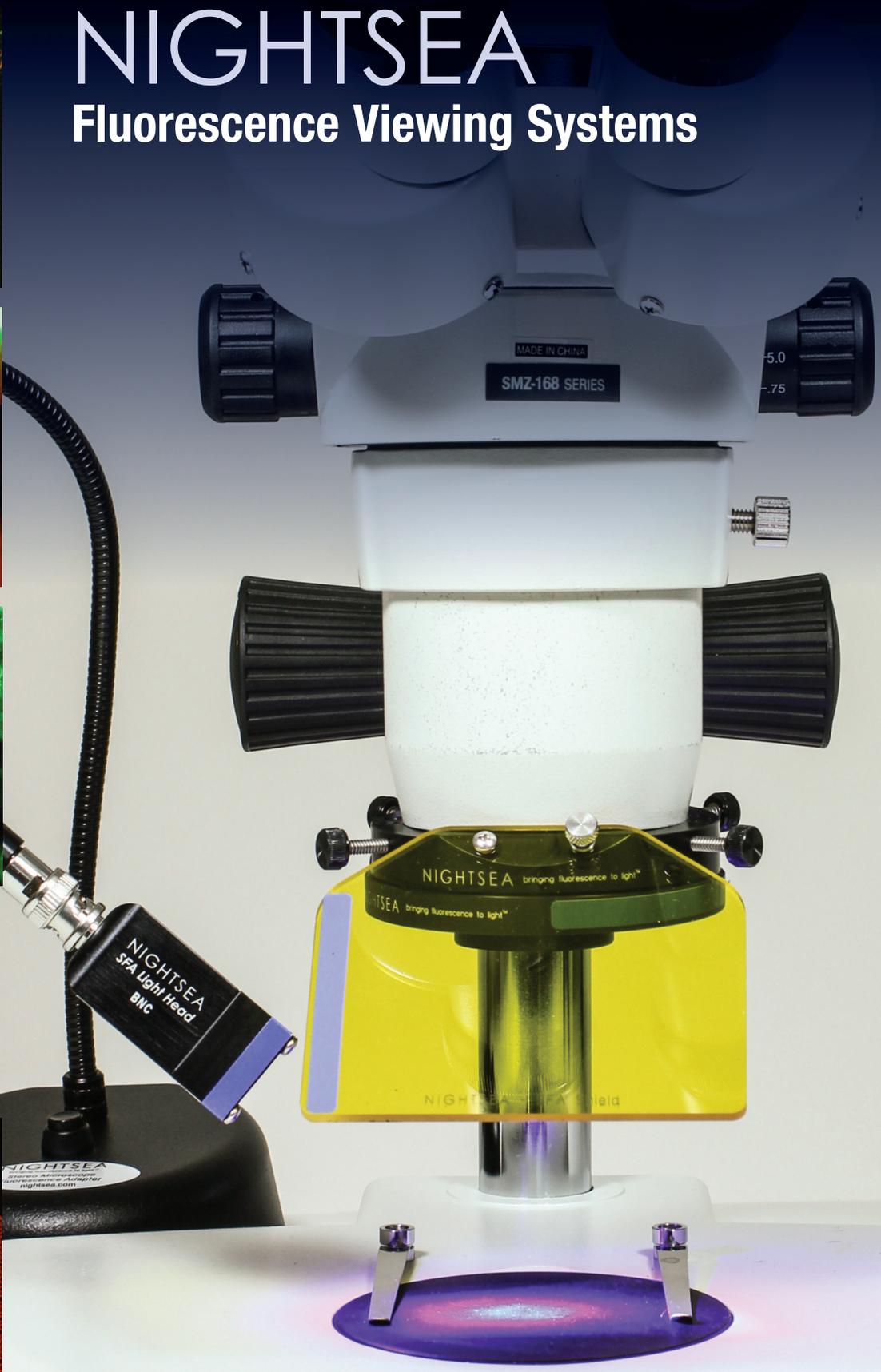
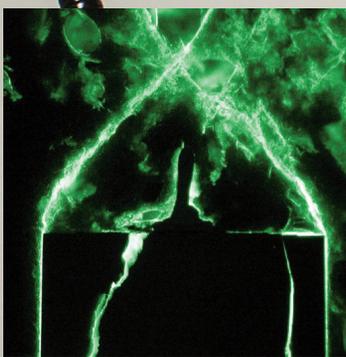
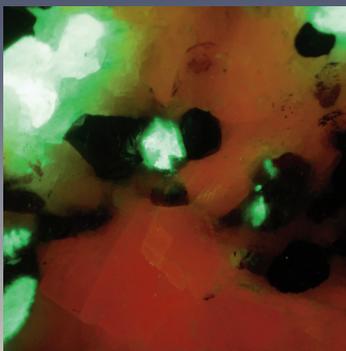
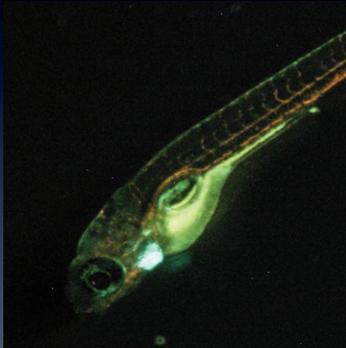


