Increased scan speed!
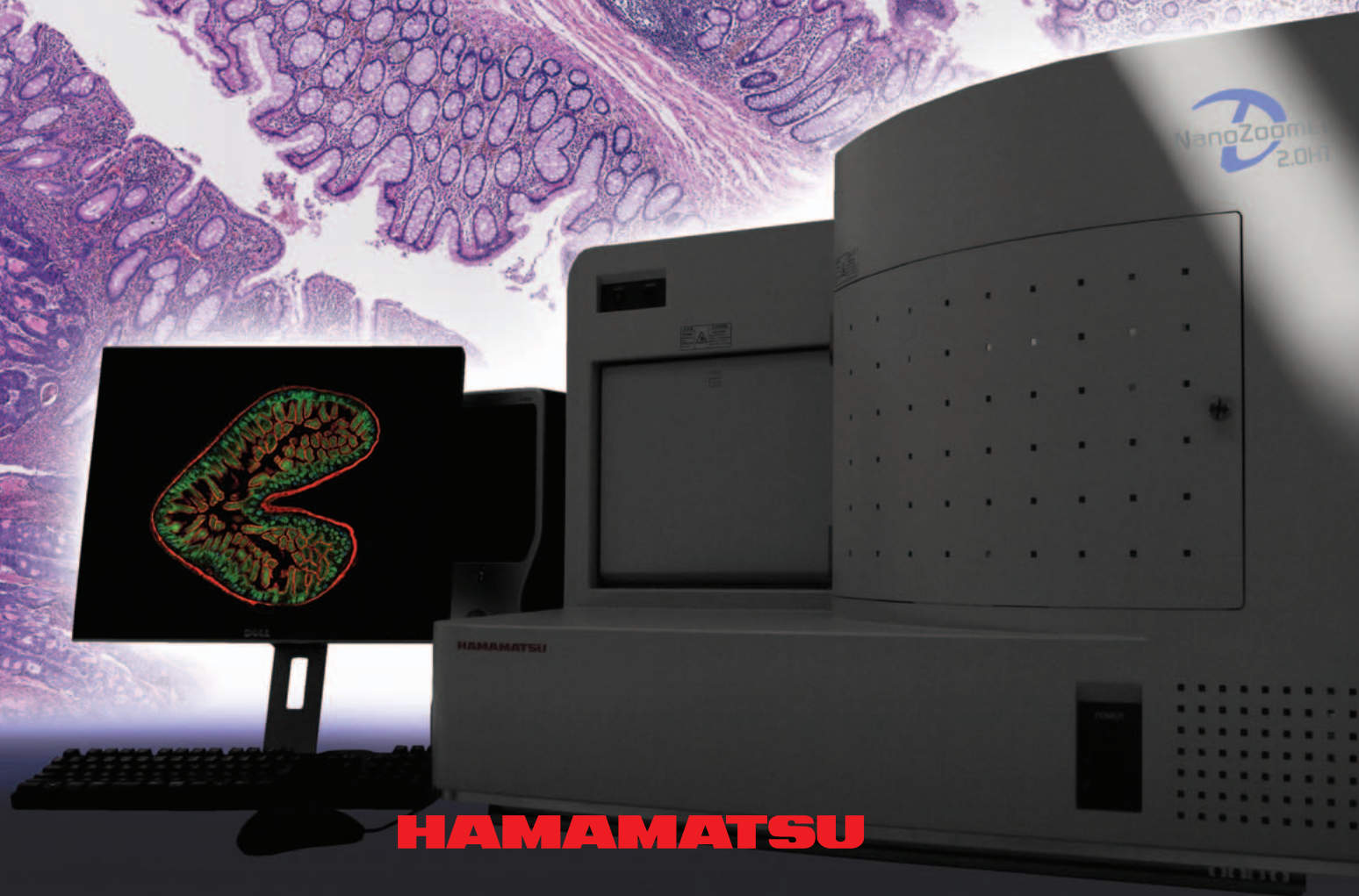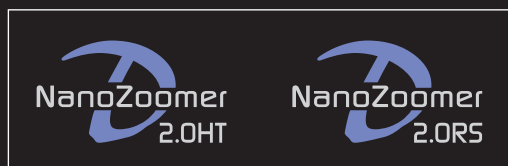
NanoZoomer 2.0® series

