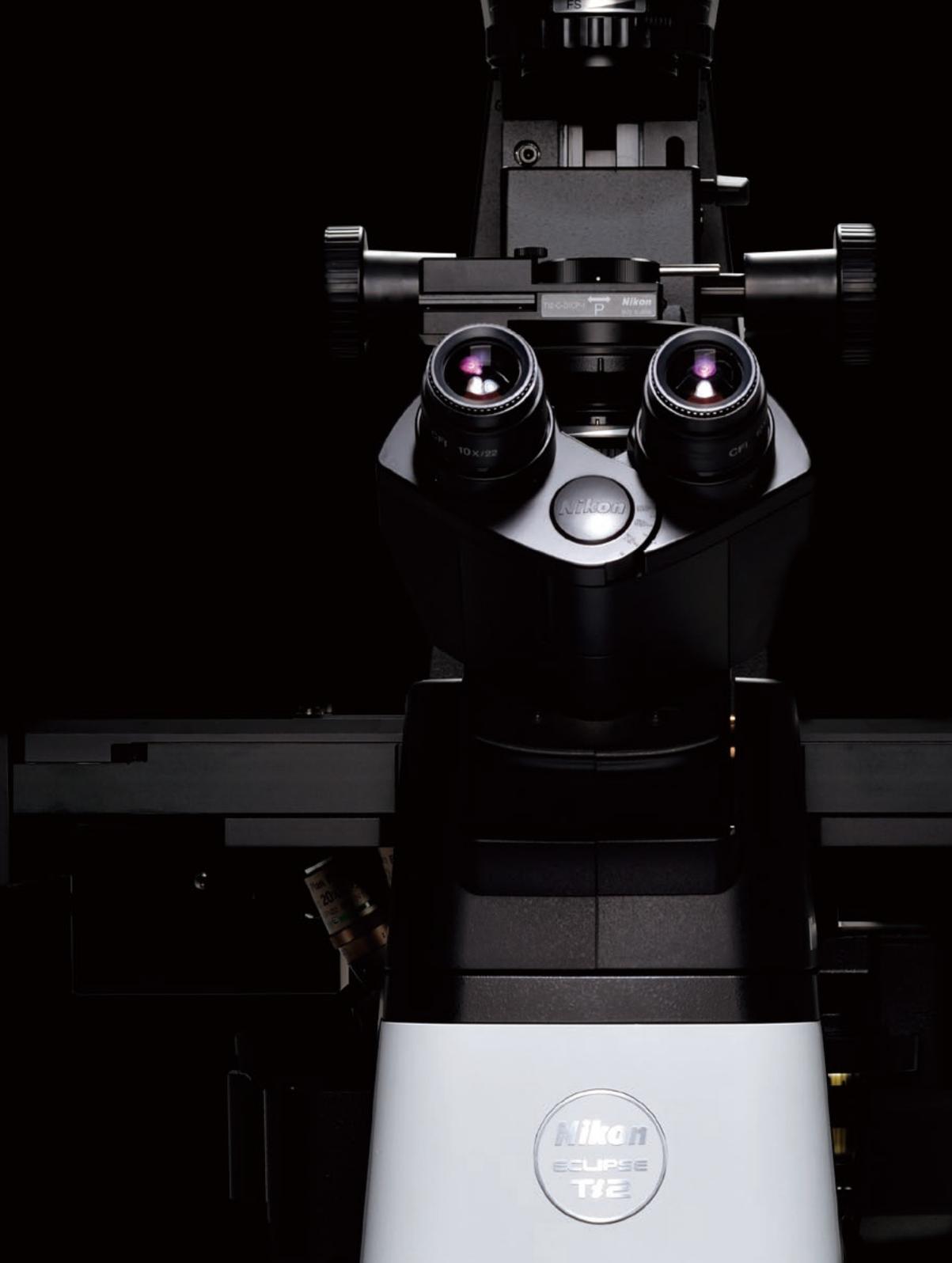




Nikon <sup>th</sup>  
100  
anniversary

See More Than Before

**ECLIPSE *Ti2***  
Inverted Research Microscope



# A New Vision for Microscopy

The Ti2 combines an unprecedented 25mm field of view with industry-leading optics, a Perfect auto-Focusing System, and a stratum structure that set the standard for expandability in imaging. Coupled with flexible illumination modules and Nikon's powerful software platform, NIS-Elements, the Ti2 delivers unparalleled flexibility in experimental design.

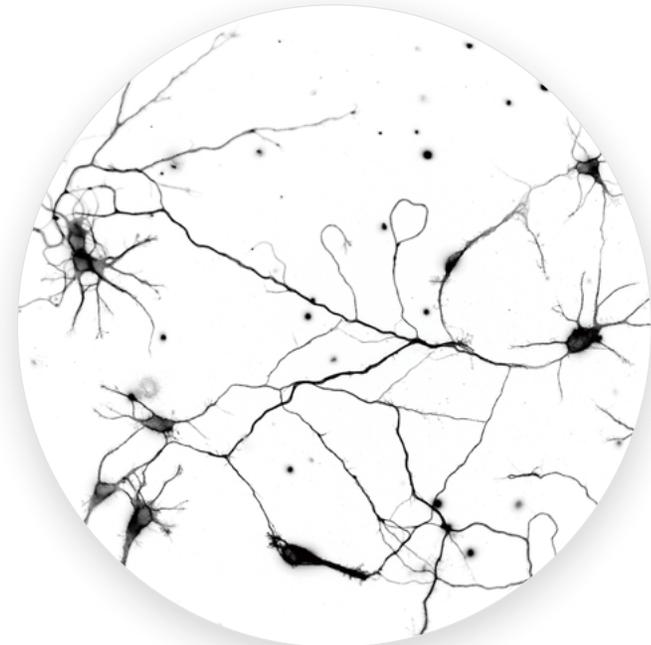
With its Assist Guide to aid microscope alignment and accessible TTL I/O signals for hardware triggering, the Ti2 is a Total Innovation in imaging from basic to advanced applications.

What will you do  
with your next microscope?



## See More Than Before with 25mm Imaging Ports

The Eclipse Ti2 offers an unprecedented 25mm field of view (FOV) capturing 2X more data in a single image compared to previous technology. The large FOV provides incredibly flat images from edge-to-edge, even with large format sCMOS cameras, enabling users to extract quantitative data from the entire image.

