



Imaging Software

NIS-Elements

Advanced Solutions for your Imaging World



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

NIS-Elements is an integrated platform of imaging software developed by Nikon to achieve comprehensive control of microscope image capturing and document data management.

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.

Flexible, easy-to-use core architecture

NIS-Elements supports plug-in-based software modules to expand functionality. The software can be used seamlessly for anything from device control of microscopes or cameras to EDF (Extended Depth of Focus) and deconvolution.

Easy multidimensional image acquisition

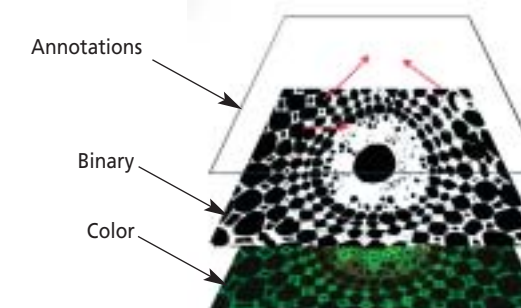
High-level quantitative analysis

User-friendly macro function

Various device support

Multi-layer Document Structure

Each document (image windows) is a three-tiered layer structure, and is therefore ideally suited for analysis.



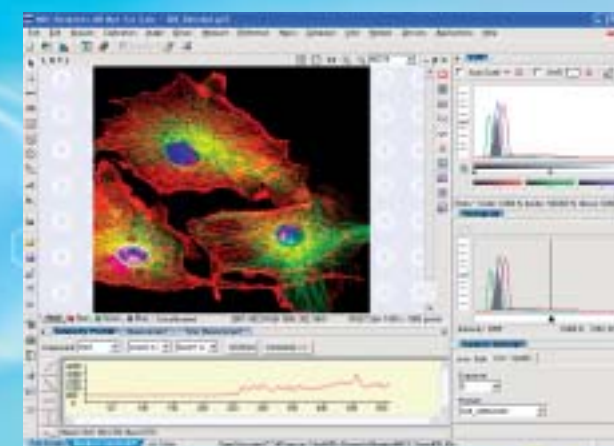
NIS-Elements is compatible with all common file formats, such as JPEG2000, ND2, TIFF, JFF, JPG, BMP, LIM, AVI, ICS/IDS. ND2 is a special format for NIS-Elements. ND2 allows storing sequences of images acquired during nD experiments. It contains information about the hardware settings and the experiment conditions and settings.

Selectable Layouts

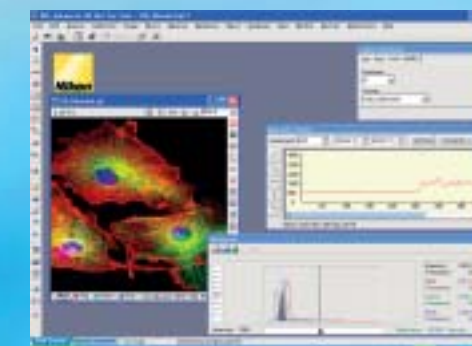
NIS-Elements comes with the built-in layouts "Docked Controls" and "Full Screen."

Layouts of all windows and toolbars can be freely customized by the user.

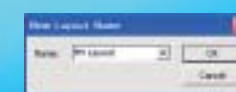
Switching between layouts is achieved by a single mouse click.



Docked controls



Full screen



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

- **NIS-Elements AR** – Advanced Research software for fully automated acquisition and device control through full six-dimensional image (X, Y, Z, λ (wavelength), T (time), Multi-point) acquisition and analysis.
- **NIS-Elements BR** – Basic Research software for acquisition and device control through four-dimensional (X, Y, Z, T), (X, Y, Z, λ) acquisition.

Report Generator

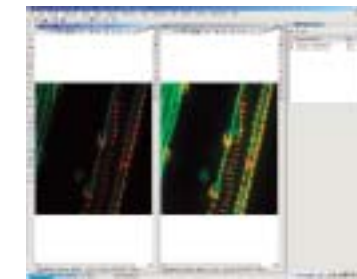
Report Generator enables the user to create customized reports containing images, database descriptions, measured data, user texts, and graphics. PDF format files can be created directly from NIS-Elements.