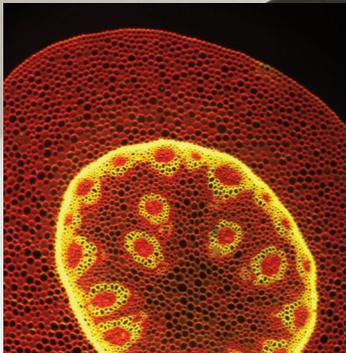


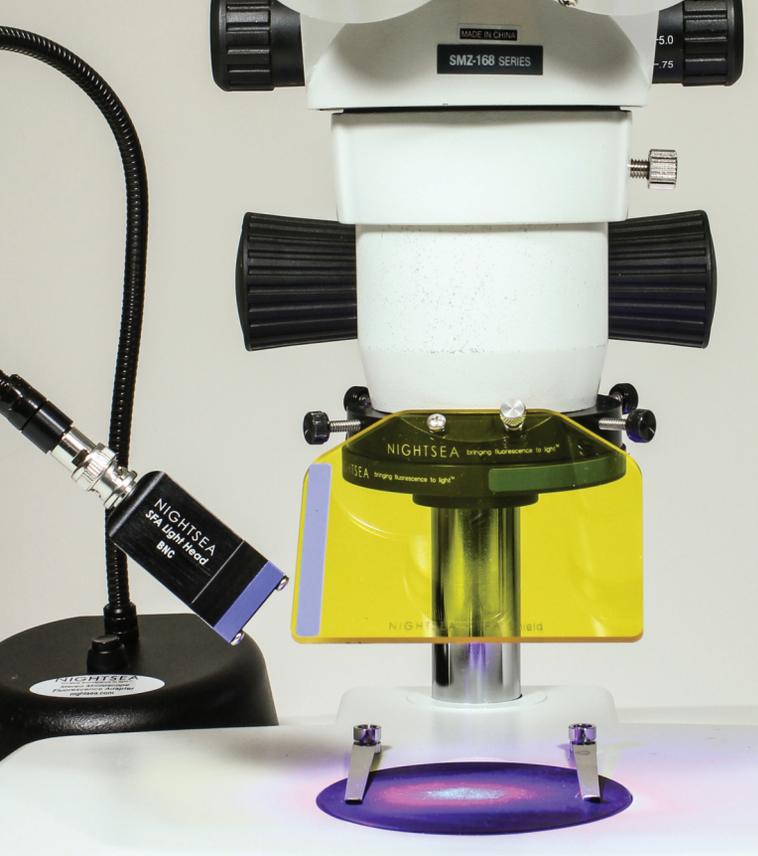
Practical and economical solutions for viewing and photographing fluorescence

# NIGHTSEA Fluorescence Viewing Systems



**Electron  
Microscopy  
Sciences**





## NIGHTSEA Stereo Microscope Fluorescence Adapter

Adapt your existing lab stereo microscopes for fluorescence

### Overview

The NIGHTSEA Stereo Microscope Fluorescence Adapter adapts just about any stereo microscope (dissecting microscope) for fluorescence with no modification to the microscope itself. The modular design lets you easily switch between several different excitation/emission combinations to work with a variety of fluorescent proteins and other fluorophores. There are now **six** different excitation/emission combinations available, plus white light.

### Applications

This simple system is excellent for:

- Quick screening of your fluorescent genotypes - *Drosophila*, zebrafish, *C. elegans*,...
- Genotype sorting
- Fluorescence-aided dissection, injection, or micromanipulation
- Pre-screening sample preps for confocal or other high-resolution imaging
- Freeing up your research-grade fluorescence microscopes for more demanding work
- New faculty start-up budgets
- Bringing fluorescence into the teaching laboratory

### The Stereo Microscope Fluorescence Adapter system consists of:

- Flexible gooseneck lamp base with power supply
- Adapter for microscope
- Light head
- Barrier filter
- Filter shield

The light head, barrier filter, and filter shield are interchangeable so that you can easily switch between excitation/emission light+filter combinations.

The microscope mounting adapter fits up to 67mm to work with the majority of stereo microscopes. An oversize adapter and an adapter for the Leica EZ4 series are also available.



### Fluorescence isn't just for research microscopes anymore...

- Now sort on your laboratory-level stereos
- Use to facilitate micromanipulation and dissection
- Expand from your research lab to your classroom

### Modular...

- Installs in seconds - just clicks into place
- Interchangeable excitation/emission combinations
- Move from microscope to microscope
- No modification to your microscope needed

### Economical — More Glow for the Dough...

- Stretch your lab budget
- Inexpensive enough for classroom use

### Grows as your lab grows...

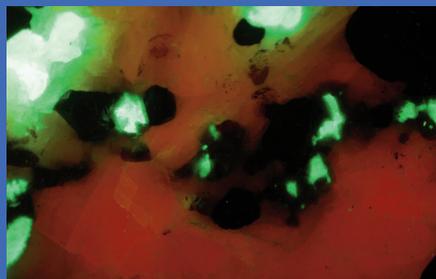
- Buy just what you need now (up to 5 different wavelength sets)
- Add more as your needs expand

### Here are samples of what you can see:



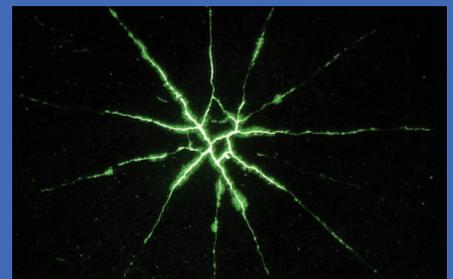
#### Fluorescent Proteins

GFP-tagged *Drosophila* larva



#### Geology

Calcite and willemite fluorescence



#### Industry

Electronic component failure analysis

Once you are set up for one excitation/emission wavelength combination, additional combinations can be added by purchasing a kit that consists of a light head, barrier filter, and viewing shield. These three elements can be removed and replaced in seconds, and color coding ensures that you are using the right combination. The barrier filter clicks on to the ring adapter magnetically, so it is easy to remove it to switch back to white light viewing.