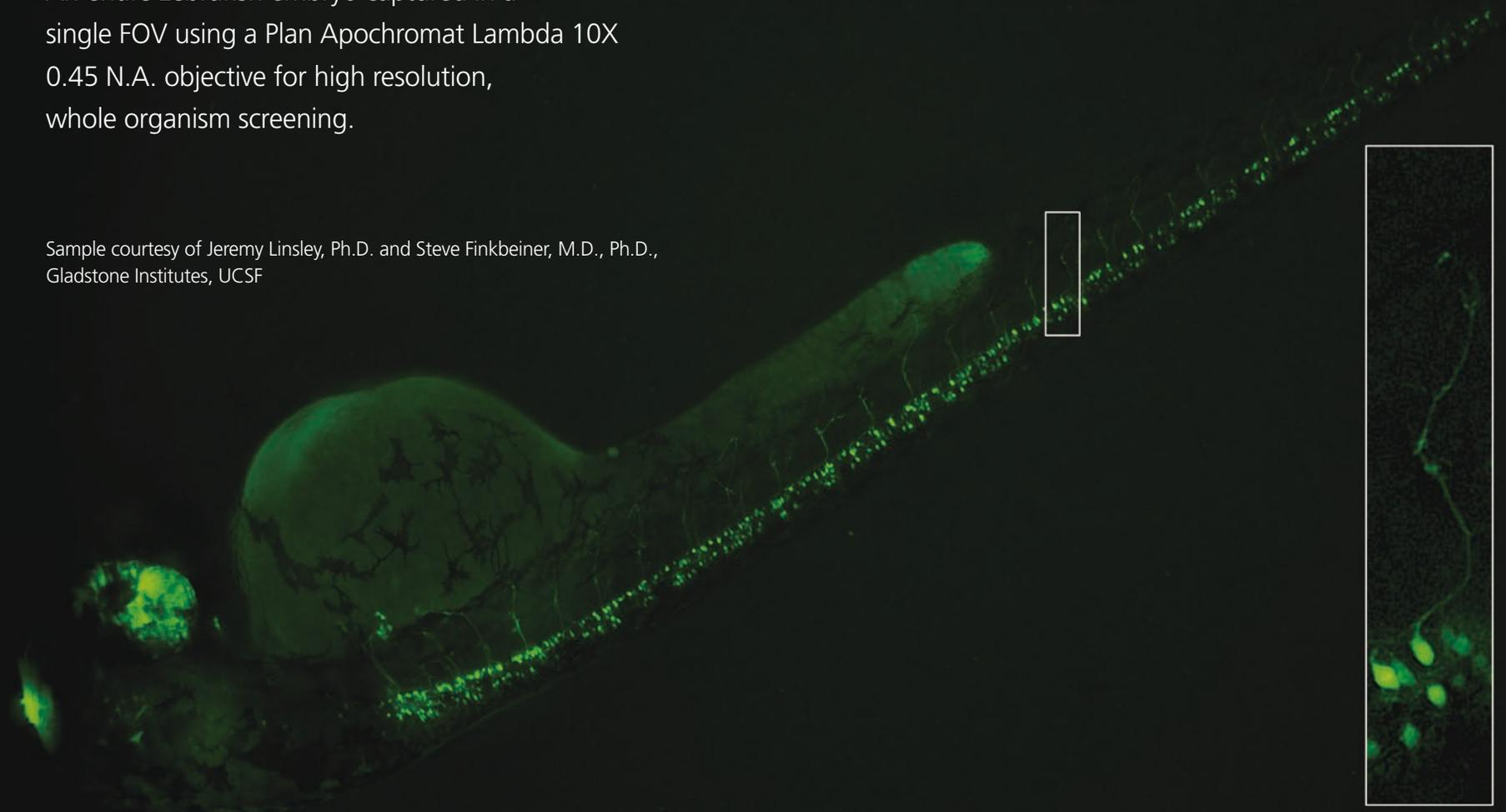


Cultured neurons stained for microtubules, captured with a Plan Achromat Lambda 60X Oil 1.4 N.A. objective. Standard 18mm FOV versus new 25mm FOV of Ti2. Image courtesy of Joshua Z. Rappoport, Ph.D., Northwestern University, Nikon Imaging Center

# See More with Your Whole Organism Screens

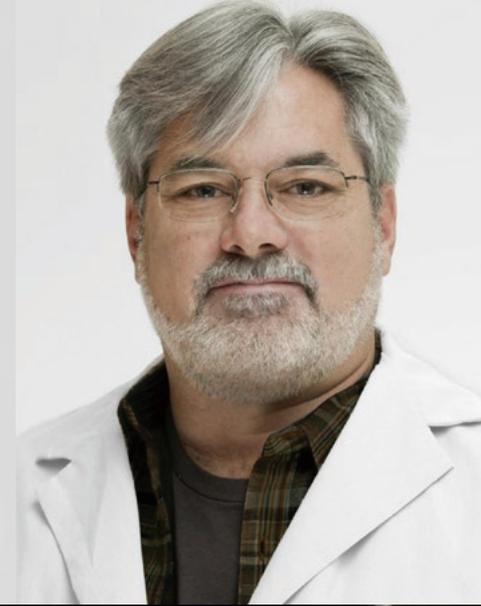
An entire zebrafish embryo captured in a single FOV using a Plan Apochromat Lambda 10X 0.45 N.A. objective for high resolution, whole organism screening.

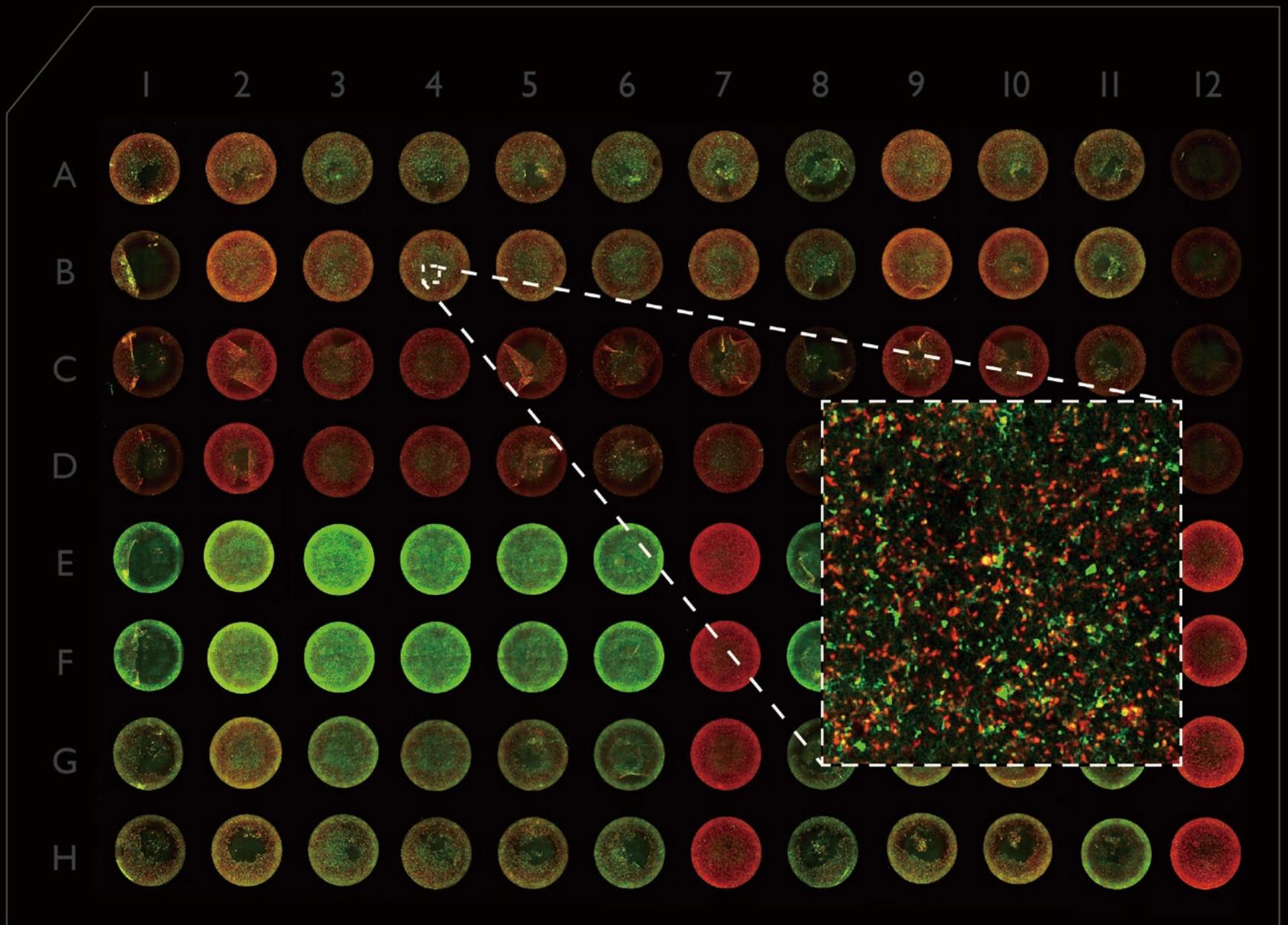
Sample courtesy of Jeremy Linsley, Ph.D. and Steve Finkbeiner, M.D., Ph.D., Gladstone Institutes, UCSF



“The Ti2’s 25mm FOV is a game changer. It dramatically accelerates high-throughput data acquisition, and opens up new possibilities for screening.”

