



Imaging Software
NIS-Elements
Advanced Solutions for your Imaging World



Nikon offers total 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 multi-dimensional imaging tasks flawlessly with support for capture, display, peripheral device control, and data management & analysis of images of up to six dimensions to achieve a more productive workflow.

The system also contributes to experiment efficiency with a database building feature developed to handle archiving, searching, and analysis of large numbers of multi-dimensional 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 and deconvolution.

Easy multi-dimensional image acquisition

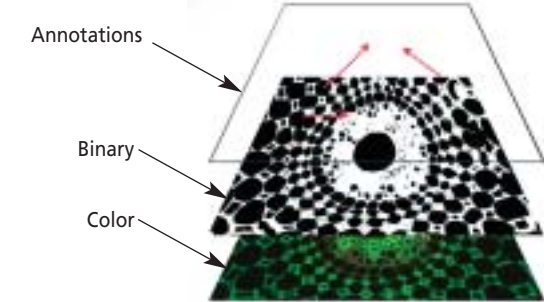
High-level quantitative analysis

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. Multiple layer save is available with JPEG2000/ND2/LIM format.



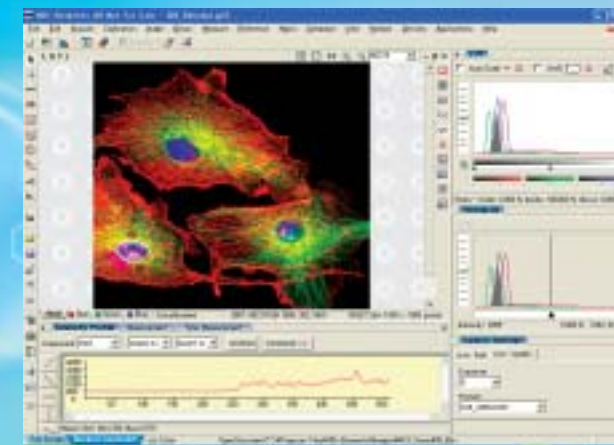
NIS-Elements can work for all common file formats, such as JPEG2000, ND2, TIFF, JFF, JPG, JTF, BMP, LIM, AVI, ICS/IDS. ND2 is a special format for NIS-Elements. ND2 allows storing sequences of images acquired during ND experiments. It contains information about the hardware settings and the experiment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

Selectable Layouts

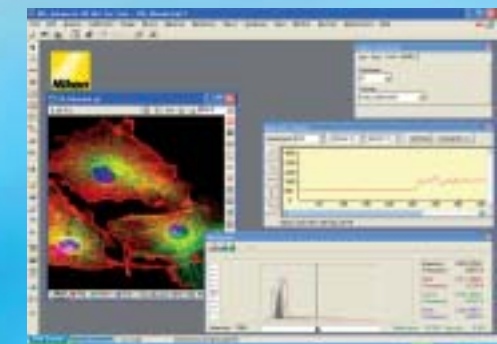
NIS-Elements comes with the built-in layouts "Docked Controls" and "Full Screen."

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

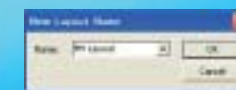
Switching between layouts is achieved by a single mouse click.



Docked controls



Full screen



The NIS-Elements suite is available in two distinct packages scaled to address users' 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, Multi-point) acquisition and analysis.
- **NIS-Elements BR** – Basic Research software for acquisition and device control through four-dimensional (X, Y, X, 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, Lambda (wavelength) and Time within one integral platform, for simpler-than-ever multi-dimensional imaging setting. Four types of "dimensions" of acquisition—Time, Multipoint, Z series, Wavelength (Multichannel)—can be selected. All types of ND documents can be combined together in one ND2 file sequence.

*In NIS-Elements Basic Research package, only two dimensions can be acquired within one ND experiment.

View Synchronizer

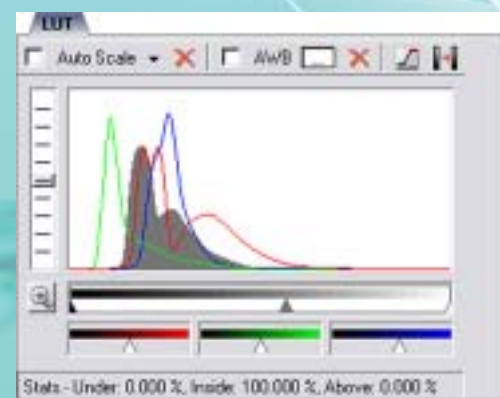
View Synchronizer enables the comparing (run and view) of two or more N-Dimensional documents. It automatically synchronizes the views of all documents added.