High-speed, high-resolution digital slide scanner with network features
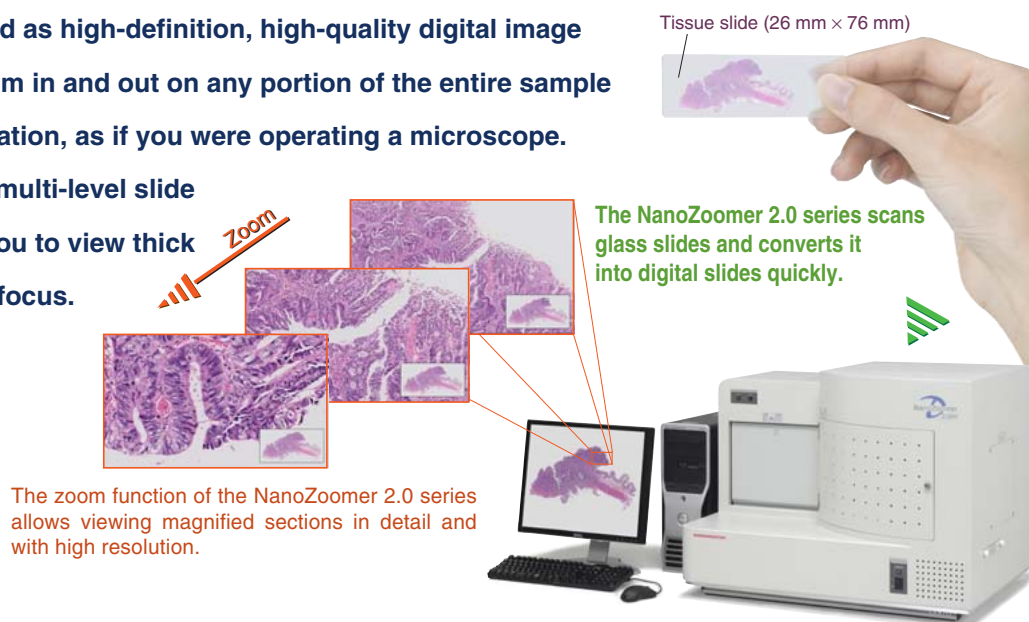
HAMAMATSU

NanoZoomer 2.0 series proposes new methods in drug development and medical research.

The NanoZoomer 2.0 series is a system that converts glass slides into digital slides by scanning them quickly at high resolutions.

Digital slides can be stored as high-definition, high-quality digital image data in which you can zoom in and out on any portion of the entire sample with a simple mouse operation, as if you were operating a microscope. In addition, the "Z-stack" multi-level slide scanning feature allows you to view thick samples by changing the focus.

Tissue slide (26 mm × 76 mm)

The NanoZoomer 2.0 series scans glass slides and converts it into digital slides quickly.

Zoom

The zoom function of the NanoZoomer 2.0 series allows viewing magnified sections in detail and with high resolution.

Digital slides have many advantages!

Digitizing slides opens up a variety of new possibilities.

Copying and Sharing

Digitized slides can be copied and shared. This feature of digital slides can be used in a variety of applications. For example, a large group of people can observe and discuss a single sample.

Slide Storage

Digital data does not deteriorate, and it is more secure from damages and losses than glass slides. You can view digital data in its original quality anytime and anywhere.

Networks

Using the Internet or a local area network, you can observe and evaluate slides from a distant location.

Databases

Large numbers of digital slides can be stored into a database and incorporated into a laboratory information system. You can share data and construct slide libraries with distant facilities and research institutes.