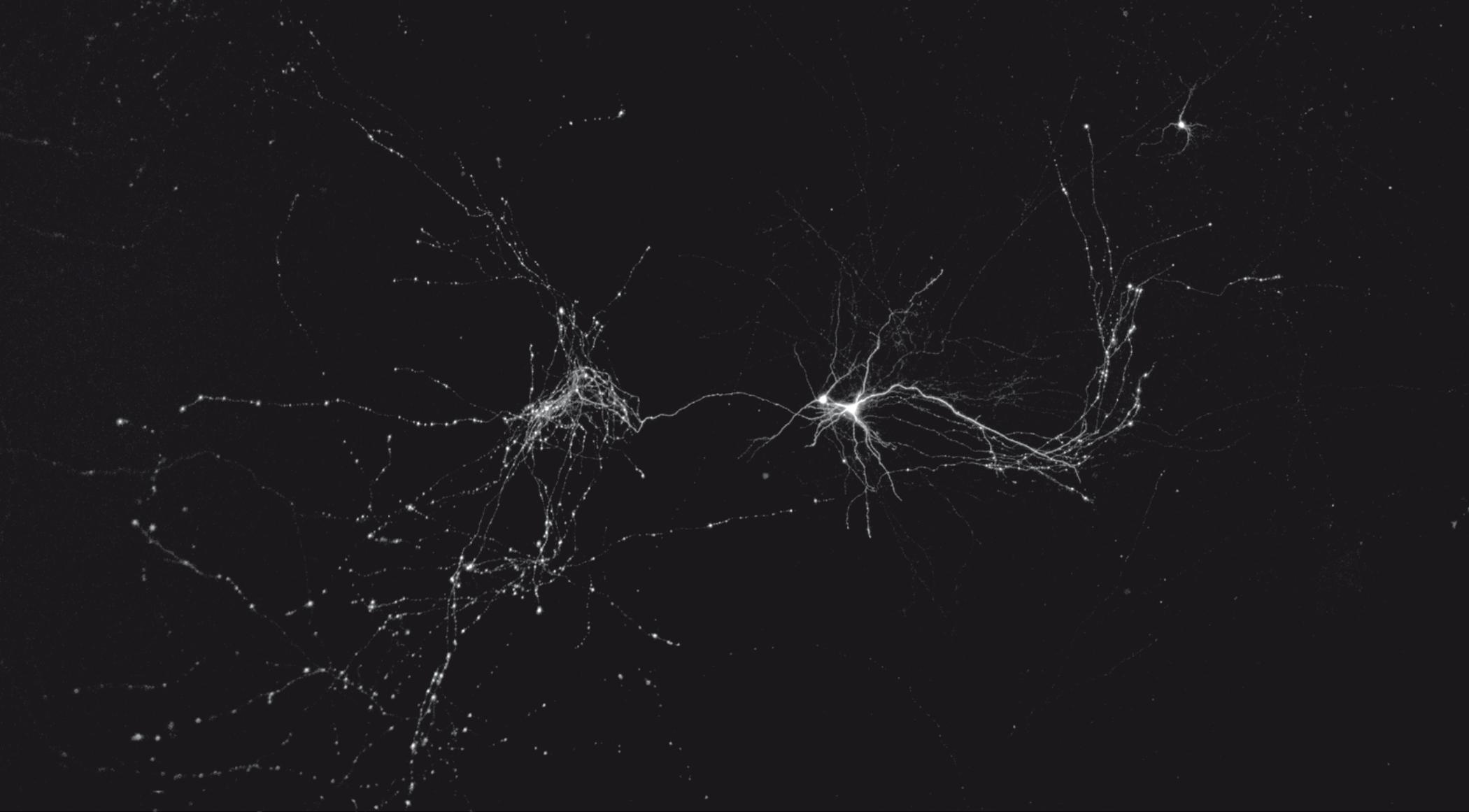
*Steve Finkbeiner, M.D., Ph.D., Gladstone Institutes, UCSF*





Large image stitch of an entire 96-well plate containing GFP and RFP neurons using a Plan Apochromat Lambda 4X objective.

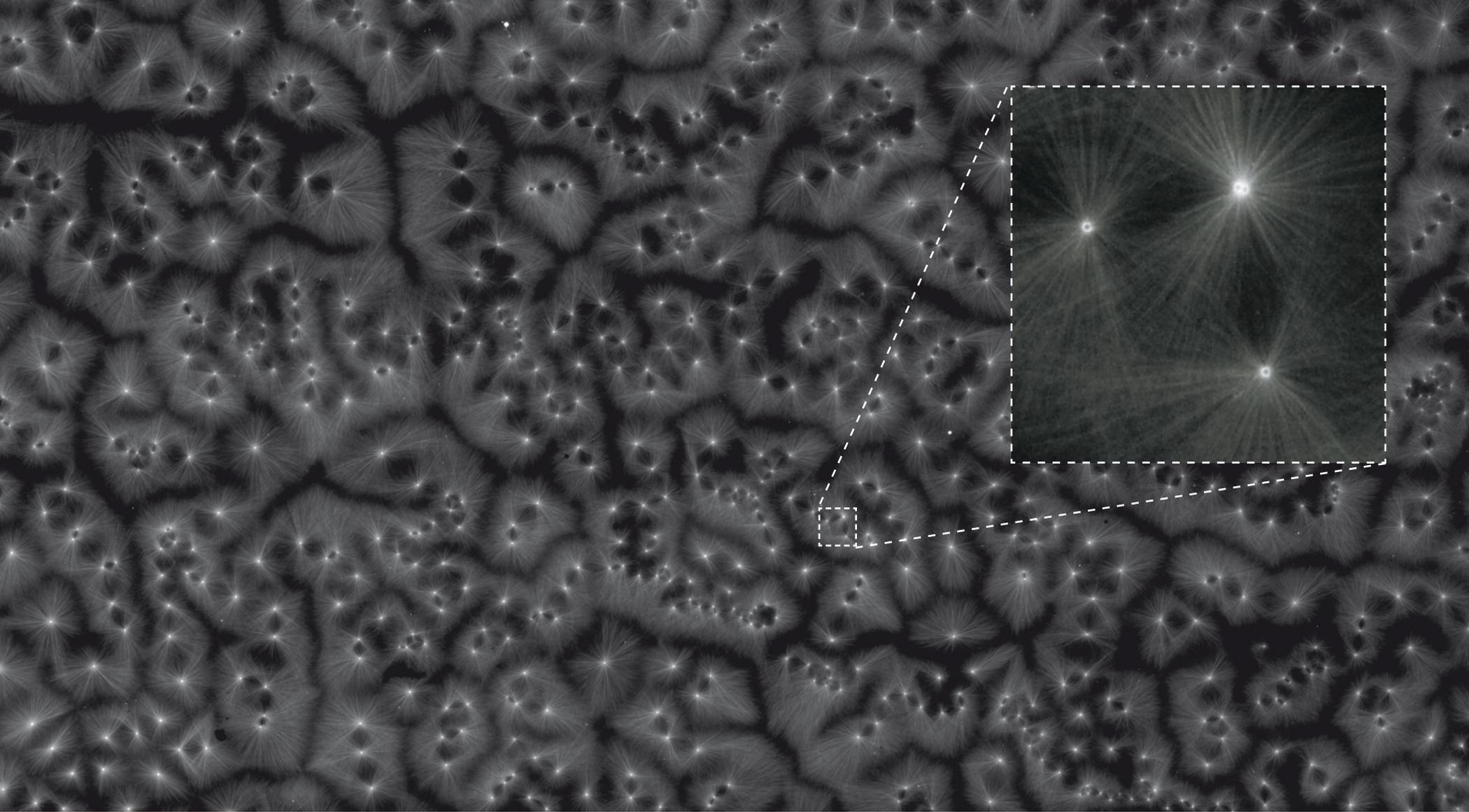
Sample courtesy of Jeanette Osterloh, Ph.D. and Steve Finkbeiner, M.D., Ph.D., Gladstone Institutes, UCSF



## Accelerate Your High Content Screen

The large FOV of Ti2 not only accelerates throughput of high content screens but enables high resolution objectives to be utilized without compromising speed or throughput.