## Wavelength Sets

Designation	Excitation	Emission	Fluorophores
UV – Ultra Violet	360-380nm	415nm LP	DAPI, ...
VI – Violet	400-415nm	460nm LP	CFP, ...
RB – Royal Blue	440-460nm	500nm LP	GFP, eGFP, fluorescein...
RB-GO – Green Only	440-460nm	500-560nm BP	GFP, eGFP, fluorescein...
CY – Cyan	490-515nm	550nm LP	YFP, Venus, Lucifer Yellow...
GR – Green	510-540nm	600nm LP	DsRed, dTomato...

## Green-Only Barrier Filter

The Green-Only (GO) Barrier Filter isolates the green part of the spectrum and is for use with the Royal Blue excitation source. While our other barrier filters are long-pass filters this filter is a bandpass, transmitting from approximately 500 to 560nm. The long-pass filter has served well for most users who need to visualize green-fluorescent protein (GFP), and if you are exploring fluorescence in nature it is preferable. The primary motivation for adding the green-only filter to the line-up was for the benefit of researchers using GFP in plants such as *Arabidopsis thaliana*, a common research model. Plants contain chlorophyll, which has a distinctive red fluorescence that can sometimes mask the GFP emission, making it harder to see and photograph.



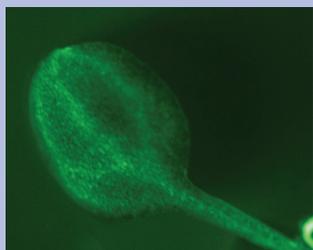
Arabidopsis fluorescence imaged with long-pass filter



Arabidopsis fluorescence imaged with bandpass filter



Arabidopsis fluorescence imaged with long-pass filter



Arabidopsis fluorescence imaged with bandpass filter

We tested this new barrier filter with *Arabidopsis* supplied by Dr. Chip Celenza (Department of Biology, Boston University). These plants express GFP in the roots and vasculature. The images above show examples of plants photographed with the long-pass filter (left) and green-only filter (right). There is no chlorophyll in the roots so the GFP is evident there in both images, but the weaker expression in the leaves is much more apparent in the images on the right.

## Lamp Base Light Control Options

The SFA lamp base is available in three versions: Standard, DIM, and PULSE. Standard lamp bases provide a steady light when turned on. DIM lamp bases feature an OFF/ON/DIM switch to change the intensity of the light. PULSE lamp bases incorporate a BNC connector that accepts a voltage signal to control the excitation source ON/OFF.

Only one control option is available per base. The DIM and PULSE options can be purchased as part of a new system, as a retrofit to an existing base, or in a stand-alone lamp base purchased a la carte.

### NIGHTSEA DIM Option

The DIM option adds a combined switch and dimmer control. When you first turn the unit on it is at full power. As you rotate the switch the intensity decreases, reaching about 30% power at the minimum setting. You have finer control in the brighter portion of the adjustment range. An intensity indicator (1-10) makes it easy to record and repeat preferred settings.



Dimmer switch option on SFA



Target at max and min excitation

### NIGHTSEA PULSE Option

The PULSE option adds a BNC connector on the rear of the base that accepts a user-supplied voltage input to turn the light on and off. Some possible applications are:

- External control (computer, function generator, etc.) for precise illumination timing for photoactivation, behavioral experiments
- PWM input for light dimming
- Footswitch for hands-free operation. Contact EMS for details



**Voltage Input** 2.8 - 6.0 VDC for ON, <0.6VDC OFF

**Maximum Operation Frequency** 10kHz

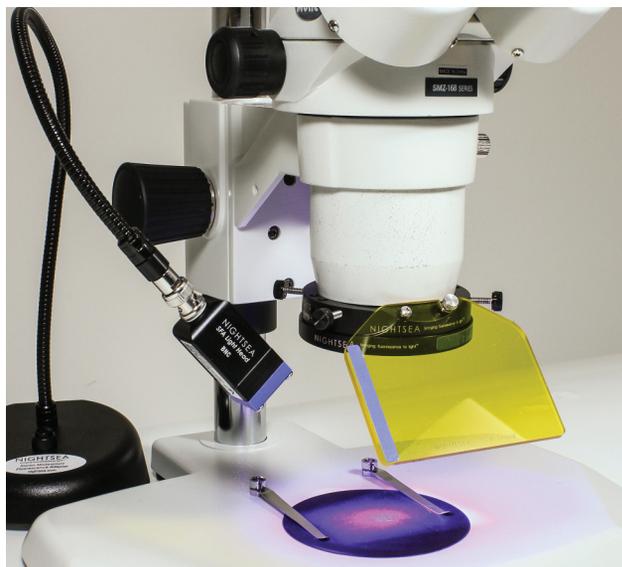
**BNC cable not included**

## See how it works... Learn how to do it...

We've added video content to our website to help you get to know our latest products even better!

Stop by and see what it's all about.

## Ordering Information: Full Systems



### Stereo Microscope Fluorescence Adapter, Full System

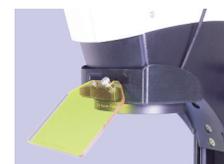
Full system with one illumination color consisting of:

- Lamp Base with Power Supply and International Plug Set
- Light Head — Ultraviolet, Violet, Royal Blue, Cyan, or Green
- Microscope Mounting Adapter
- Barrier Filter
- Viewing Shield
- Padded Travel Case