High-speed, high-resolution digital slide scanner with network features

2.0HT

NanoZoomer 2.0HT

2.0RS

NanoZoomer 2.0RS

Feature 2.0HT

Process up to 210 slides automatically

The NanoZoomer 2.0-HT processes up to max. 210 slides automatically using its dedicated slide cassettes. You can save time by processing large amounts of samples overnight. The NanoZoomer 2.0-HT can also automatically read a slide's barcode information and use it to name the slide file.
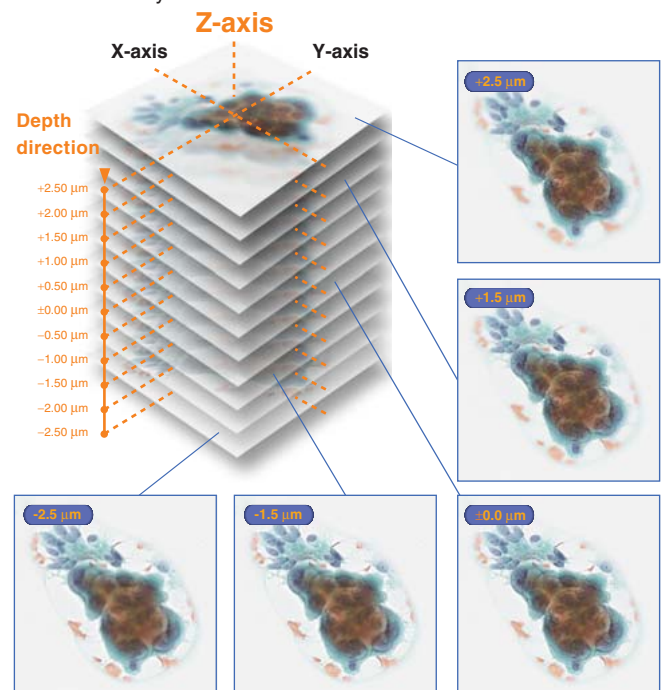
Feature 2.0RS

Automatically process up to 6 slides of regular size or 2 slides of double size

The NanoZoomer 2.0-RS is compact and affordable. It maintains the performance of the NanoZoomer 2.0-HT except for the number of slides processed automatically. It processes up to 6 slides of regular size (76 mm × 26 mm) or 2 slides of double size (76 mm × 52 mm) automatically. (The processing of double size slides is an optional feature.)

Functions 2.0HT 2.0RS

High-speed scanning at approximately 1 min. 40 s. for 1.9 billion-pixel slide image*

The NanoZoomer 2.0 series achieves both high speed and high sensitivity by using TDI line scanning instead of traditional CCD tiling. A single slide can be scanned at a resolution of approx. 1.9 billion pixels in approx. 1 minute 40 seconds.

* 1.9 billion pixels is based on the sample size of a 20 mm × 20 mm at 20× mode scan. Additional 1 minute is necessary for setting up a slide.

Improved 40× mode scanning speed, ideal for routine scans

The NanoZoomer 2.0 series reduces scanning time in 40× scan mode to 4.5 minutes only.

Ability to observe fluorescent samples provides a new approach to fluorescence imaging

By using the Fluorescence Illumination Optics L10387 with the NanoZoomer 2.0 series, you can observe and analyze fluorescent samples without worrying about photobleaching. It will open up new applications which could not be done with a traditional microscope.

Optional image distribution software

The NanoZoomer 2.0 series has optional image distribution software that is intended to facilitate the broader use of digital slides. You can use the free slide viewing software to view the images on a server at any time anywhere.

Z-stack feature for thick samples

There are samples which have 3D structures such as clumps of cells and thick tissues. They require focus adjustment during observation. To handle these kinds of slides, the NanoZoomer 2.0 series is equipped with the Z-stack feature that allows you to focus on different depths in the sample.

The NDP.view viewer software lets you adjust the focus on a Z-stack slide much like you would adjust the focus of a microscope. You can also point to an area of interest and let NDP.view apply autofocus for maximum clarity.