A closeup from a high content screen utilizing a Plan Apochromat Lambda 10X 0.45 N.A. objective. The entire well from a 96-well plate was captured in a 3x3 image stitch with a 10x objective. Neuronal sample courtesy of Gaia Skibinski, Ph.D. and Steve Finkbeiner, M.D., Ph.D., Gladstone Institutes, UCSF

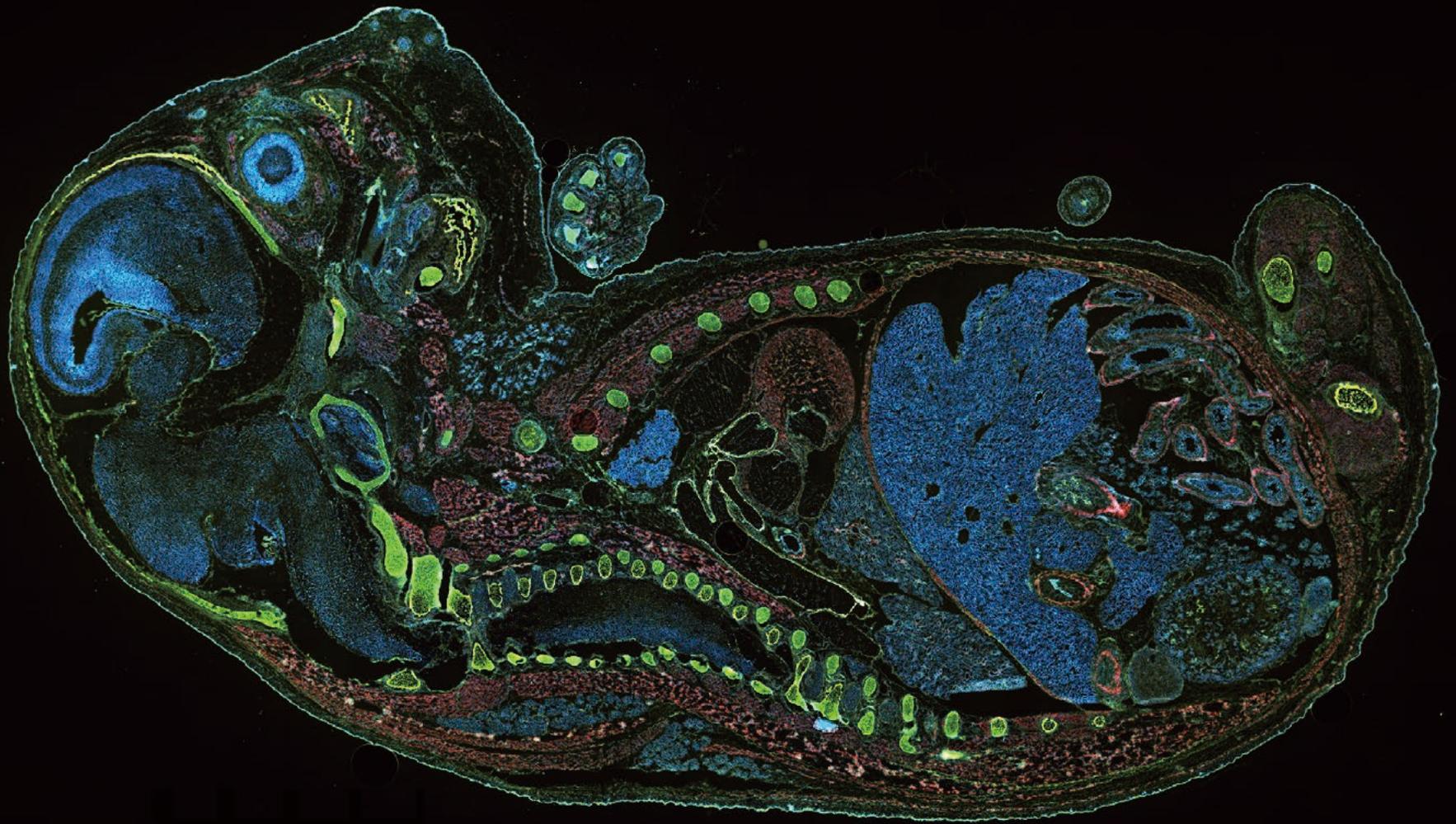


## So Much Data in One Image

“The field of view to the camera is amazing – so much data in one image. The Ti has defined the state of the art for flexible microscopy platforms. Updating this stand is important news in research microscopy.”

*Tim Mitchison, Ph.D., Marine Biological Laboratory*

Large image stitch of microtubule asters formed *in vitro* (Plan Apochromat Lambda 20X 0.75 N.A. objective). Sample courtesy of James Pelletier and Tim Mitchison, Ph.D., Marine Biological Laboratory



## Seamless Image Stitching with Incredibly Flat FOVs

The Ti2's large field of view provides incredibly flat images, resulting in significantly reduced acquisition and post-processing times for large image stitching applications.

## See More Than Before with Nikon Optics

Nikon's world-class objective lenses are manufactured with precision technology and fine-tuned by master craftsmen who undergo years of dedicated training to produce lenses with unrivaled clarity and performance.

The Plan Apochromat Lambda series of objectives employ Nikon's exclusive Nano Crystal Coat technology to achieve ultra-high transmittance rates through the near-infrared range. Chromatic aberration correction is provided from ultraviolet light to near infrared. With their outstanding flatness of field, the Plan Apochromat Lambda series combine with the 25mm FOV of the Ti2 to redefine the boundaries of microscopy.



# *kiwami*

: To master or pursue excellence





## Built Around the User – Assist Guide

Realtime data from the Ti2's built-in sensors (including an internal camera that images the aperture planes) is integrated by a unique Assist Guide function to guide users through alignment procedures and microscope operation. Check Mode alerts users when microscope components are out of place, reducing troubleshooting time. These intelligent features can help standardize training and reduce instances of user error. The Assist Guide function is available through both PC and tablet interfaces.

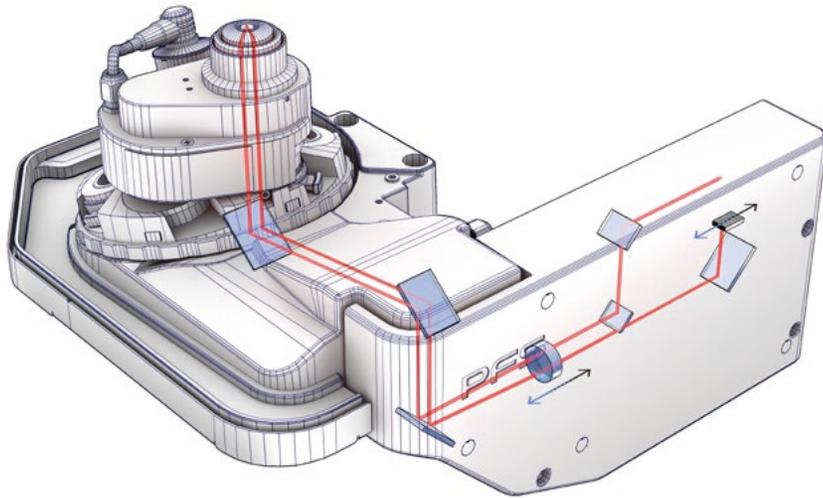
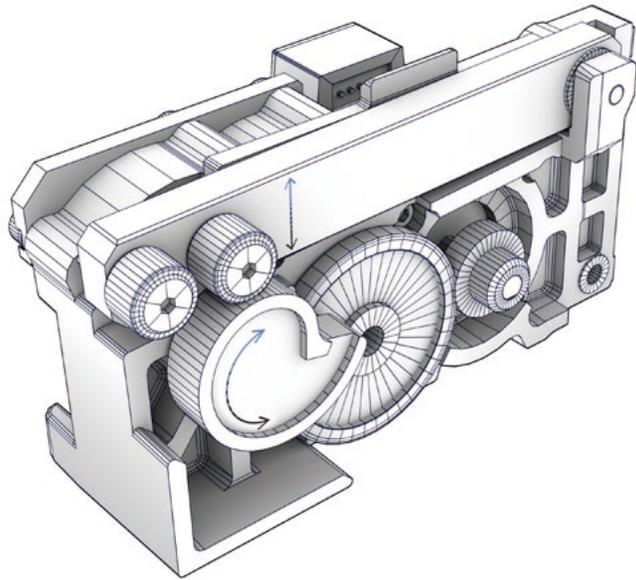


## Diagnose User Issues Much More Efficiently

“The Assist Guide feature will be extremely useful for instructing the next generation of microscopists, as well as for verifying that everything is configured appropriately. Trouble shooting is something we spend a lot of time on in a core facility and this will really help us diagnose user issues much more efficiently.”