Acquisition Color Setting

LUT

Color modification can be easily set with the LUT (look-up table). 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 Symetric and Asymmetric variations.



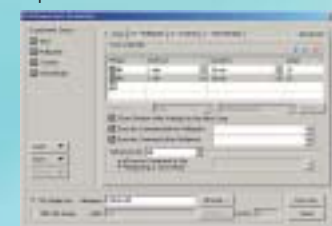
Multichannel Fluorescence

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

The sophisticated but user-friendly time lapse process enables the staggering of image capture simply by 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.

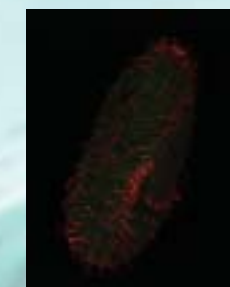
View

ND Viewer (Multidimensional image display)

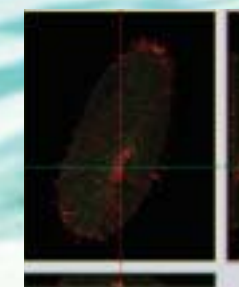
Easy-to-use parameters for multi-dimension image operation are located on the frame of the screen.



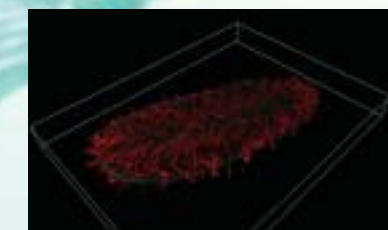
Process



Multi-dimensional 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 NIS-Elements multidimensional document.



RAM Capturing

RAM capturing enables the recording of sequences displaying very quick acquisitions lasting tens of milliseconds, by using a part of virtual memory to store temporary data of live images.



Image Processing Functions

Color Adjustment

contrast/background subtraction/component mix
NIS-Elements is suitable for hue adjustment, independently for each color, transforms color image to one of the RGB or HSI components.

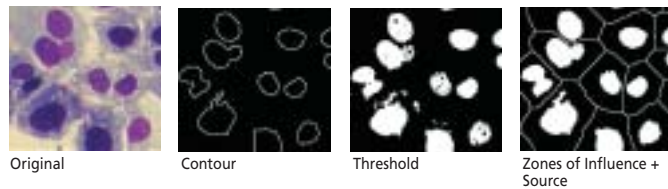


Filters

smoothing/sharpness/edge detection
Filters are available from smoothing, sharpness, edge detection etc.

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.



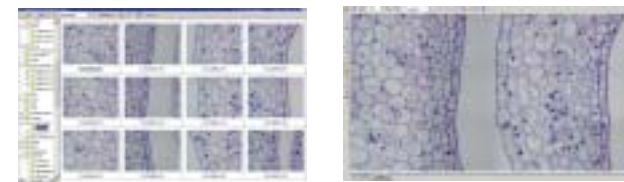
Image Arithmetic

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



Large Image Stitching

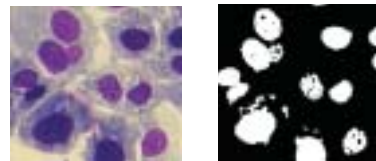
The samples are scanned automatically using a motorized XY stage with auto-focus capability and captured images are stitched into one large image. Special algorithms ensure maximum accuracy, resulting in ultra high-resolution images.



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, Automatic Measurement 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

The measurement is performed by, for example, directly drawing two parallel lines on the screen. Features are available from: taxonomy, counts, length, semiaxes, area, angle or profile—and 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.



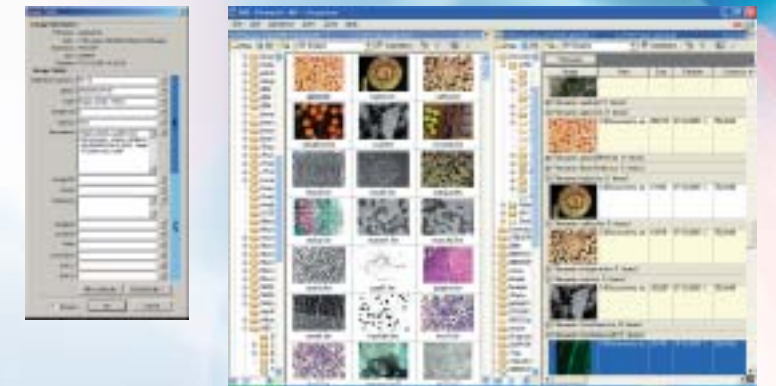
Time Measurement

Time measurement, records the average pixel intensities within defined probes during a time interval, can be performed on live camera signals.