Cat. No.	Description	Qty.
<b>Standard Lamp Base</b>		
SFA-UV	Full System with Ultraviolet, Standard lamp base	each
SFA-VI	Full System with Violet, Standard lamp base	each
SFA-RB	Full System with Royal Blue, Standard lamp base	each
SFA-RB-GO	Full System with Royal Blue, Green-Only Barrier Filter, Standard lamp base	each
SFA-CY	Full System with Cyan, Standard lamp base	each
SFA-GR	Full System with Green, Standard lamp base	each
<b>DIM Lamp Base</b>		
SFA-UV-DIM	Full System with Ultraviolet, DIM lamp base	each
SFA-VI-DIM	Full System with Violet, DIM lamp base	each
SFA-RB-DIM	Full System with Royal Blue, DIM lamp base	each
SFA-RB-GO-DIM	Full System with Royal Blue, Green-Only Barrier Filter, DIM lamp base	each
SFA-CY-DIM	Full System with Cyan, DIM lamp base	each
SFA-GR-DIM	Full System with Green, DIM lamp base	each
<b>PULSE Lamp Base</b>		
SFA-UV-PULSE	Full System with Ultraviolet, PULSE lamp base	each
SFA-VI-PULSE	Full System with Violet, PULSE lamp base	each
SFA-RB-PULSE	Full System with Royal Blue, PULSE lamp base	each
SFA-RB-GO-PULSE	Full System with Royal Blue, Green-Only Barrier Filter, PULSE lamp base	each
SFA-CY-PULSE	Full System with Cyan, PULSE lamp base	each
SFA-GR-PULSE	Full System with Green, PULSE lamp base	each



Leica EZ4 Mount Adapter



### Full System with Leica EZ4 Adapter

Full system with one illumination color consisting of:

- Lamp Base with Power Supply and International Plug Set
- Light Head — Ultraviolet, Violet, Royal Blue, Cyan, or Green
- Leica EZ4 Mounting Adapter
- Barrier Filter
- Viewing Shield
- Padded Travel Case

The Leica EZ4 Mounting Adapter enables you to use the NIGHTSEA Stereo Microscope Fluorescence System with the Leica EZ4 series of stereo microscopes, with or without integrated camera. Easily attach the barrier filter magnetically and hold the filter shield in place with a thumbscrew. The adapter is available for purchase separately to quickly move between Leica and other stereo microscopes (see below).

Cat. No.	Description	Qty.
<b>Standard Lamp Base</b>		
SFAZ-UV	Full System with Ultraviolet, Standard Lamp Base	each
SFAZ-VI	Full System with Violet, Standard Lamp Base	each
SFAZ-RB	Full System with Royal Blue, Standard Lamp Base	each
SFAZ-RB-GO	Full System with Royal Blue, Green-Only Barrier Filter, Standard Lamp Base	each
SFAZ-CY	Full System with Cyan, Standard Lamp Base	each
SFAZ-GR	Full System with Green, Standard Lamp Base	each
<b>DIM Lamp Base</b>		
SFAZ-UV-DIM	Full System with Ultraviolet, DIM Lamp Base	each
SFAZ-VI-DIM	Full System with Violet, DIM Lamp Base	each
SFAZ-RB-DIM	Full System with Royal Blue, DIM Lamp Base	each
SFAZ-RB-GO-DIM	Full System with Royal Blue, Green-Only Barrier Filter, DIM Lamp Base	each
SFAZ-CY-DIM	Full System with Cyan, DIM Lamp Base	each
SFAZ-GR-DIM	Full System with Green, DIM Lamp Base	each
<b>PULSE Lamp Base</b>		
SFAZ-UV-PULSE	Full System with Ultraviolet, PULSE Lamp Base	each
SFAZ-VI-PULSE	Full System with Violet, PULSE Lamp Base	each
SFAZ-RB-PULSE	Full System with Royal Blue, PULSE Lamp Base	each
SFAZ-RB-GO-PULSE	Full System with Royal Blue, Green-Only Barrier Filter, PULSE Lamp Base	each
SFAZ-CY-PULSE	Full System with Cyan, PULSE Lamp Base	each
SFAZ-GR-PULSE	Full System with Green, PULSE Lamp Base	each
<b>Leica Adapter Only</b>		
SFAZ-AD	Leica EZ4 Adapter only	each

### Add-On Light and Filter Sets

Each add-on excitation/emission set consists of:

- Light Head
- Barrier Filter
- Viewing Shield
- Padded Storage Box



Cat No.	Description	Qty.
SFA-LFS-UV	Add-On Light and Filter Set, Ultraviolet	each
SFA-LFS-VI	Add-On Light and Filter Set, Violet	each
SFA-LFS-RB	Add-On Light and Filter Set, Royal Blue	each
SFA-LFS-RB-GO	Add-On Light and Filter Set, Green-Only	each
SFA-LFS-CY	Add-On Light and Filter Set, Cyan	each
SFA-LFS-GR	Add-On Light and Filter Set, Green	each

### Modular White Light Head

This is an extremely convenient option for general illumination and as a focusing aid for fluorescence imaging. Now if you are using the NIGHTSEA system for fluorescence you do not need a separate white light source. Just exchange the fluorescence excitation light head module for the white-light module in a matter of seconds.