*Joshua Z. Rappoport, Ph.D., Northwestern University, Nikon Imaging Center*





## The Best in Focus

The Ti2's Z-drive and Perfect Focus System (PFS) have been completely re-designed to provide unparalleled focus stability.

The new cam-based Z focusing mechanism minimizes XY drift to provide an ultra-stable platform for demanding applications. The Z-drive has also been detached from the main body of the microscope in order to maintain a close distance between the actuator and the objective lens even in expanded (staged-up) configurations.

Nikon's PFS has been an industry leader in autofocus systems. Utilizing a linear encoder and a high-speed feedback mechanism, PFS corrects focus drifts caused by temperature changes and mechanical vibrations. The re-designed 4th generation PFS achieves a new standard in focus stability. The detector portion has been separated from the nosepiece to reduce burden on the z-drive and heat output has been virtually eliminated to provide an incredibly stable imaging environment.

*Mr. Aoyama, Chief Researcher,  
Mechanical Design Unit at Nikon*



Nikon

PF5

DAPI EX 340-04 CM 400 NA 435-4	YFP/HD EX 490-50 CM 510 NA 520-4
G-2A EX 510-04 CM 520 NA 540	DAPI EX 340-04 CM 400 NA 435-4

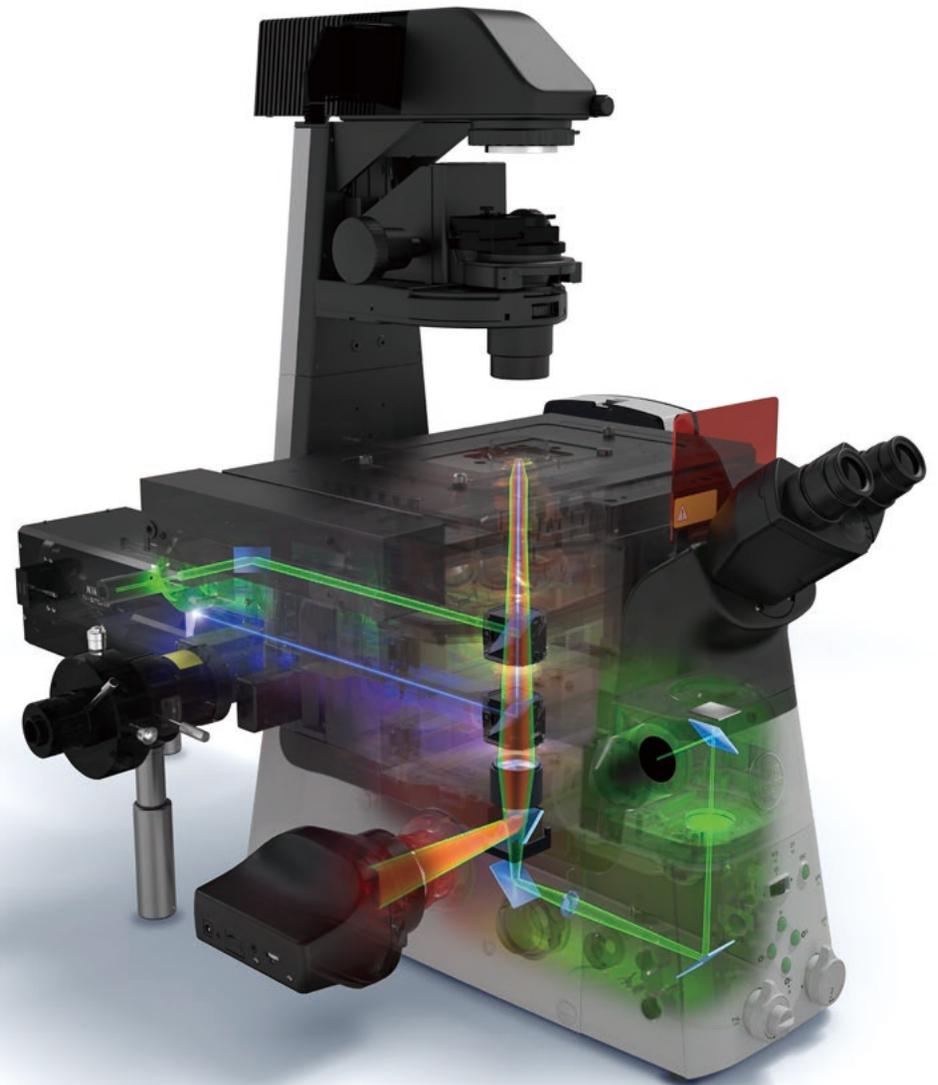


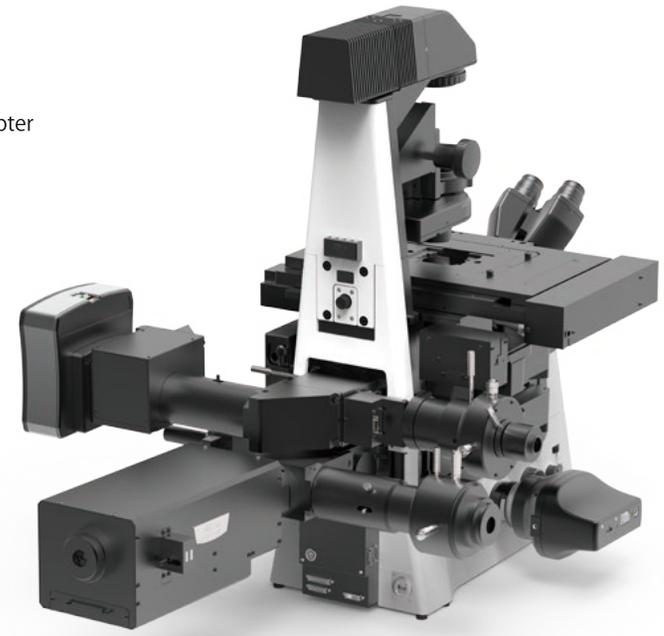
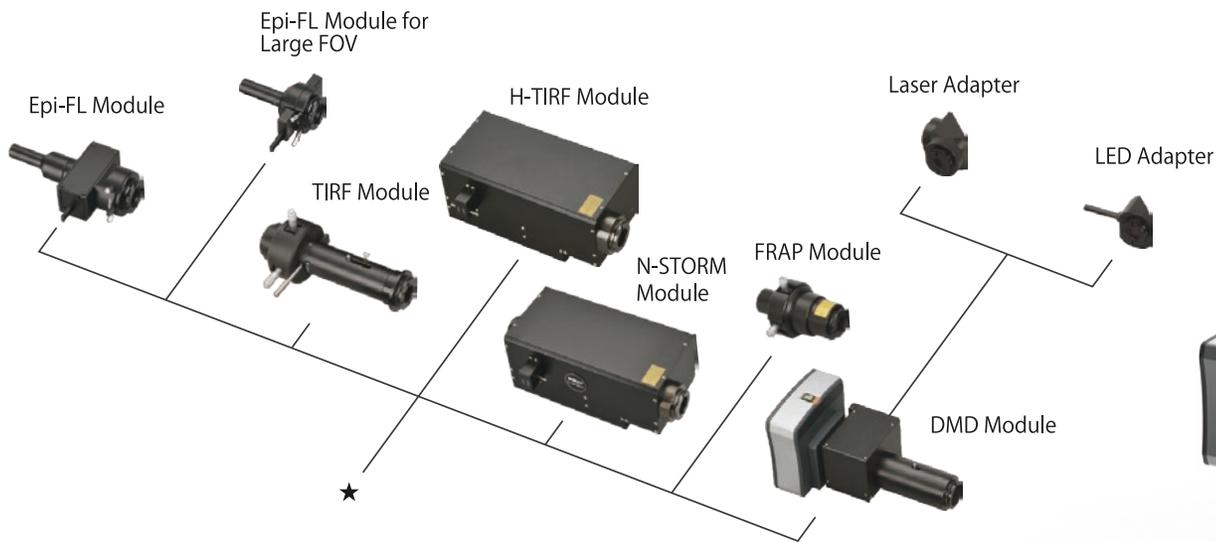
**CAUTION**  
Handle in proper manner  
Do not exchange  
a filter cube while  
Microscope is on.  
Filter-Cube-21501 (00)  
EYEBROW  
BFW200A

## Flexible and Future-Proof

In its standard configuration, the Ti2 can accommodate up to three different illumination devices, enabling you to easily incorporate FRAP or photo-stimulation with a variety of imaging applications such as confocal or TIRF. By taking advantage of infinity optics, the Ti2 can be expanded (staged-up) to accommodate two optical layers and up to five different illumination devices for unsurpassed flexibility in experiment design. This flexibility also ensures the system can be easily modified to accommodate future needs.

