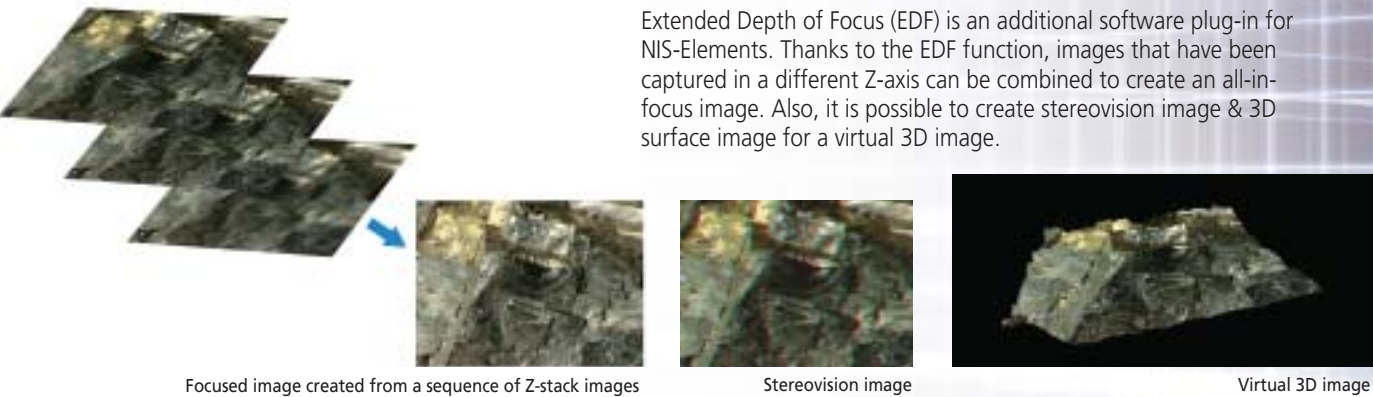
Extended Depth of Focus (EDF) is an additional software plug-in for NIS-Elements. Thanks to the EDF function, images that have been captured in a different Z-axis can be combined to create an all-in-focus image. Also, it is possible to create stereovision image & 3D surface image for a virtual 3D image.

Focused image created from a sequence of Z-stack images   Stereovision image   Virtual 3D image

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.
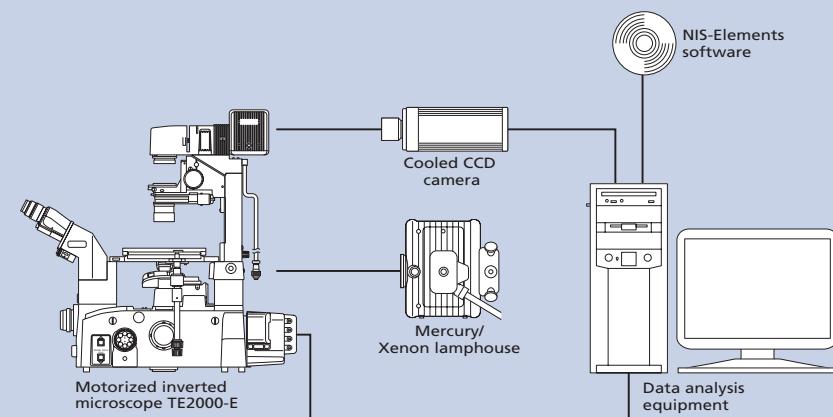

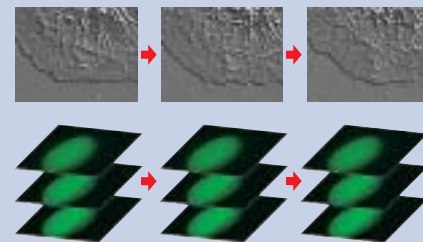### Hardware plug-ins for peripherals are also available.