Cat No.	Description	Qty.
SFA-LH-WH	Modular White Light Head	each

### SFA a la carte

Need an extra, not a set? Order from here:

Cat No.	Description	Qty.
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#### SFA Light Heads:

SFA-LH-UV	Light Head, Ultra Violet	each
SFA-LH-VI	Light Head, Violet	each
SFA-LH-RB	Light Head, Royal Blue	each
SFA-LH-CY	Light Head, Cyan	each
SFA-LH-GR	Light Head, Green	each

#### SFA Barrier Filters:

SFA-BF-UV	Barrier Filter, Ultra Violet	each
SFA-BF-VI	Barrier Filter, Violet	each
SFA-BF-RB	Barrier Filter, Royal Blue	each
SFA-BF-RB-GO	Barrier Filter, Green Only	each
SFA-BF-CY	Barrier Filter, Cyan	each
SFA-BF-GR	Barrier Filter, Green	each

#### SFA Filter Shields:

SFA-SH-UV	Filter Shield, Ultra Violet	each
SFA-SH-VI	Filter Shield, Violet	each
SFA-SH-RB	Filter Shield, Royal Blue	each
SFA-SH-RB-GO	Filter Shield, Green Only	each
SFA-SH-CY	Filter Shield, Cyan	each
SFA-SH-GR	Filter Shield, Green	each

#### SFA Adapters:

SFA-AD	Adapter	each
SFAZ-AD	Leica EZ4 Adapter	each
SFA-XL-AD	Oversize Adapter	each

#### SFA Bases:

SFA-BASE	Standard Base	each
SFA-BASE-DIM	DIM Base	each
SFA-BASE-PULSE	PULSE Base	each

### NIGHTSEA DIM and PULSE Retrofit Options

The DIM and PULSE options for the base (see page 3) can be retrofitted to existing Model SFA Stereo Microscope Fluorescence Adapters.

Cat No.	Description	Qty.
SFA-BASE-DIM-R	DIM Option — Retrofit	each
SFA-BASE-PULSE-R	PULSE Option — Retrofit	each

### Fluorescence Adapter for Dino-Lite Digital Microscopes

The NIGHTSEA Model SFA Stereo Microscope Fluorescence Adapter can be used with the Dino-Lite series of digital microscopes. While Dino-Lite does offer some models with fluorescence built in, in some cases you can achieve improved performance by using the SFA excitation light sources in combination with matching barrier filters pre-mounted in a Dino-Lite endcap so that they just snap onto the front of the microscope.

Since there is no provision for mounting a filter shield on the Dino-Lite, the SFA system for Dino-Lite will include a pair of barrier filter glasses for each wavelength purchased.

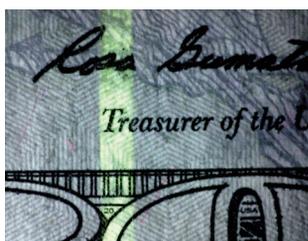


Dino-Lite digital microscope paired with NIGHTSEA fluorescence excitation light source

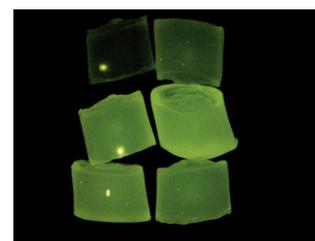


Dino-Lite digital microscope with array of NIGHTSEA barrier filters

### A sampling of images we have made with the Dino-Lite/NIGHTSEA combination.



Fluorescent markings in currency. Dino-Lite + NIGHTSEA UV excitation



Gel defect in nylon granules. Dino-Lite + NIGHTSEA Royal Blue excitation

### Wavelength Sets

Wavelength sets are named and color coded for the color of the excitation light, not the color of the emitted fluorescence.

Designation	Excitation	Emission
UV – Ultra Violet	360-380nm	415nm longpass
VI – Violet	400-415nm	460nm longpass
RB – Royal Blue	440-460nm	500nm longpass
RB-GO – Green Only	440-460nm	500-560nm bandpass
CY – Cyan	490-515nm	550nm longpass
GR – Green	510-540nm	600nm longpass

With the Royal Blue (RB) excitation we offer two barrier filters – longpass and bandpass. Read our article on selecting the right passband option for your application.

*Note: Wavelength sets are named and color coded for the color of the excitation light, not the color of the emitted fluorescence.*

Cat No.	Description	Qty.
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#### One-color complete setup

SFA-DL-UV	Ultraviolet (360 – 380nm) excitation	pair
SFA-DL-VI	Violet (400 – 415nm) excitation	pair
SFA-DL-RB	Royal Blue (440 – 460nm) excitation with longpass filter	pair
SFA-DL-RB-GO	Royal Blue with Green-Only bandpass filter	pair
SFA-DL-CY	Cyan (490 – 515nm) excitation	pair
SFA-DL-GR	Green (510 – 540nm) excitation	pair

#### Modular excitation/emission sets

SFA-DL-LFS-UV	Ultraviolet excitation	pair
SFA-DL-LFS-VI	Violet excitation	pair
SFA-DL-LFS-RB	Royal Blue excitation	pair
SFA-DL-LFS-RB-GO	Royal Blue excitation with Green-Only bandpass filter	pair
SFA-DL-LFS-CY	Cyan excitation	pair
SFA-DL-LFS-GR	Green excitation	pair

## Accessories

### Battery and Charger



Compact battery pack that can run the Stereo Microscope Fluorescence Adapter (SFA) all day long. The battery enables truly portable operation so that you can set up demos anywhere or explore fluorescence in the field, without having to worry about plugging into the power grid.

Just plug the battery into the SFA base instead of the usual power connector. The battery has been tested at over 8 hours of continuous operation, and it will last even longer if you turn the system off when you don't need it. Plug it into the included charger overnight to recharge.

### Specifications

<b>Battery Type</b>	Nickel Metal Hydride (NiMH)
<b>Capacity</b>	12V, 3.8 Ah
<b>Dimensions</b>	11.4 x 8.9 x 5.6 cm (4.5 x 3.5 x 2.19 in)
<b>Weight</b>	0.7 kg (1 lb 9 oz)
<b>Operation Duration</b>	8 hours continuous
<b>Charge Time</b>	Overnight
<b>Charger</b>	50/60 Hz, 110/220V (US type plug)

Cat. No.	Description	Qty.
SFA-BATT	Battery and Charger	each

### Eclipse MicroTent™

The patented (US Pat. No. 10,175,467) Eclipse MicroTent™ is a unique product for fluorescence microscopy that provides local darkness around conventional laboratory stereo microscopes. Fluorescence microscopes are kept in dark rooms for good reason - fluorescence can be weak and in many cases it can be difficult to see well if there is any ambient light. Microscopes may be on lab benches in shared spaces, near windows, or in other difficult-to-darken locations such as in the field. Turning off overhead lights can help but inconveniences others.

