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

NIS-Elements is an integrated software imaging platform developed by Nikon which delivers comprehensive microscope control, image capture, documentation, image analysis and data management. NIS-Elements handles multidimensional imaging tasks flawlessly with support for capture, display, peripheral device control, and analysis & data management of images of up to six dimensions. The system also contributes to experiment efficiency with an intuitive image analysis feature set and database building capabilities developed to handle archiving and management of large numbers of multidimensional image files. Unified control of the entire imaging system offers significant benefits to microscopists for cutting-edge research, such as live cell imaging.

Why NIS-Elements?

As a leading microscope manufacturer, Nikon realizes the importance of providing its customers with system-based solutions to free them to focus on their projects and research and not on the complexities of the microscope. Never before has a software package offered such comprehensive control of microscope systems, image acquisition, image analysis and data management.

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, a wide range of image analysis tools for automated counting, object tracking* and classification* in addition to image processing including deconvolution*.

*Optional

**Br**
NIS-Elements BR is suited for standard research applications, photodocumentation of fluorescent samples and image analysis including intensity and counting measurements. 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 bioscience, clinical and industrial applications, with basic measuring and reporting capabilities.

A multi-channel dataset is easily acquired by controlling the fluorescence excitation and emission filter settings through software presets.

2D motor control and Extended Depth of Focus (EDF) as well as automatic capture of multiple Z planes of the specimen create an all-in-focus image that can be viewed in stereo and 3D views.
Image Acquisition

NIS-Elements offers the most suitable image acquisition for various applications with the integrated control of the camera, motorized microscope and peripheral devices.

Multichannel (multi color)

NIS-Elements can acquire full bit depth multi-color images, combining multiple fluorescence wavelengths and different illumination methods (DIC, phase contrast etc.), while offering independently scalable channels.

Multidimensional imaging

* Available dimensions vary depending on the package. NIS-Elements captures images in a combination of multiple dimensions such as Time-Lapse, Multichannel, Z-series, and Multipoint. It is also possible to create and manage the acquisition of a multi-dimensional dataset with a thirty-minute time lapse of two wavelengths and a Z series across each well of a multi-well plate.

Z-series

Through motorized focus control, NIS-Elements reconstructs and renders 3D images from multiple Z-axis planes.

Movie Capture, Fast Image Capture

NIS-Elements has several options to observe and capture a sample’s change and fast movement.

Fast Time Lapse

Fast Time Lapse is designed for ultra high-speed cameras. The hard disk drive can be used together with PC memory to enable a longer acquisition time.

RAM Capture

RAM Capture allows for acquisition at the fastest possible rate of the camera. A RAM buffer is utilized to enable capture and retrieve a high speed time lapse, which aids in the capture of fleeting events such as calcium sparks, motility and translocation.

AVI Live-Stream Capture

AVI Acquisition automatically captures live data into an easily exportable and viewable AVI format.

Time Saving Acquisition by Hardware Collaboration

Nikon’s original technology optimizes image acquisition speeds by synchronizing the camera with the microscope and peripheral devices.

Trigger Acquisition

Triggering external devices directly from the camera enables synchronized control of various devices such as the laser unit without passing through the PC. This allows for the fastest performance of the system components for multi-wavelength excitation in TRIF observation.

AVI Live-Stream Capture

Nikon’s original technology optimizes image acquisition speeds by synchronizing the camera with the microscope and peripheral devices.

Image Stitching (Large image)

Large image acquisition generates high magnification images by stitching multiple adjacent frames from a multipoint acquisition or from multiple single images captured from a previous session.

Optical Configuration

Preset or ‘Optical Configurations’ can be saved for each observation method such as FITC fluorescence and DIC imaging, memorizing the settings of the microscope, camera and peripheral devices. The optical configurations are created through a one click set up and are displayed as icons in the tool bar for easy access and use.

Time Lapse

Time lapse imaging in NIS-Elements is easily configurable simply by setting the time interval and duration of capture. The Perfect Focus System of the motorized inverted microscope Ti-E enables high-accuracy image capture without focus drifting even during extended time-lapse experiments.

Time-lapse imaging generates high accuracy images with the integrated control of the motorized stage and motorized focus.

Stage points of the sample of a multi-well plate or dish. Stage points are memorized and can be saved and loaded for future imaging sessions.

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Display and Data Processing

Various methods are available for displaying and processing captured images and datasets.