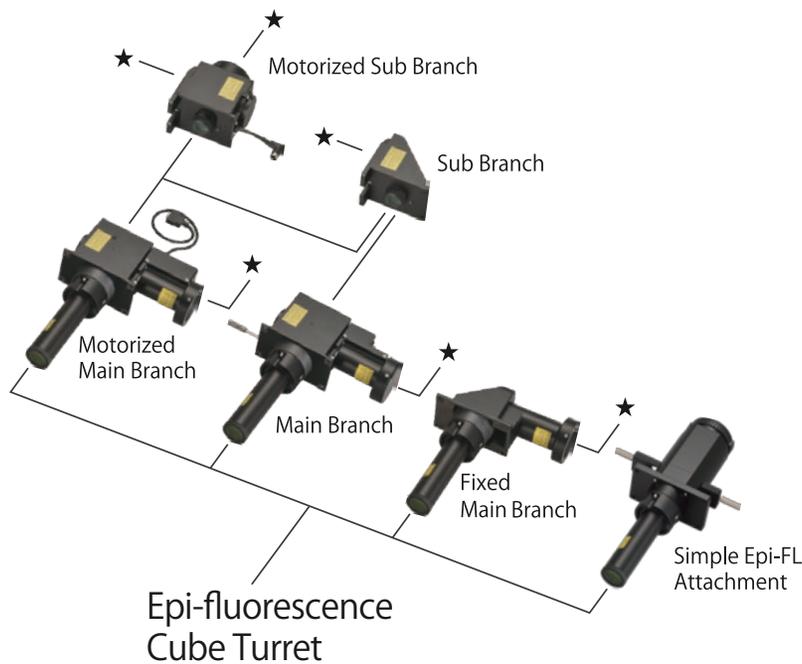
The newly designed Z-drive and PFS4 enhance the stability and performance of the Ti2 even in its expanded form. Combined with the incredible FOV, the Ti2 provides the ultimate platform to meet all your current and future imaging needs.





## Endless Possibilities

The Ti2 offers a modular series of illumination devices for laser and LED-based applications, called LAPPs. The LAPP system includes modules for epi-fluorescence, TIRF, FRAP, DMD, and super-resolution. Modules can be mixed and matched and further combined with confocals to accommodate the most demanding imaging applications. In addition, the modular system readily accommodates free-space coupling of laser-based applications like optical tweezers. The flexibility of the Ti2-LAPP system ensures your system is future-proof and easily re-configured to meet your evolving research needs.

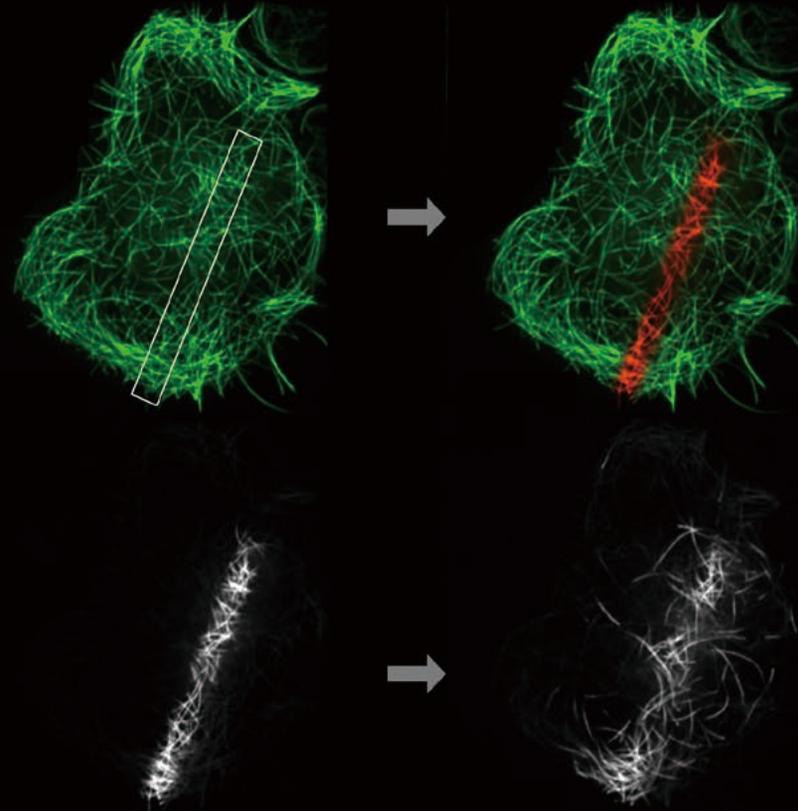


## Customize Freely

The Ti2-LAPP system includes a variety of modular illumination devices which can be custom combined to meet even the most challenging experimental needs.

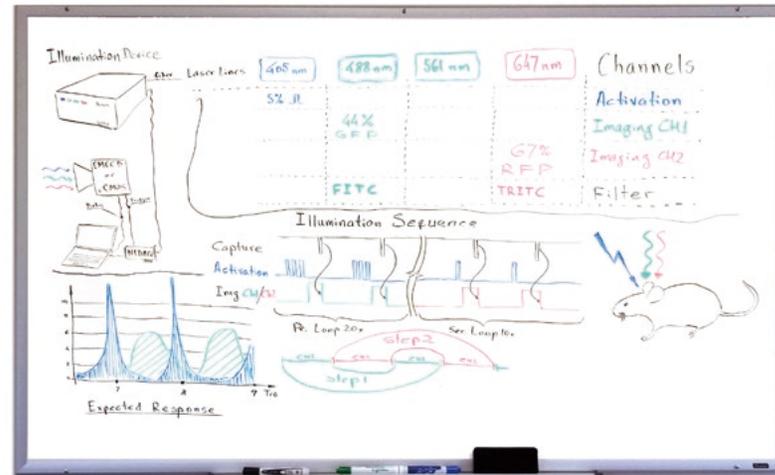
The large FOV epi-fluorescence illuminator with its built-in fly-eye lens technology provides incredible flatness of field across the large 25mm FOV.

Multiple TIRF illuminators including manual and fully motorized versions can be combined to provide simultaneous, multi-angle TIRF imaging. The powerful yet easy-to-use LAPP TIRF illuminators with unique accessories such as gradation ND filters and  $1/4 \lambda$  plates are ideal for single molecule imaging and localization-based super-resolution.



The digital micromirror device (DMD) provides simultaneous photo-stimulation of multiple, custom ROIs, while the FRAP device delivers powerful laser illumination for photo-bleaching. The LAPP-DMD and FRAP modules enable seamless integration of photo-activation/conversion, optogenetics, and FRAP into your TIRF, confocal and Epi-FL imaging experiments.