NIS-D Stage	For motorized XY stage control	NIS-D XCITE	For fiber illumination control
NIS-D Shutter	For control of motorized filter wheel with shutter	NIS-D Z-drive	For external Z-drive control
NIS-D Splitter DV	For control of camera emission splitter		

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9

System Configuration Examples

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

NIS-Elements software

Cooled CCD camera

Mercury/Xenon lamphouse

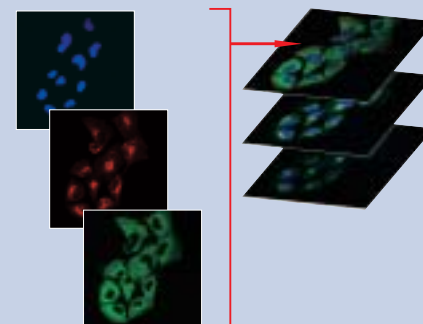Motorized inverted microscope TE2000-E

Data analysis equipment

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.
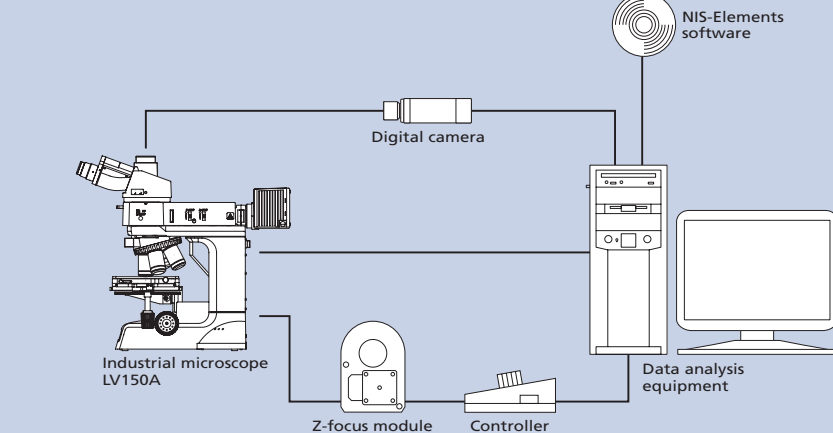
4D (XYZλ) Multicolor Imaging System

NIS-Elements software

Motorized barrier filter wheel

Cooled CCD camera

Mercury/Xenon lamphouse

Motorized excitation filter wheel

Motorized inverted microscope TE2000-E epi-fluorescence set

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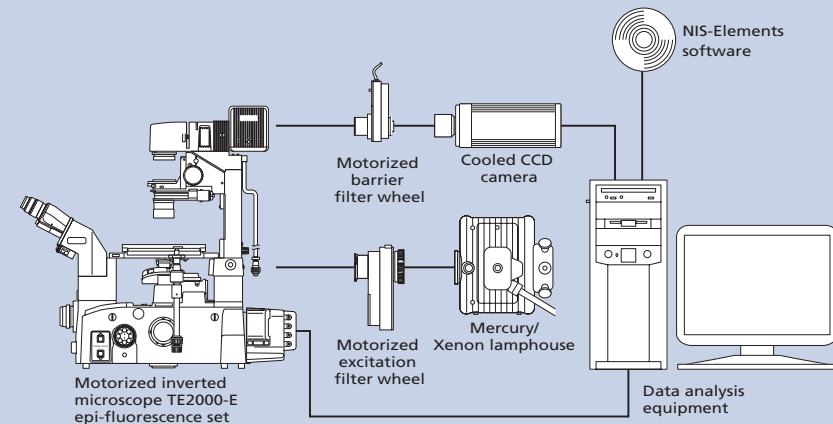
By controlling the fluorescence filter wheel, excitation and absorption lights can be changed to observe a specimen.