Multi-dimensional Image Display

NIS-Elements displays time lapse, multi-channel, multiple X, Y, Z positions in an intuitive layout, which allows for automatic playback and the ability to select subsections of the data to be saved as a new file.

Merge Channels

Multiple single channel images (e.g., two from three-channel acquisition images) can be merged together to create an overlay of full depth separately scalable images. With Ar and Br, images can be merged by simply dragging the tab of one image onto another image. With D, images are merged by selecting each image for red, blue, green and brightfield channels.

Z-Series Image Display

Z-series images can be displayed in various formats such as max. and min. projections, X-Z axis and Y-Z axis cross-sectional slice view and 3D volume view. Rotatable 3D volume rendered views from 3D datasets are easily converted to an AVI or MOV format for file sharing and export.

Deconvolution

AQ Blind Deconvolution

Haze and blur of the acquired fluorescence image is eliminated by reassigning out-of-focus intensities back to the spatial locations to where they originated. This process keeps the intensity of the image, and allows for quantitative analysis. Algorithms for wide-field fluorescence and confocal fluorescence images are available. (From AutoQuant®)

2D Real-time Deconvolution

The real-time 2D deconvolution module (from AutoQuant®) can be applied to a live image or an already acquired dataset. The module also allows the elimination of out-of-focus blur from live images and X-Y axis time-lapse images.

5D Deconvolution

This 2D deconvolution method eliminates image blur using 2-stack subtraction with the nearest neighbor method.

Image Processing

Image Filtering, Color Adjustment

*Usable functions vary depending on the package.
With NIS-Elements image processing tools, it is possible to modify image display and feature extraction using various filters for, for example, sharpness, smoothing and detection. White balance and RGB/HSV balance adjustment are additional available options.

Arithmetic operation (Image arithmetic)

NIS-Elements enables arithmetic operations such as addition, subtraction, multiplication and division on an image or between multiple images. Arithmetic operation between multiple images is also possible.

Arithmetic operation (Image averaging)

NIS-Elements reduces the noise of an image by averaging multiple sequential images such as time-lapse images. Rolling averaging that does not reduce frame rate is available as well.

Extended Depth of Focus (EDF)

NIS-Elements EDF function selects the in-focus area from multiple Z-stack images, and produces one all-in-focus image. The composite image can be viewed and rotated as a virtual 3D image, as it contains Z axis information.
Measurement and Analysis

Interactive Measurement allows easy measurement of length and area by drawing lines or an object directly on the image. The results can be attached to the image, and also exported as text or to an Excel spreadsheet. Annotations such as arrows, circles, squares, text are also available display options.

ROI Statistics
*Usable functions vary depending on the package. Common pixel measurements such as area, maximum or minimum intensity are possible with the user defined ROI (Region Of Interest). ROI or multiple ROIs statistic results for a single image or a multi-dimensional dataset are displayed and easily exported as text or an excel file.

Auto Measurement (Object Counting)
Auto measurement measures the number or area of objects which are extracted from images by the creation of a binary layer through thresholding using RGB/HIS or intensity values. The results can be listed or exported as text or an excel file. It is possible to save and reuse thresholding parameters.

Classifier
Object Classifier
Object classifier uses objects identified by thresholding along with additional features such as shape factors, and other statistical methods including nearest neighbor and neural networks for classifying objects into multiple categories. It is also possible to teach the module based on interactive ‘picking’ of image pixels.

Pixel Classifier
This function classifies each pixel in the image with RGB/HIS and intensity across the whole image. Results are reported in percentage and it is possible to save and reuse parameters across a large sample of images. Multiple binary layers are also displayed with multiple colors on the image and are available with other analysis tools within the software package.

Time (Intensity) Measurement
Time measurement creates a graph of sequential intensity change of time-lapse images or live images. Ratio view function* allows the measurement of the ratio of two wavelengths across multiple ROIs and shows the ratio value by pixel. Numeric data and graph images are exportable and the measurements on the graph are available as well. * Only with Ac

Calcium & FRET
Ca++ ion concentration calibration of the ratiometric fluorochrome Fura2, for example, is available using an easily configurable wizard. Corrected FRET image and FRET efficiency, reported in percentage is also available using three filter sets (three types of excitation–fluorescent combination: “Donor – Donor,” “Acceptor – Acceptor” and “Donor – Acceptor”) and two bleed-through factors.