NIS-Elements can organize X, Y, Z, λ (wavelength), T (time) and multi-point within one integral platform, for simpler-than-ever multidimensional imaging setting. Four types of "dimensions" of acquisition—Time, Multipoint, Z series, Wavelength (Multichannel)—can be selected. By combining these, you can perform 6D and 4D acquisitions according to application (plug-in).

View Synchronizer

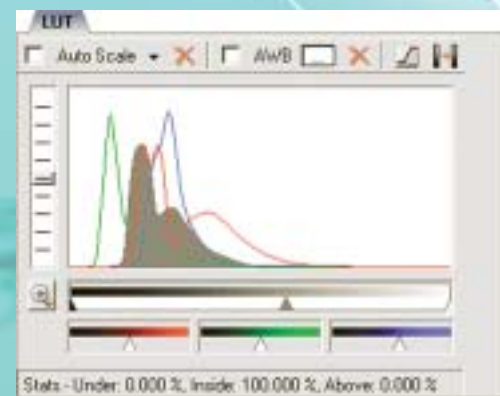
View Synchronizer enables the comparing (run and view) of two or more multidimensional documents. It automatically synchronizes the views of all documents added to the view synchronizer module.



Acquisition Color Setting

Look-Up Table

Color modification can be easily set with the Look-Up Table (LUT). Indexed-color pixels are mapped into a selected set of true color values. The histogram, threshold, gamma parameter, and brightness of RGB components are adjustable. Modifications on live image processing can be easily accomplished on the GUI.



Parameters for Each Dimension

Z-series

Images with different Z axis distances can be captured once the motorized Z-focus control is set. Two methods of capture in the Z axis—Absolute positioning and Relative positioning—are available. The Relative positioning method has Symmetric and Asymmetric variations.



Multichannel Fluorescence

Images using defined filters can be captured to view in various light wavelengths. In addition to predefined filter settings, customized filter settings can also be saved. Simply define the color of channels and the optical configuration that is to be used for capturing the set of images.



Time Lapse

Sophisticated and user-friendly time lapse acquisition, which was time consuming business before, can be accomplished by simply defining interval, duration, and frequency of capture.



Multipoint Experiments

With the motorized stage installed, it is possible to automatically capture images at multi points in XY(Z) during the nD experiment.



Each acquisition can be accomplished separately.

View

nD Viewer (Multidimensional image display)

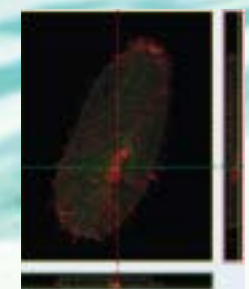
Easy-to-use parameters for multidimensional image operation are located on the frame of the screen.



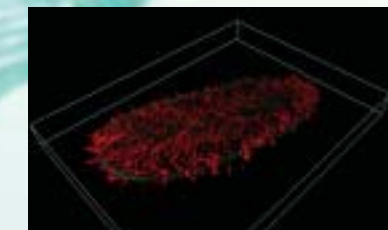
Process



Multidimensional image



Orthogonal image



Volume rendering



Converting images to nD documents

A series of images from timelapse acquisition, or captured Z stack images, can be easily converted to ND2 format. The converted images can be viewed and processed using features of the NIS-Elements multidimensional document.



RAM Capturing

RAM Capturing, a built-in memory function to store temporary data of live images, enables the recording of sequences of very quick acquisition and past biological events in the video RAM (related to the size of the RAM Memory).



Image Processing Functions

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.

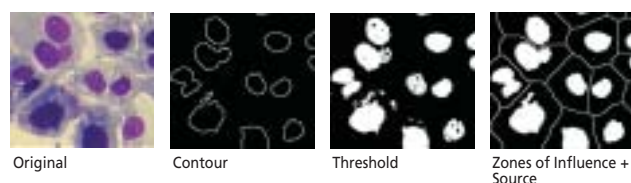


Filters

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.