The Eclipse MicroTent™ creates local darkness around a microscope while still providing easy access to the sample stage and the focus and zoom controls. It is designed for stereo microscopes but could potentially be used with many varieties of compound microscopes.

#### Features

- Opening for the microscope oculars with elastic sleeve to minimize light entry
- Large front flap provides easy access to the sample stage and can fasten open
- Arm slots on sides to provide access to focus and zoom controls
- User-customizable feedthrough patches to provide additional penetrations for camera port, power cords, CO<sub>2</sub> lines, or other features as you need
- Tru-Block™ Eye Shields included with every Eclipse MicroTent™
- Folds flat for storage

**Dimensions:** 46 x 30 x 50 cm (18 x 12 x 20 in.)  
Please contact us if you require a custom-sized tent.

Cat. No.	Description	Qty.
SFA-TENT	Eclipse MicroTent™	each



### Eye Shields

Light entering your eyes from the side can interfere with what you want to see in microscopy in general, and fluorescence microscopy in particular. Eye cups are available, but the standard ones don't extend far from the microscope and don't do a good job as ambient light increases. Our soft, molded rubber high-sided microscope eye shields are the answer. The tall wings extend up far enough to truly shield your eyes from any level of ambient light and eliminate distractions so that you can see your subject better. Two pairs (one Standard, one Compact) will be included with every Eclipse



Standard



Compact

MicroTent™, and you can also purchase them separately.

**The Tru-Block Eye Shields are available in two sizes:**

Standard: fits 36 - 45mm (1.45 - 1.75")  
Compact: fits 28 - 37mm (1.10 - 1.46")

Cat. No.	Description	Qty.
SFA-EYE-S	Tru-Block Eye Shields - Standard	set
SFA-EYE-C	Tru-Block Eye Shields - Compact	set

### SFA + Eclipse MicroTent + Battery = Fluorescence Everywhere

Combine the battery with the Eclipse MicroTent and you not only don't need a place to plug in, you don't even need to be in the dark! We have used this combination to do fluorescence microscopy at a beach in the middle of the day, in the desert at high noon, and more. Fluorescence can be found everywhere, and now you have the tools to go there.



## Accessories

### Light Head Hangers and Cables

The NIGHTSEA light head hangers and cables conveniently hold the light head in lieu of the gooseneck lamp. The hangers mount to the end of any of the thumbscrews on the SFA adapter ring. They are available with two different pivot arm lengths for use with long and short working distance microscopes.

The cables are available in single and dual styles. With the single cable and one light head hanger you can remove the light head from the gooseneck and mount it on the SFA adapter ring. With the dual cable you can power TWO light heads from one base. Just add a second light head and two light head hangers and you have double the excitation intensity.

The light head hangers are offered for microscopes with different working distances below the objectives:

- Long working distance (LWD) – 6.5 cm (2.56 in.) and greater
- Short working distance (SWD) – 6.3-4.6 cm (2.48-1.81 in.)

The light head hangers and cables are available individually or in combination kits.



Cat No.	Description	Qty.
SFA-LHH-L	Light Head Hanger, long working distance	each
SFA-LHH-S	Light Head Hanger, short working distance	each
SFA-LHC	Single Light Head Cable	each
SFA-DLHC	Dual Light Head Cable	each
SFA-HK-L	Single hanger kit, long working distance, SFA-LHC + SFA-LHH-L	kit
SFA-HK-S	Single hanger kit, short working distance, SFA-LHC + SFA-LHH-S	kit
SFA-DHK-L	Dual hanger kit, long working distance, SFA-DLHC + 2x SFA-LHH-L	kit
SFA-DHK-S	Dual hanger kit, short working distance, SFA-DLHC + 2x SFA-LHH-S	kit

### Switch Box Kit

Easily change the lighting conditions while you work with the Switch Box Kit, in both working distances (long and short). Kit consists of a BNC switch box, 3 BNC cables (including one with a female to female adapter to attach to the gooseneck), and 2 Light Head Hangers.



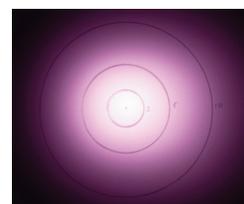
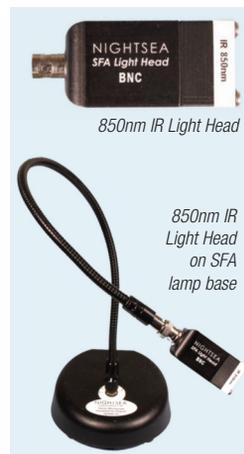
Cat No.	Description	Qty.
SFA-SWK-S	Switch Box Kit, short working distance: BNC switch box, 3 BNC cables, one with female/female gooseneck adapter, 2 LH Hangers	kit
SFA-SWK-L	Switch Box Kit, long working distance: BNC switch box, 3 BNC cables, one with female/female gooseneck adapter, 2 LH Hangers	kit

### Infrared Light Source

Researchers sometimes need an infrared light source for non-intrusive observation of behavior. And sometimes the subjects are small and you need to make the observations with a stereo microscope. The SFA-LH-IR850 is an 850nm light source that is compatible with the NIGHTSEA Model SFA Stereo Microscope Fluorescence Adapter. The light head plugs directly into the lamp base supplied with the SFA system. You can acquire the light head as a supplement to the SFA system that you already own for fluorescence observation, or you can acquire it in combination with a lamp base as a stand-alone device.