Z-axis

X-axis   Y-axis

Depth direction

+2.50 μm
+2.00 μm
+1.50 μm
+1.00 μm
+0.50 μm
±0.00 μm
−0.50 μm
−1.00 μm
−1.50 μm
−2.00 μm
−2.50 μm

+2.5 μm
+1.5 μm
−2.5 μm
−1.5 μm
±0.0 μm

TDI (Time Delay Integration) **technology enables the quick production of high-resolution digital slides.**

The NanoZoomer series scanning unit uses "line scanning method" and "TDI method." It can convert a large number of glass slides into digital slides automatically in a short time.

Features

Variety of superior scan features from the expertise of Hamamatsu sensor technology.

TDI combines both high speed and high sensitivity

The NanoZoomer 2.0 series uses time delay integration (TDI) to provide high speed and high sensitivity simultaneously. Hamamatsu technology allows synchronizing TDI sensor signal with the movement of a microscopic sample object being scanned.

High-speed scanning at approximately 1 min 40 s. for 1.9 billion pixel slide image*

A 1.9 billion pixels digital slide is created at 20× mode in approx. 1 minute 40 seconds. It also creates a 7.6 billion pixel digital slide at 40× mode in approx. 4.5 minutes.

* 1.9 billion pixels is based on the sample size of a 20 mm × 20 mm at 20× mode scan. Additional 1 minute is necessary for setting up a slide.

Dedicated system design makes the NanoZoomer 2.0 series user friendly and highly reliable.

The NanoZoomer 2.0 series is a specialized machine designed for routine use. It is user friendly and highly reliable. It employs a variety of sensors monitoring mechanical operations to ensure the safety of your slides.

3-chip TDI camera provides superior color reproduction

The NanoZoomer 2.0 series uses a 3-chip TDI camera to accurately reproduce sample colors. It enables observing minute variations in the colors of the sample. The 3-chip TDI camera has red, green and blue channels, and they are used to produce a single RGB image.

Automatic processing of a large number of slides

The NanoZoomer 2.0-HT processes up to max. 210 slides automatically using its dedicated slide cassettes. Just load the slides and press the start button to automatically load and scan each sample. The NanoZoomer 2.0-RS is compact and affordable. It maintains the performance of the NanoZoomer 2.0-HT except for the number of slides processed automatically.

The key to improved scanning

The NanoZoomer 2.0 series achieves both high speed and high sensitivity by using a unique 3-chip TDI line scanning method instead of traditional CCD tiling.

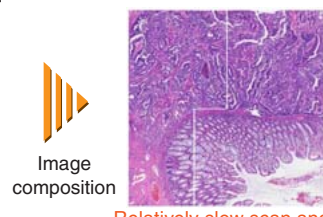### Line scanning makes scanning faster
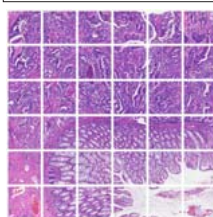
Traditional CCD tiling

Image composition

Relatively slow scan and 2D composition of tiles
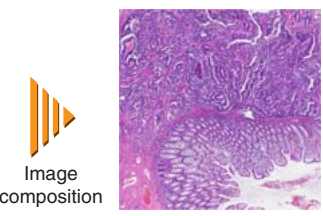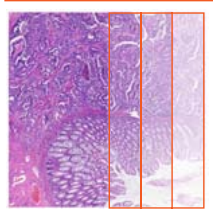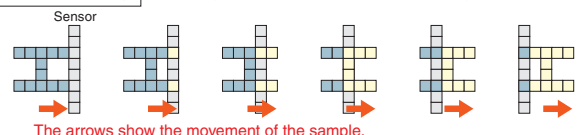
TDI Line Scanning

Image composition

The image is scanned line by line.

Fast scanning and 1D composition

### Unique TDI sensors realizes both high sensitivity and high speed simultaneously

Line scanning   The signal comes out without integration.

Sensor

The arrows show the movement of the sample.

TDI sensor: Four steps (the actual NanoZoomer 2.0 sensors have 64 steps)

The scanned object moves constantly, and the signal is reinforced at each stage by integrating the signal. This leads to fast and sensitive scanning.