Morphology

open/close/erode/dilate
NIS-Elements offers a rich spectrum of mathematical morphology functions (clean, erode, dilate, open, close, smooth), morphologic separation functions, linear morphology functions, fill functions (fill holes, close holes), skeleton functions (medial axis, skeletonize, pruning) and other functions (such as: binary invert, convex hull, contour, skeletonize, homotopic marking, zones of influence, etc.).



Merge Channels

The merge channels function enables the creation of one merged image from images captured with different optical filters or under different camera settings. It combines color planes, stored in separate files, into one RGB image.



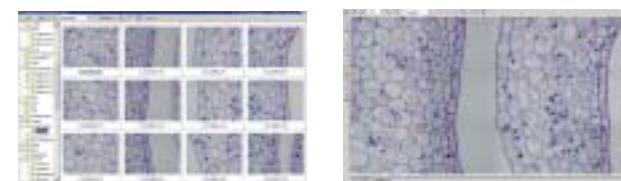
Image Arithmetic

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



Large Image Stitching

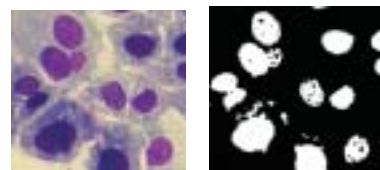
Samples can be scanned automatically using a motorized XY stage, and the captured images can be stitched into one large image. Special algorithms ensure maximum accuracy, resulting in ultra high-resolution images.



Measurement Functions

Image Segmentation

Using the RGB or HSI color spaces, NIS-Elements can segment the image and create binary images. Using the binary image, an automatic measurement function records length, area, angle and colorimetry.

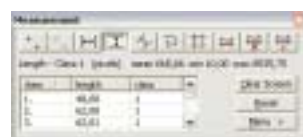


Automatic Measurement

Using binary objects, it can automatically measure sets of length, area, density and colorimetry parameters. About 30 different object features can be measured.

Interactive Measurement

This measurement can be performed by directly drawing two parallel lines on the screen. Features available include: taxonomy, counts, length, semi-axes, area, angle or profile. All output statistics and histograms can be exported to MS Excel.



Profile

There are five possible interactive profile measurements: 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, HIS values, or RGB values ignoring intensity. The classifier enables data to be saved in separate files.



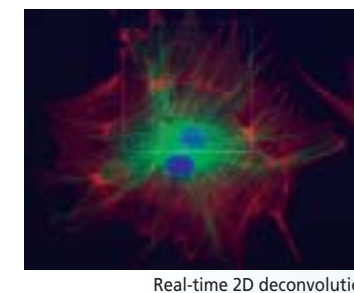
Time Measurement (Plug-in)

Time Measurement records the average pixel intensities within defined probes during a time interval and can be performed with live camera signals.



2D Real-time Deconvolution/3D Deconvolution (Plug-in)

Using the deconvolution module, haze and blur of the image can be reduced with a single click. Available in two- and three-dimensional image stacks.



Real-time 2D deconvolution



Volume rendered image

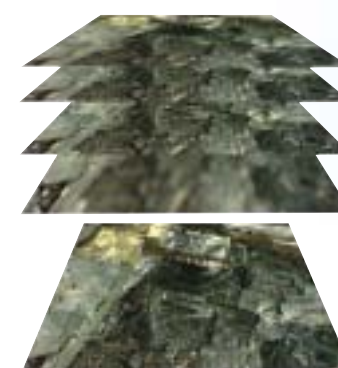


Before deconvolution

After deconvolution

EDF: Extended Depth of Focus (Plug-in)

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



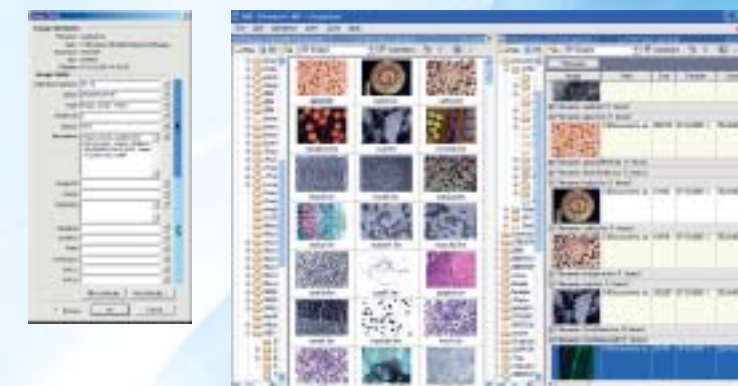
Virtual 3D image

Database (Plug-in)

NIS-Elements has a powerful built-in image database support that enables the creation of an image database, including text, memo, number, and date values.