Industrial System

NIS-Elements software

Digital camera

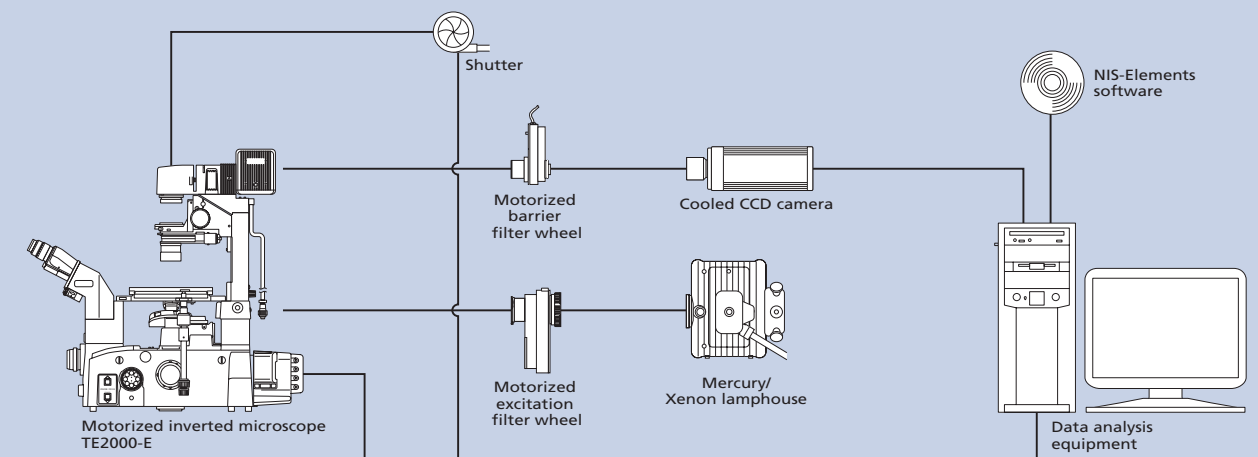Industrial microscope LV150A

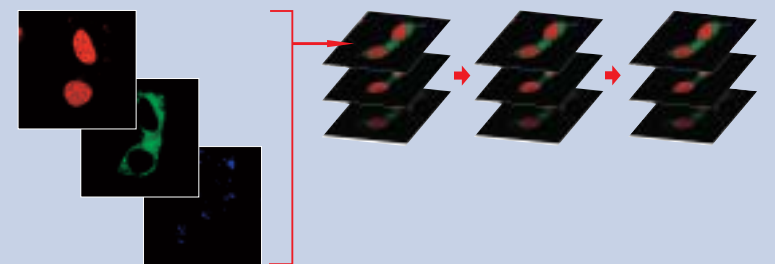Z-focus module   Controller

Data analysis equipment

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.
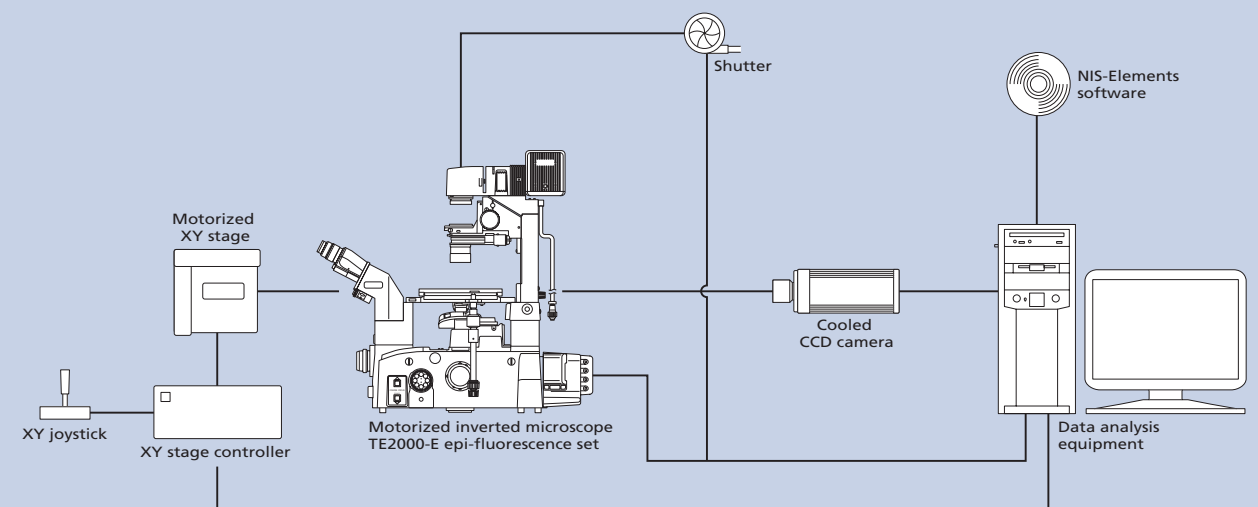
5D (XYZλt) Imaging System

Shutter

NIS-Elements software

Motorized barrier filter wheel

Cooled CCD camera

Motorized excitation filter wheel

Mercury/Xenon lamphouse

Motorized inverted microscope TE2000-E

Data analysis equipment

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

Shutter

NIS-Elements software

Motorized XY stage

Cooled CCD camera

XY joystick

XY stage controller

Motorized inverted microscope TE2000-E epi-fluorescence set

Data analysis equipment

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.
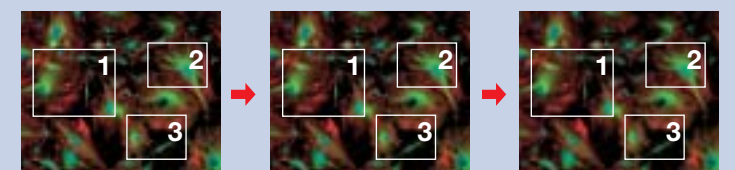
Features