Signal level

TDI sensor (Four steps)

1st stage   2nd stage   3rd stage   4th stage
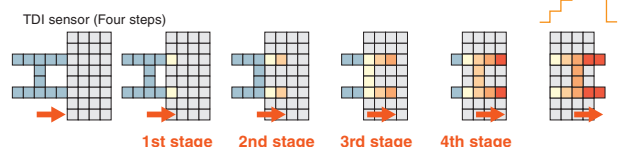
# Quickly converts transparencies into high-resolution digital slides!
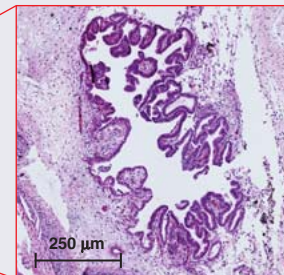
Examples
A powerful tool for a wide range of applications in drug development and medical research

Application for ES and iPS cells research

It is used to test differentiation activity of ES/iPS cells by injecting into an immunodeficient mouse. From any part of a larger overall picture, several differentiated tissues are observed.

ES/iPS cells

An immunodeficient mouse

3 mm

250 μm
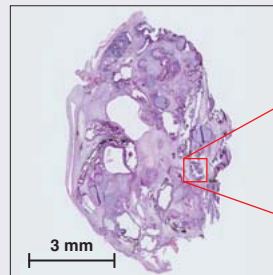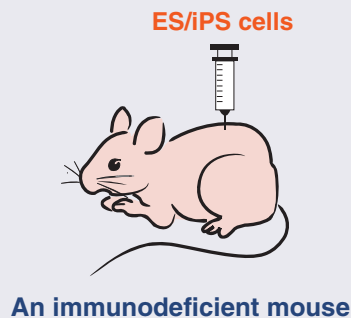
▲ Teratoma formation by using mouse iPS cells (HE-stain). (Entire image)

▲ Epithelial-like tissues are observed. (Selected area, magnified)

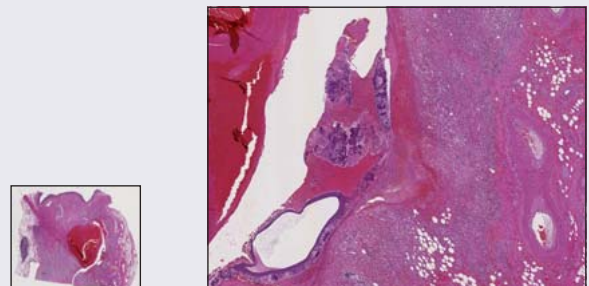Courtesy of Center for iPS Cell Research and Application, Kyoto University

Observing H&E stained samples

H&E staining is the popular staining method for tissue samples.
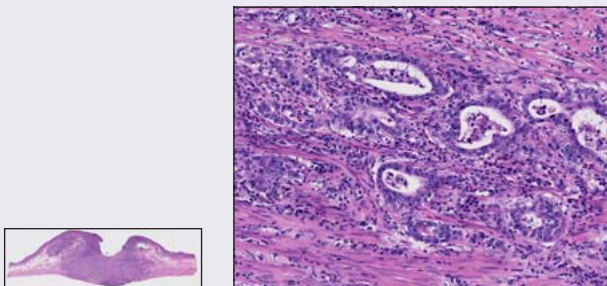
▲Stomach cancer H&E stain
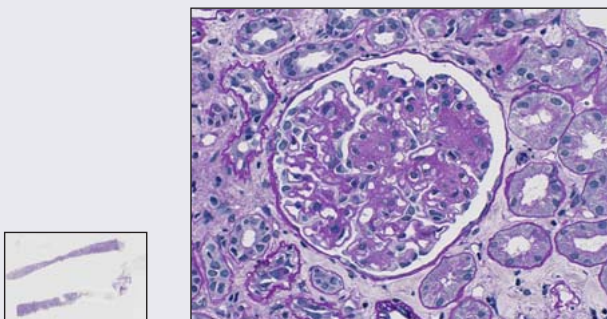Courtesy of Hiroshi Ogawa MD, Department of Pathology, Seirei Mikatahara Hospital.