Sample above courtesy of Vladimir Gelfand, Ph.D. and Urko del Castillo Rojo, Ph.D., Northwestern University



## Customized Software

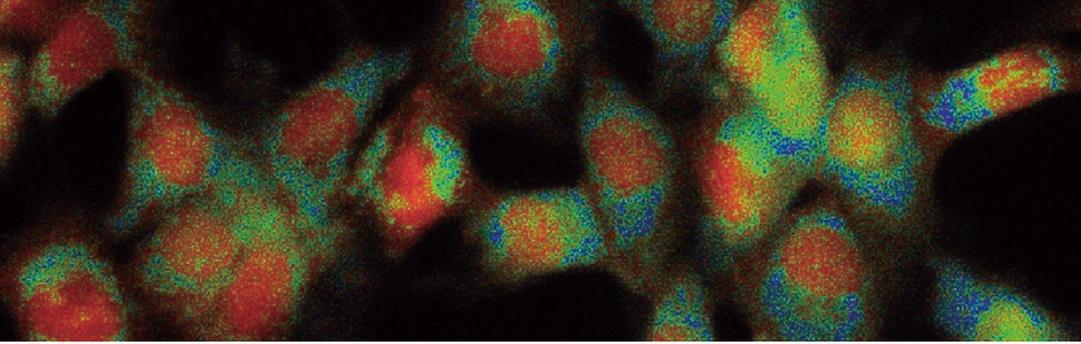
NIS-Elements is Nikon's unified software platform for all imaging modalities. It provides acquisition control for basic to advanced imaging systems as well as powerful analysis tools and stunning display/presentation capabilities. NIS-Elements can be streamlined for simple, turnkey use and expanded for fully customized, complex experiments such as conditional workflows that incorporate computation during experiments. NIS-Elements also offers graphical programming modules such as JOBS and Illumination Sequence for customizing tasks such as stimulation timing. For ultimate flexibility, data is easily extracted for analysis in external programs. In addition to Nikon hardware, NIS-Elements controls devices from a vast array of manufacturers to enable the highest level of customization.

The screenshot shows the NIS-Elements software interface. The left sidebar contains various tool icons. The main window displays a list of tasks and a data grid. The tasks include:

- use Plate with 96 wells
- CaptureDefinition : capture definition
- AFSettings : setup autofocus
- WellSelection : select wells in Plate.Wellplate (50)
- align Plate.Wellplate (Aligned)
- Wells : for each well in WellSelection.Selection
  - Move to center of Wells.CurrentWell
  - Move to Center Position of: Wells.CurrentWell
  - Move to Z  Use Well PFS Offset
  - AF\_Well\_Plate\_Acq : setup autofocus
  - TimeLapse : during 10 sec ; no delay
  - Move to well C1 of Plate.Wellplate
  - CaptureDefinition1 : capture definition

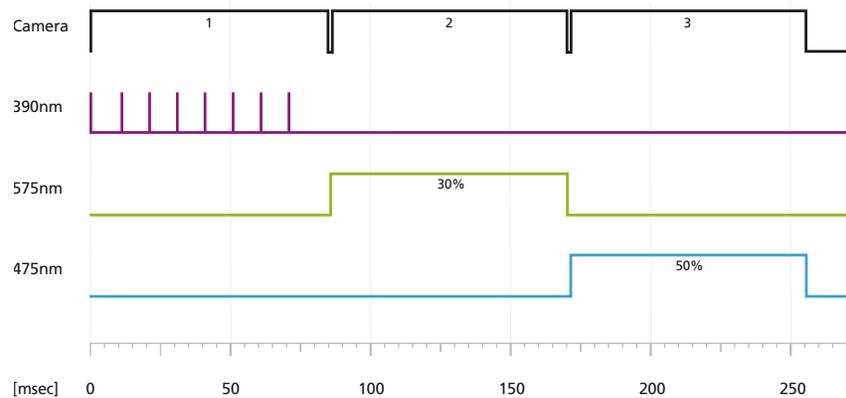
The data grid shows numerical values for each well in a 10x10 grid:

0.0479	0.0545	0.0690	0.0493	0.0842	0.0819	0.0299	0.0509	0.0466	0.0670	0.0819	0.0922
0.0389	0.0443	0.0695	0.0479	0.0834	0.0621	0.0479	0.0545	0.0690	0.0493	0.0842	0.0819
0.0372	0.0464	0.0588	0.0408	0.0685	0.0695	0.0372	0.0464	0.0588	0.0408	0.0685	0.0695
0.0389	0.0443	0.0695	0.0479	0.0834	0.0621	0.0389	0.0443	0.0695	0.0479	0.0834	0.0621
0.0372	0.0464	0.0588	0.0408	0.0685	0.0695	0.0372	0.0464	0.0588	0.0408	0.0685	0.0695
0.0299	0.0509	0.0466	0.0670	0.0819	0.0922	0.0299	0.0509	0.0466	0.0670	0.0819	0.0922
0.0479	0.0545	0.0690	0.0493	0.0842	0.0819	0.0479	0.0545	0.0690	0.0493	0.0842	0.0819
0.0389	0.0443	0.0695	0.0479	0.0834	0.0621	0.0389	0.0443	0.0695	0.0479	0.0834	0.0621
0.0372	0.0464	0.0588	0.0408	0.0685	0.0695	0.0372	0.0464	0.0588	0.0408	0.0685	0.0695
0.0299	0.0509	0.0466	0.0670	0.0819	0.0922	0.0299	0.0509	0.0466	0.0670	0.0819	0.0922



## Accelerate Your Research with Triggering

As research continually evolves towards more demanding, higher-speed imaging applications, every millisecond matters. The Ti2's unique hardware triggering capabilities remove the need for software-callbacks during acquisition routines to maximize imaging speed. Triggering also minimizes the amount of time specimens are exposed to light, thereby extending long-term imaging. In hardware triggering, the detector communicates directly with motorized devices to synchronize and initiate their movement, thereby bypassing latencies that result from software-based control and verifications.



## Accessories

Accessories to further enhance the flexibility and performance of your imaging system.



### External Phase Contrast Tube (Motorized)

Enables users to capture phase contrast images without sacrificing signal intensity in their fluorescent images.



### Stage Up Kit

Expands the stratum structure of the microscope and allows additional imaging applications to be incorporated.



### Auto Correction Collar

The harmonic drive mechanism and automatic correction algorithm allows users to easily correct for spherical aberration and ensure the highest level of objective performance.



### Water Immersion Dispenser

The Water Immersion Dispenser automatically applies the appropriate amount of water to the tip of an objective, eliminating evaporation and overflow during experiments.

# Specifications

		ECLIPSE Ti2-E, Ti2-E/B* <sup>1</sup>	ECLIPSE Ti2-A	ECLIPSE Ti2-U	
Main body	Optical system	Infinity-corrected CFI60			
	Field number <sup>2</sup>	22 with C-mount, 25 with F-mount			
	Intermediate Magnification switching	Manual switching of 1.0X/1.5X (exchangeable from 1.5X to 2.0X)			
		Status detection		—	
	Bertrand lens	Manual in/out, and manual focus, Status detection		—	
	Output port	4 Motorized positions Eyepiece 100%, left 100%, right 100%, eyepiece 20%/left 80% (Ti2-E/B: bottom 100%)		4 Manual positions Eyepiece 100%, left 100%, right 100%, option (to eyepiece 20%/left 80% or eyepiece 20%/right 80%)	
		Can add ports by use of back port unit and/or choice of tube base unit* <sup>3</sup>			
Focusing unit	Motorized drive, Coarse/fine focus changeover, 10mm stroke, Minimum increments: 0.01μm, 0.02μm (with encoder control)		Manual drive, Coarse/fine focusing knob, 10mm stroke		
Stage up	Available* <sup>4</sup>				
Tube body	Binocular tube	Binocular S tube TC-T-TS (field number 22), Ergonomic ER tube TC-T-ER (field number 22)			
	Motorized eyepiece tube base unit for external PH (TI2-T-BP-E)	Camera port (field number 16), Motorized PH turret with 4 motorized positions	—		
	Assist eyepiece tube base unit (TI2-T-BA)	Assist camera (field number 22), Status detection		—	
	Eyepiece tube base unit with port (TI2-T-BC)	Camera port (field number 16)	—	Camera port (field number 16)	
Transmitted illumination	Pillar for transmitted illumination (TI2-D-PD)	Condenser vertical stroke: 66mm, Backward tilting up to 25 degrees, With field diagram and refocusing mechanism 2 filter slot positions (4 filter position option is also available with Filter Slider for transmitted illumination (TI2-D-SF))			
	LED Lamphouse for dia illumination (TI2-D-LHLED)	High power LED			
	Precentered Lamphouse (D-LH/LC)	100W halogen bulb (pre-centered)			
Condenser	Motorized condenser turret (TI2-C-TC-E)	7 motorized positions (Ø37mm x4, Ø39mm x3), LWD/ELWD/CLWD/NAMC condenser lenses are supported	—		
	Intelligent condenser turret (TI2-C-TC-I)	7 manual positions (Ø37mm x4, Ø39mm x3), Status detection, LWD/ELWD/CLWD/NAMC condenser lenses are supported		—	
	Condenser turret (TC-C-TC)	7 manual positions (Ø37mm x4, Ø39mm x3), LWD/ELWD/CLWD/NAMC condenser lenses are supported			
	ELWD-S condenser turret (TE-C)	4 manual positions, With ELWD condenser lens (NA0.3/OD65)			
	HNA condenser slider (TI2-C-SCH)	2 manual positions (Ø37mm x1, Ø39mm x1), HNA dry lens/HNA oil lens are supported			
	Condenser lens	LWD (W.D.=30mm, NA=0.52), ELWD (W.D.=75mm, NA=0.3), CLWD (W.D.=13mm, NA=0.72), HNA dry (W.D.=5mm, NA=0.85), HNA oil (W.D.=1.9mm, NA=1.3), NAMC (W.D.=44mm, NA=0.4)			