	NIS-Elements AR	NIS-Elements BR	NIS-Elements D
Window type	MDI (multiple)	MDI (multiple)	SDI (single)
Camera control	●	●	●
Microscope control	●	●	●
Nikon peripheral device control	●	●	●
Non-Nikon peripheral device control	● (option)	● (option)	● (option)
Live image capture	●	●	●
Time-lapse image capture (T)	●	●	▲
Z-series image capture (Z)	●	●	●
Multichannel image capture (λ)	●	●	
Multipoint image capture	●	●	●
Multidimensional image capture	● (option)	● (option)	
RAM capture	●		
LUT	●	●	●
Histogram	●	●	●
Image processing	●	▲	▲
Binary processing	●	▲	▲ (option)
Manual measurement	●	●	●
Automatic measurement	●	●	● (option)
Time measurement (time-lapse intensity measurement)	●	● (option)	
3D measurement	● (option)	▲ (option)	▲ (option)
Volume measurement	●		
Database	● (option)	● (option)	● (option)
Macro	●	▲	▲
Advanced interpreter (macro extension)	●	● (option)	● (option)
Report generation	●	●	●
E-mailing	●	●	●
Live compare	●	● (option)	● (option)
Sliced view	●	●	●
Volume view	●	●	
Split view	●	●	
Ratio view	●		
EDF/Real-time EDF	● (option)	● (option)	● (option)
3D deconvolution	● (option)		
AutoQuant 3D blind deconvolution	● (option)		
RT (2D real-time) deconvolution	● (option)		
Metallographic analysis (METALO)			● (option)

● full function ▲ limited function

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.

* 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. July 2007 ©2006-7 NIKON CORPORATION

NIS-Elements Supported Devices

Nikon Cameras
DQC-FS/FW
Digital Sight Series (1QM, Qi1, 5M, 5Mc, Fi1, 2Mv, 2MBW, 2MBWc)
DXM1200 Series

Third-party Cameras
Roper Scientific
  Coolsnap (ES, EZ, HQ2, K4)
  Cascade (128+, 1K)
Qimaging
  Retiga 2000R (Mono/Color)
Pixellink
  PL-A661/A662
Vosskuhler
  1300 Series, 2000/C
Hamamatsu
  ORCA
  C9100-02/C9100-12
  ImagEM C9100-13
Imaging Source
  Imaging Source Converter
  DFG/1394 (FireWire)
Matrox
  Matrox Meteor II
JVC
  KY-F75
Sony
  DFW-X710/SX910
TWAIN

Microscope Devices
TE2000
TE2000 Perfect Focus System
Eclipse I Series (90i, 80i, DIH)
LV NCNT Nosepiece Controller
Motorized Universal Epi FL Unit
LV Series
Intensilight
MM 400/800
AZ100M
Nikon Remote Focus Accessory
99640, 99641, 99888
(plug-in required)

Third-party Devices
Prior
  ProScan H29, H128
  ProScan II H30
  PCI High Speed Controller
  OptiScan
  NZ100, NanoStageZ
Marzhauser
  LSTEP
  ECO-STEP
  MCL2, MCL3
Uniblitz
  Uniblitz Shutter
Sutter
  Lamda10-2, 10-3, 10-B, SC
Physical Instrument
  Piezo PI E-662, E-665
National Instruments
  TTL Input/Output (NI Card)
Optical Insights
  Camera Emission Splitter (Dual view)
EXFO
  EXFO XCite
Vincent Associates
  VCM-D1 (RS232C)
LUDL
  MAC5000
  73005080/73005081 (Filter Wheel)
  73005056 (XY Stage)
  73005056 (Z Focus)
ASI
  MS-2000 (XY Stage/Z Focus)
  FW-1000 (Filter Wheel)
  SC-2000 (Shutter)
Prairie Technologies
  SFC (Swept Field Confocal)

Operating Environment

Minimum PC Requirements:

CPU	Pentium IV 3.2 GHz or higher
RAM	1GB or higher
OS	Windows XP Professional SP2 English Version
Hard Disk	600MB or more required for installation
Video	1280X1024 dots, True Color mode

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

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