The light head incorporates a high power 850nm LED and a medium beamwidth diffusing lens to create a smooth illumination area. The output is centered at 850nm with a FWHM (full width at half maximum) of approximately 50nm. There is virtually no emission at wavelengths shorter than 750nm.

We recommend that you use the DIM base with the LH-IR850 in order to have finer control of illumination intensity.



A test target with circles of 2, 5, and 10cm diameter with the IR light head illuminated at full power, directed at the target center from a distance of approximately 10cm (4 in.). The illumination spot is not visible to the naked eye. This photograph was made with a camera that had been modified to image only infrared light.

Cat No.	Description	Qty.
SFA-LH-IR850	IR Light Head	each
SYS-IR850	IR Light Head plus NIGHTSEA DIM Base	each

### SFA Mobile Extension Kit

The Mobile Extension Kit provides added versatility to your SFA microscope fluorescence adapter system by enabling you to use the light head as a handheld light source. Do you work with both macro and micro subjects? Do you want to screen larger specimens before dissection or other microscope work? Can't fit everything under the microscope? Then the SFA-MEK Mobile Extension Kit is a way to get more use out of your system.

The kit includes three components:

- Rubber-coated hand grip with wrist lanyard and custom made enclosure that holds an SFA Light Head securely. The slots on the side of the enclosure provide for cooling color code identification.
- Barrier filter glasses. *See page 15 for more information.*
- Lightweight extension cable.



To use the kit just take the light head off the SFA gooseneck base, connect it to one end of the extension cable, and attach the other end of the cable to the gooseneck. Insert the light head in the holder and screw down the thumbscrew to secure it in place. Put on the filter glasses that correspond to the light head color and you're ready to go! If you want to use the Mobile Extension with more than one excitation wavelength you can add additional barrier filter glasses at any time.

Cat No.	Description	Qty.
SFA-MEK	SFA Mobile Extension Kit	kit

# NIGHTSEA Stereo Microscope Fluorescence Adapter for Keyence VHX

Add versatile Keyence fluorescence capability with the NIGHTSEA adapter system

## Overview

The NIGHTSEA Model SFA Fluorescence Adapter system adds a versatile fluorescence imaging capability to the Keyence VHX series of digital microscopes. The system is being used successfully by a growing number of Keyence owners for a variety of applications. Visit our website for a full gallery of images made with the NIGHTSEA adapter and the Keyence microscope.

## Fluorescence solutions for most Keyence lenses

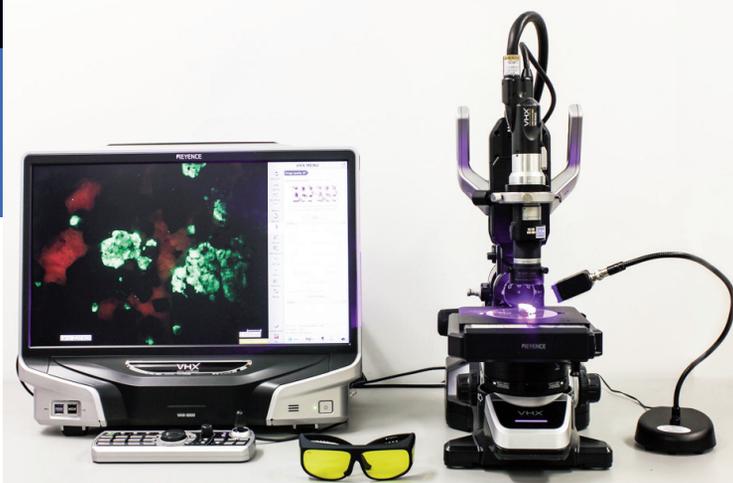
Keyence offers a variety of lenses for imaging at different scales. NIGHTSEA offers several variants of our fluorescence adapter system that work with the most commonly used Keyence lenses – the ZST, Z100, Z50, Z20, and Z00.

### The key elements of any fluorescence system are:

- A light source that produces sufficient energy in the appropriate wavelength range to excite fluorescence in the sample of interest
- A barrier filter in the viewing path that blocks reflected excitation light while transmitting the fluorescence emitted by the sample

### NIGHTSEA implements these for the Keyence system with:

- high intensity LED light sources available in five excitation wavelength ranges (see list on next page)
- emission barrier filters that can be added to the Keyence lenses easily and non-invasively



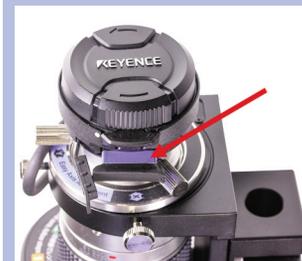
Fluorescent mineral sample imaged with the Keyence + NIGHTSEA systems



Z00, Z20, and Z50 lenses – the barrier filter slips over the bottom of the lens.



Keyence VH-ZST lens, fiber optic port with NIGHTSEA adapter and light head

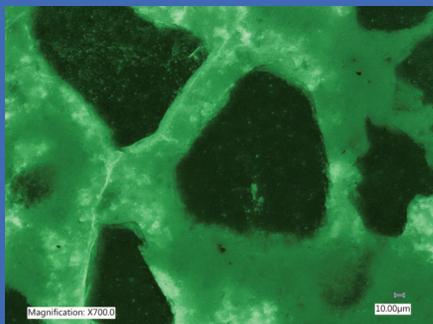


Z100 and ZST lenses – the barrier filter inserts in the Analyzer slot at the top of the lens.