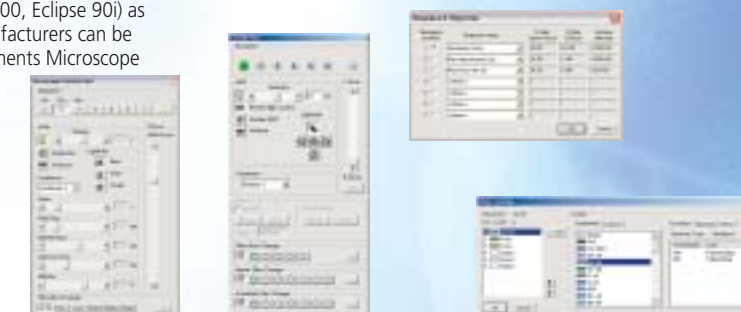
The NIS-Elements image database tool will help solve the many image management problems.

Filtering, sorting and multiple grouping are also available according to the database field given for each image.



Microscope Control

Nikon motorized microscopes (Eclipse TE2000, Eclipse 90i) as well as motorized devices from other manufacturers can be controlled through NIS-Elements. "NIS-Elements Microscope Control Pad" offers all the necessary functions grouped in one window.



Devices Corresponding to NIS-Elements

Nikon Devices

Digital Sight DS-2M series, DS-5M series, DXM1200F

Microscope

Eclipse TE2000-E/TE2000-PFS
Eclipse 90i
Digital Imaging Head
Eclipse LV100A Nosepiece Controller

Other Devices

Camera

Cascade 512B, Coolsnap ES (Roper Scientific)
PL-A661, PL-A662 (Pixellink)
ORCA series (Hamamatsu Photonics)
JVC KY-F75 (JVC)
TWAIn cameras

Plug-in

XY scanning stages (Prior and Marzhauser)
Shutter (Uniblitz/Sutter Lambda 10-2)
Remote Z-focus Accessory (Conix)
Dual-view (Optical Insights)
X-Cite 120 series (EXFO)
Piezo PI E-622

Comparison Chart

		NIS-Elements AR	NIS-Elements BR
Image Acquisition		●	●
Capture	RAM Capture	●	●
	Time Lapse	●	●
	Z-Stack	●	●
	MCF	●	●
	Multi-Position	● (Option)	● (Option)
	4D		● (Option)
	6D	● (Option)	
Display and Process	Annotation	●	●
	2D View, 3D View	●	●
	ND Viewer	●	●
	Filter, Morphology	●	●
Capture, display and multifunction	Large Image	●	●
	EDF	● (Option)	● (Option)
	2D Real-Time Deconvolution	● (Option)	
	3D Deconvolution	● (Option)	
	Live Compare	●	● (Option)
	Macro	●	●
	Advanced Interpreter	●	● (Option)
Measurement	Segmentation	●	●
	Time-Measurement	●	● (Option)
	Auto-Measurement	●	●
Report	Report Generator	●	●
Management	DB	● (Option)	● (Option)
	Vector Layer	●	●
	Multi-Dimensional File Format	●	●

Operating Environment

All PC environments should meet the following minimal requirements:

CPU	Pentium IV 3.2 GHz or higher	Hard disk	600MB or more required for installation
RAM	1GMB or higher	Video	1280X1024 dots, True Color mode
OS	Windows XP Professional SP2 English Version	User	Administrator Authorized Users for installing Administrator Authorized Users for operating

Please note that Nikon cannot guarantee operability of NIS-Elements software even when all of the above requirements are met.

* Monitor images are simulated.

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