Object Tracking
2D tracking of an object utilizes the threshold of objects over time and produces measurements such as velocity, acceleration, and distance from a specified origin. The tracking module offers both automated tracking and manual tracking methods.
HDR (High Dynamic Range) Image Acquisition
HDR creates an image with appropriate brightness in both the dark and bright regions in a sample by combining multiple images acquired with different exposure settings. It is also possible to create HDR image using multiple captured images.

Background Compensation
Background correction uses previously captured images to correct uneven background brightness of live images or captured images.

Live Image Comparison
Live Image Comparison enables easy image comparison between a sample image and a live image. Live observation side by side with a paused live image is also available in split screen mode.

Database
Using the organizer function, captured images are displayed in thumbnails for easy retrieval of the desired image. By simply clicking on the thumbnail image, the image is easily opened. Sorting and filtering this database of images and datasets using acquisition details such as objective settings, date, and author is an easy method for data management as well.

Report Generation
Images captured with NIS-Elements have information such as acquisition details and analysis results, allowing export and PDF conversion of the image and the associated image header and data information.

User Control
For safe system management, it is possible to individually limit each user authorization using the user account of Windows® (such as the Administrator or Guest). It limits the authorization and modification of the settings of devices (microscopes or other), optical configuration and layout editing.

GUI Option
Industrial Simple GUI
With D package, the simple GUI mode provides controls for the most common operations such as image capture and simple analysis.

Dark Color Scheme
This popular display option mode has a brightness level interface color palette suitable for use in a dark microscopy room.

Layout Manager
Layout manager enables customizing layouts of controls, toolbars and menus and application (image acquisition or measurement). Saving custom layouts is possible and accessible through one-click tab access.

Compatibility with Third-party Products
NIS-Elements is compatible not only with Nikon products but also with third-party products such as high-sensitivity CCD cameras and peripheral devices. Third party devices and cameras are easy to integrate through the NIS-Elements intuitive install and device manager.

Off-line Package for Analysis
The NIS-Elements off-line software package offers analysis tools such as intensity measurements and object counting of tiff and multi-dimensional format images captured with Nikon’s microscopes and third-party software.

Viewer Software
This is free software for image display of single images and datasets captured using NIS-Elements. Possible views include Tile View, Max/Min Projections and 3D Volume View. Saving multi-dimensional files into TIFF format is available as well. The viewer is downloadable from the Nikon website.

Software Upgrade Agreement (SUA) License
NIS-Elements can be upgraded for one year from the date of purchase. The Software Upgrade Agreement (SUA) License, which is purchasable in one-year license segments, extends the access to the latest version of NIS Elements.
Features

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CoolSNAP Series
Cascade Series
Andor Technology
Luca S, Luca R
iXon+ 897, 888, 885

Q imaging
Retiga EXi Aqua/Blue
Retiga 2000R - Monochrome
Retiga SRF + RGB-HM-S Slide
Hamamatsu
ImageEM C9100-13
ORCA-R2
Flash-2.8
ORCA (DCAM)
C9100-02, C9100-12

Others
TWAIN Device*

NIS-Elements Supported Devices (ver. 3.22 or later)

Nikon Microscopes
Inverted Microscope TI, TE2000
Upright Microscope 90i, 80i
Multizoom Microscope AZ1000M
Industrial Microscope LV Series
Measuring Microscope MM-400800**
Fiber Illuminator Intensilight
Nikon Remote Focus accessory

Third-party Devices
Opto-Scientific
ProScan II (H31)
ProScan II (H30)
ProScan II (H29)
OptiScan II E510
OptiScan
N2100, nanostageZ
Prior E5102E
Prior NIKRFIL

Ludl Electronic Products
MAC3000

Marchäuser Wetzlar
TANGO Desktop, Tango PCI
LSTEP, ECO-STEP, MCL2, MCL3
Vincent Associates (Unibitiz)
VMM-D3 (only via TE2000)
VCM-D1

Sutter Instrument
Lambda 10-2, 10-3, 10-B, XL
Physical Instrument
PI E-662, 665 (RS232)
Photometrics
Dual View
EXFO
EXFO Xcite120
ASI (Applied Scientific Instrumentation)

Supported Operation System
Windows 7 Professional (32/64 bit Version)
Windows Vista Business SP2 (32/64 bit Version)
Windows XP Professional SP3 (32 bit Version)

NIS-Elements is compatible with all common file formats, such as JPG, JPEG, TIFF, BMP, GIF, PNG, ND2, JPEG, JPEG, AVI, ICCVDS. ND2 is a special format for NIS-Elements. ND2 allows storing sequences of images acquired during in vitro 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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