▲Pancreatic AVM with anisakiasis, resulting in pancreatic bleeding
Courtesy of KobeCity Medical Center General Hospital, Department of Pathology, Yukihiro Imai, MD Ph.D.

Conferences using digital slides

With digital slides, you can share the same sample among many people without worrying about sample deterioration.

▲PAS stained kidney biopsy sample
Courtesy of Department of Pathology, The University of Tokyo Hospital,
Hiroshi Uozaki, M.D., Ph.D.

Expressed parvalbumin mRNA (In situ hybridization method)

Evaluation of tumor and virus infection by gene expression in a cell or a tissue.
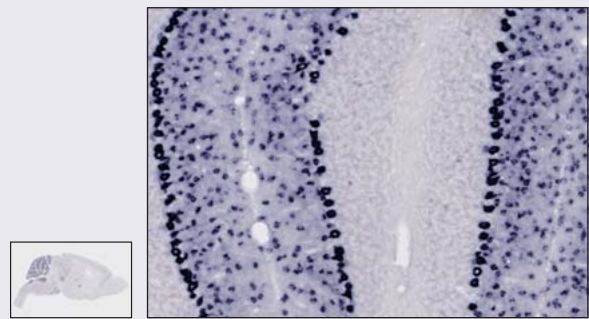
▲NBT and BCIP developed color of mouse brain tissue slice
Courtesy of Ms. Chihiro Saruta, Teiichi Furuichi PhD,
Laboratory for Molecular Neurogenesis, Riken Brain Science Institute.

Optional fluorescence sample scanning feature with
Fluorescence Illumination Optics

The NanoZoomer 2.0 series converts fluorescent samples into digital slides with the Fluorescence Illumination Optics L10387. You can observe them as often as you like without concern for photobleaching.

The L10387 provides the fluorescent illumination system with the excitation light source, 3 filter sets, and calibration slides.

The L10387 provides a new approach to fluorescence imaging!

There are a number of advantages to using the NanoZoomer 2.0 series.

Create and save digital fluorescent slides

You can convert samples that are susceptible to photobleaching into digital data. This allows you to thoroughly observe the details of a sample, without worrying about photobleaching. The digitizing of fluorescent samples also allows conducting image analysis such as stain density measurement, morphology analysis and DNA analysis.

Take in the slide as a whole, while retaining the ability to zoom in and observe any area

It's easy to zoom in and out on any part of an entire sample. The ability to observe a tissue sample as a whole promises to open up new ways of observing fluorescent samples, such as analyzing fluorescent protein expression.

Features dark field illumination for sample identification

Fluorescent sample locations are difficult to determine using bright field illumination. So the NanoZoomer 2.0 series uses dark field illumination* to determine sample locations. This makes locating and scanning samples easier.

* Under patent filing.

Features highly efficient optics created for use with a TDI sensor

The L10387 allows the NanoZoomer 2.0 series to scan even weak fluorescent samples quickly. It also prevents unnecessary photobleaching by minimizing the area of excitation.

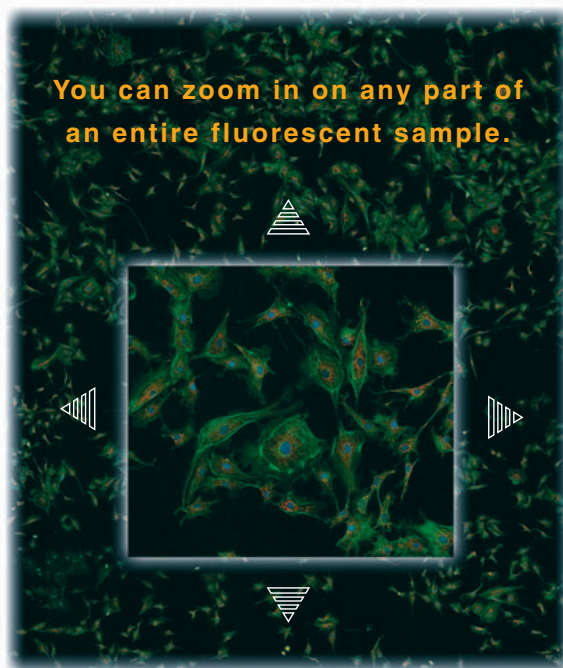### You can use Z-stack and fluorescence imaging together

You can use the Z-stack feature with thick fluorescence samples just like you can with brightfield samples.