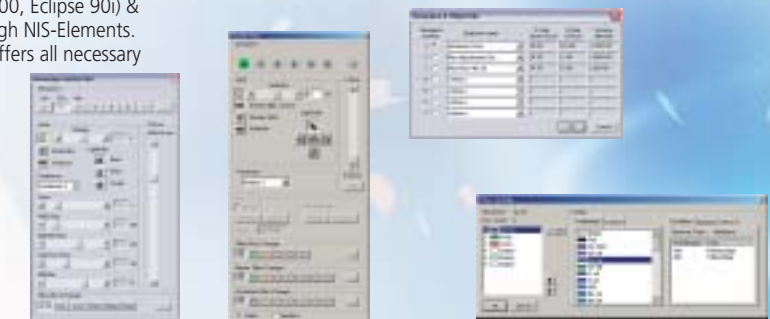
Database

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 to solve the Image management problem. Filtering, sorting and multiple grouping are also available according to the database field given for each images.



Microscope Control

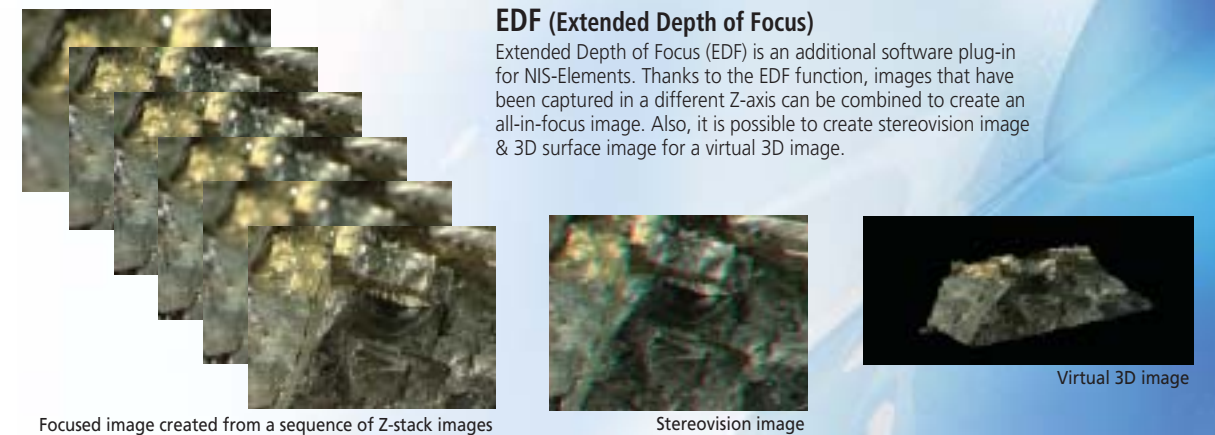
Nikon motorized microscope (Eclipse TE2000, Eclipse 90i) & motorized devices can be controlled through NIS-Elements. "NIS-Elements Microscope Control Pad" offers all necessary functions grouped in one window.



Plug-in Modules

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.



Deconvolution

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



Devices Corresponding to NIS-Elements

Nikon Devices

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

Microscope

Eclipse TE2000E

Eclipse 90i

90i Motorized ND Filter Unit

90i Motorized XY Stage

DIH-M/E Digital Imaging Heads

Eclipse LV100A Nosepiece Controller

Optional

TE2000-PFS (Perfect Focus System)

COOLSCOPE

Other Devices

Camera

Roper cameras

Pixellink cameras

Hamamatsu ORCA series

Optional

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

NIS-Elements F—is Freeware, basic image capture software bundled with every Nikon Instruments digital camera.

Comparison Chart

		Advanced Research Package	Basic Research Package	Freeware
Capture	Image Acquisition	●	●	●
	RAM Capture	●	●	
	TimeLapse	●	●	
	Z-Stack	●	●	
	MCF	●	●	
	Multi-Position	●		
	4D	●	●	
	6D	●		
Display and Process	Annotation	●	●	●
	2D View, 3D View	●	●	
	ND Viewer	●	●	
	Filter, Morphology	●	●	
Capture, display and multifunction	Large Image	●	●	
	EDF	● (Option)	● (Option)	
	Deconvolution	● (Option)		
	Macro	●	●	
Measurement	Segmentation	●	●	
	Auto-Measurement	●	●	
Report	Report Generator	●	●	●
Management	DB	●	●	
	Vector Layer	●	●	
	Multi-Dimensional File Format	●	●	

Operating Environment

All PC environments should meet the following requirements:

CPU Pentium IV 3.2 GHz or higher
RAM 1GMB or higher
OS Windows XP Professional SP2 English

Hard disk 600MB or more required for installation
Video 1280X1024 dots, True Color mode
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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