# Specifications *(continued)*

		ECLIPSE Ti2-E, Ti2-E/B*1	ECLIPSE Ti2-A	ECLIPSE Ti2-U
Stage	Motorized stage (TI2-S-SE-E, TI2-S-SS-E)	Stroke X: ±57mm, Stroke Y: ±36.5mm, Max drive speed: approx. 25mm/sec, Magnetic sample holder		—
	Stage (TC-S-SR, TC-S-SRF)	Stroke X: ±57mm, Stroke Y: ±36.5mm, Adjustable stroke range (3 levels) with adjusting pin, Long/middle/short handle options available		
	Gliding stage (TC-S-GS)	Stroke Ø20mm		
Nosepiece	Perfect Focus Unit with motorized nosepiece for Auto Correction Collar (TI2-N-NDA-P)	5 motorized positions, Simple waterproof structure		—
	Motorized DIC sextuple nosepiece (TI2-N-ND-E) Perfect Focus Unit with motorized nosepiece (TI2-N-ND-P) Perfect Focus Unit with motorized nosepiece for MP (TI2-N-NDM-P)	6 motorized positions, Simple waterproof structure		—
	Intelligent DIC sextuple nosepiece (TI2-N-ND-I)	6 manual positions, Status detection, Simple waterproof structure		—
	Sextuple nosepiece (TI2-N-N), DIC sextuple nosepiece (TI2-N-ND)	6 manual positions, Simple waterproof structure		
Epi-filter turret	Motorized epi filter turret (TI2-F-FLT-E, TI2-F-FLTH-E)	6 motorized positions, Motorized shutter		—
	Intelligent epi filter turret (TI2-F-FLT-I)	6 manual positions, Manual shutter, Status detection*5		
Filter wheel/ shutter	Motorized BA filter wheel (TI2-P-FWB-E)	7 motorized positions, High speed mode: 50ms, Low vibration mode: 100ms (movement time between adjacent positions)		—
	Motorized shutter (NI-SH-E)*6	12ms to open/close		
Epi- fluorescence attachment	EPI-FL module (TI2-LA-FL), EPI-FL module for large FOV (TI2-LA-FLL)	Supports fiber illuminator; includes 2-position filter slider and aperture diaphragm		
	Simple EPI-FL attachment (TI2-F-FLS)	Supports both fiber illuminator and lamp house; includes 3-position filter slider		
	Field stop slider	Circular (TI2-F-FSC), rectangular (TI2-F-FSR), square (TI2-F-FSS) aperture options		
Control unit	Controller, display device	Stage joystick (TI2-S-JS), Tablet	Tablet	—
	Controller for Ti2-E (TI2-CTRE)	USB/LAN interface, I/O function		—
Operating environmental		Temperature: 0°C+40°C, Humidity: 60% RH max. (at +40°C, no condensation), Indoor use only		

Motorized accessories have a status detection function

\*1 Motorized model with a bottom port

\*2 Limitations apply based on objective and filter cube choice, stage-up configuration, and illumination module, etc.

\*3 Tube base units with a port cannot be used with Ti2-A

\*4 Stage up kit is required. Please contact Nikon.

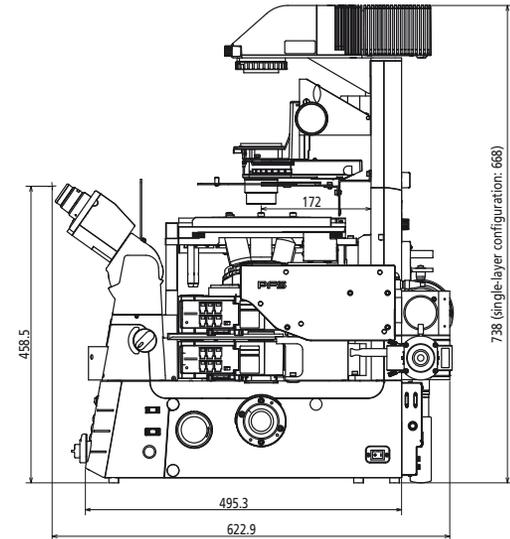
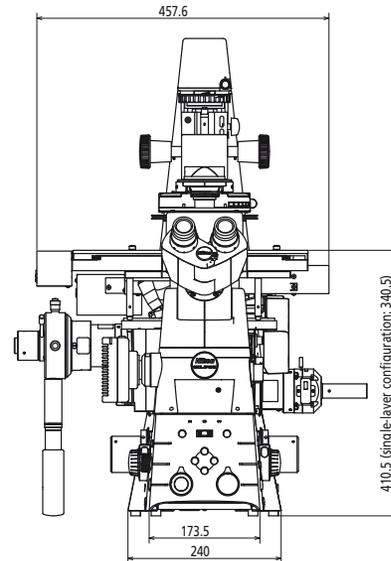
\*5 Status detection cannot be used when attached to the Ti2-U

\*6 NI-SH-CON Controller for Motorized Shutter is required for use with the Ti2-A/Ti2-U

# Dimensional Diagrams

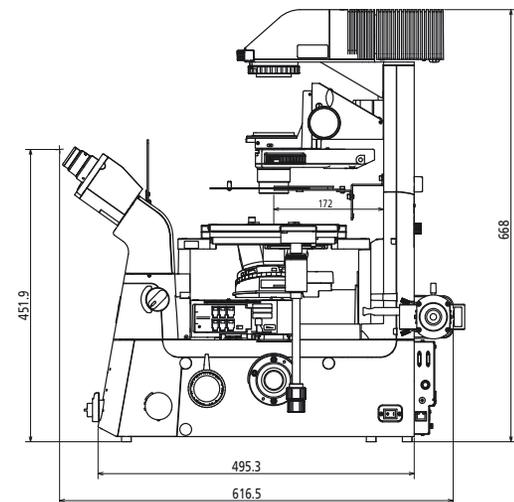
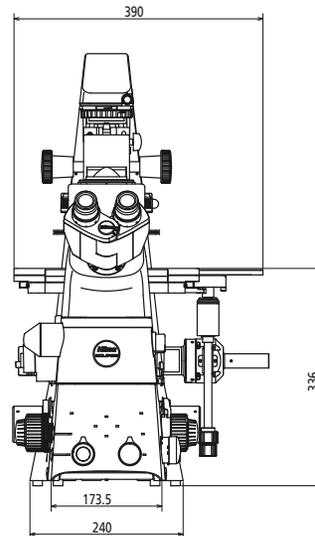
## Ti2-E

Double layer configuration with an Epi-FL module and a FRAP module.



## Ti2-A/U

Single layer configuration with an Epi-FL module.  
Illustration is of Ti2-A.



Unit: mm

Enter the "Microscopy University" on the web and discover a whole new world.

<http://www.microscopyu.com>

Specifications and equipment are subject to change without any notice or obligation on the part of the manufacturer. September 2017  
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**WARNING**

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

Monitor images are simulated.

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\*Products: Hardware and its technical information (including software)



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for NIKON CORPORATION

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