Fluorescence Illumination Optics
L10387

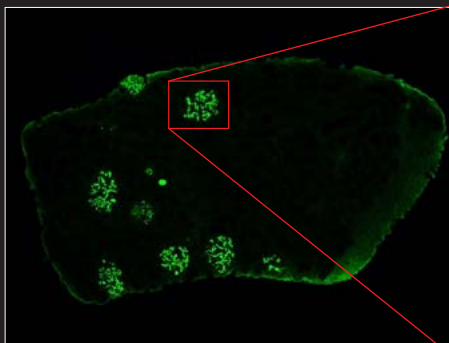You can zoom in on any part of an entire fluorescent sample.

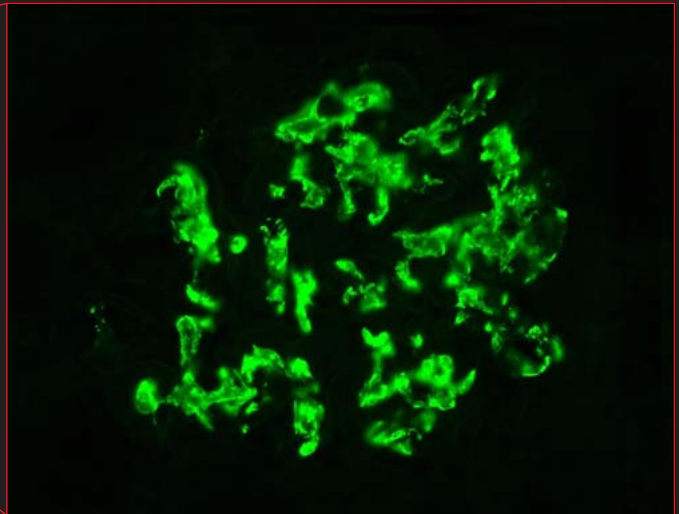# Quickly converts fluorescent samples into high-resolution digital slides!

A powerful tool for a wide range of applications in drug development and medical research

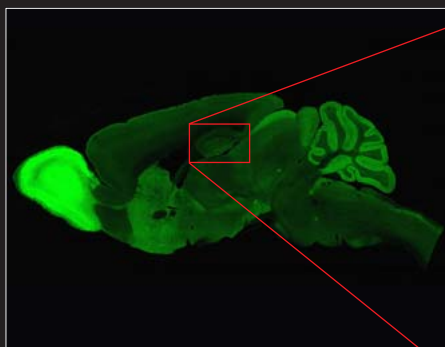## Observation of IgA nephropathy using fluorescent antibody technique

Kidney
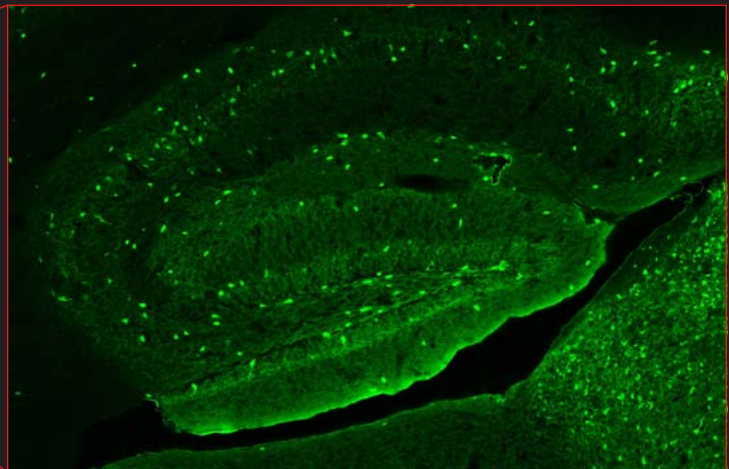Deposition of IgA in the glomerulus

Staining
FITC

Courtesy of the Department of Pathology, Keio University School of Medicine.

Fluorescence image of EGFP

Green fluorescent protein (EGFP) expressed mouse brain tissue slice

Courtesy of Yo Shinoda PhD, Teiichi Furuichi PhD, Laboratory for Molecular Neurogenesis, Riken Brain Science Institute.

■ NanoZoomer 2.0 series scanner

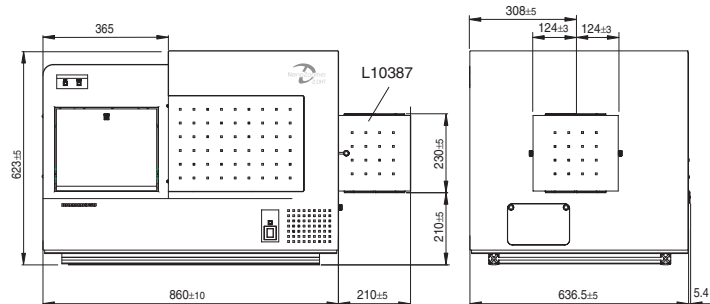|		NanoZoomer 2.0-HT	NanoZoomer 2.0-RS
Type number		C9600-13	C10730-13
Compatible glass slide		76 mm × 26 mm, thickness 0.9 mm to 1.2 mm	76 mm × 26 mm / 76 mm × 52 mm[*1], thickness 0.9 mm to 1.2 mm
Slide loader		Automatic, max. 210 slides	Standard size: 6 slides, Double size: 2 slides
Scanning range		25 mm × 52 mm	25 mm × 52 mm / 50 mm × 52 mm
Objective lens		20× N.A. 0.75	
Scanning resolution		0.46 µm/pixel (20× standard mode) and 0.23 µm/pixel (40× high resolution mode)	
Scanning method		TDI (Time Delay Integration)	
Barcode reader		One-dimensional, standard (Option: two-dimensional)	
Scanning speeds[*2]	20× mode	Approx. 1 min. (area: 15 mm × 15 mm)	
		Approx. 1 min 40 s. (area: 20 mm × 20 mm)	
	40× mode	Approx. 2.5 min. (area: 15 mm × 15 mm)	
		Approx. 4.5 min. (area: 20 mm × 20 mm)	
Slide setup time		Approx. 1 min.	
Image compression		JPEG compression	
Slide format		JPEG compressed image + slide information	
Computer operating system		Windows XP	
Dimensions		860 mm (W) × 623 mm (H) × 636.5 mm (D)	540 mm (W) × 625 mm (H) × 641.5 mm (D)
Weight		Approx. 94 kg	Approx. 60 kg
Power supply voltage		AC 100 V to AC 240 V	
Power consumption		400 V・A	
Compliance		CE	

[*1] When using A10743-02 (optional slide tray for scanning double-size glass slides)
[*2] The scanning speeds are only for the brightfield mode.

■ Fluorescence Illumination Optics L10387

Lamp House	100 W mercury lamp
Filter	3 filter cubes: B excitation, G excitation, Triple bands (UV, B, G)
Weight	Approx. 9 kg (Including the separate power supply unit)

Dimensional outlines (Unit: mm)

■ NanoZoomer 2.0-HT Scanner C9600-13 (with L10387)

■ NanoZoomer 2.0-RS Scanner C10730-13 (with L10387)
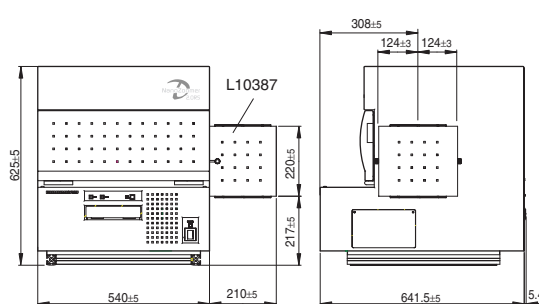
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★ **Product and software package names noted in this documentation are trademarks or registered trademarks of their respective manufacturers.**
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