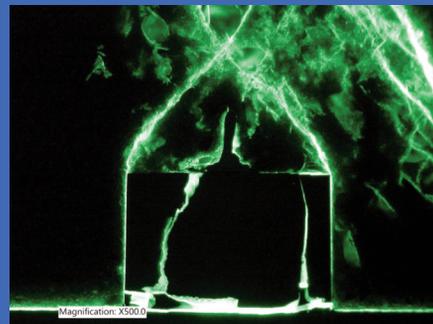


NIGHTSEA Light Head Mount for Keyence VH-ZST lens

## Here are samples of what you can see:



Cement thin section fluorescence, VH-Z100 lens, Royal Blue excitation, 700x



Electronic component failure analysis, VH-ZST lens, Royal Blue excitation, 500x



Epoxy on motor shaft, VH-ZST lens, Ultraviolet excitation, 20x

### Comprehensive Solution Kit

We have configured a versatile Keyence fluorescence adapter kit (Catalog# SFA-KZ2-IND) that includes the most useful excitation wavelengths for varied industry applications, and that adapts to all of the supported Keyence lenses. The SFA-KZ2-IND kit includes the following items, at a package price that is significantly less than purchasing the items separately:

- Three excitation light heads – Ultraviolet (UV), Violet (VI), and Royal Blue (RB). This recommendation is based on our experience with varied applications
- Two sets of three barrier filters – one set for the ZST and Z100 lenses, one set for the Z00, Z20, and Z50
- Matching barrier filter glasses for each excitation wavelength
- Accessory hardware for mounting the NIGHTSEA light head over the ZST fiber optic input port (enhanced performance at high magnification)
- Gooseneck lamp base with dimming control
- Universal power supply – 120/240VAC, 50/60Hz, with international plug set
- Packing/carrying case with custom-cut foam

We offer additional wavelength sets that may be of use for other applications.

### Why we recommend a set of three excitation wavelengths for industry needs

We have found that the combination of the Ultraviolet, Violet, and Royal Blue excitation/emission sets addresses a wide variety of industrial imaging challenges. The most common misconception we encounter is that fluorescence is uniquely associated with ultraviolet (UV) light and many customers immediately ask for that wavelength. However, we have found in several cases – even some in which UV was specifically recommended by a dye manufacturer – that either Violet or Royal Blue provided superior performance. For example:

A prospective customer wanted to image concrete thin sections impregnated with fluorescent dye. The dye supplier recommended UV, and it is true that UV will make the dye fluoresce nicely. We found that our Royal Blue excitation produced significantly brighter fluorescence.

Similar to above, except that a fluorescence epoxy had been used to highlight surface cracks in a test sample. Royal Blue excitation yielded brighter fluorescence.

A prospective customer sent us a sample of material that was known to fluoresce under UV. The goal was to see the distribution of non-fluorescent particles in a fluorescent matrix. While both UV and Royal Blue excited fluorescence in the sample, the best imaging contrast was achieved with Violet excitation.

We achieve enhanced performance with the ZST lens by mounting the light head on the lens's fiber optic port, but that path does not transmit UV well. In many cases, for example to inspect conformal coating, Violet is an excellent alternative to UV.

Acquiring the three-color system will provide the highest chance of success and will equip you with a versatile toolkit to address new fluorescence imaging challenges as they arise. Contact us if you would like to discuss your application further.



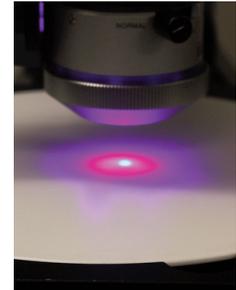
Custom case for 3-color system for Keyence

### Performance Expectations

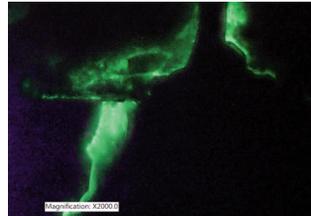
The microscopes in the Keyence VHX series were not designed for fluorescence. That said, the NIGHTSEA adapter system adds a fluorescence capability that is proving to be valuable for a growing number of users. Several companies have purchased multiple adapters so that they could replicate the performance across multiple microscopes. In at least one case the customer only purchased their Keyence system because of the added NIGHTSEA fluorescence capability that enabled a critical analysis function for them.

### Enhanced Performance with the VH-ZST

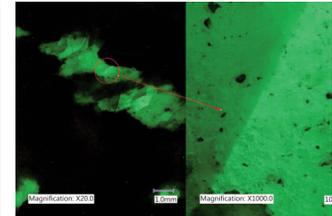
With the ZST lens and the higher magnification (200-2000x) objective you can achieve enhanced performance by removing the Keyence fiber optic illuminator and positioning the NIGHTSEA excitation light head in its place with our custom adapter. This brings the excitation energy through the lens, creating a much more concentrated illumination spot than can be achieved with the light source positioned to the side. We have made fluorescence images at up to 2000x with this configuration.



Focused fluorescence excitation spot with VH-ZST high magnification objective



Electronic component failure analysis, VH-ZST lens, Royal Blue excitation, 2000x



Fluorescent mineral (willemite) at 20 and 1000x, VH-ZST lens, Royal Blue excitation

### Wavelength Sets

There are five excitation/emission wavelength combinations available for the system.

Color	Designation	Excitation	Emission
Ultraviolet	UV	360 - 380nm	415nm longpass
Violet	VI	400 - 415nm	450nm longpass
Royal Blue	RB	440 - 460nm	500nm longpass
Cyan	CY	490 - 515nm	550nm longpass
Green	GR	510 - 540nm	600nm longpass

### Ordering Information

Cat. No.	Description	Qty.
<b>Best Value Full System Kit</b>		
Includes three wavelengths (UV + VI + RB), supports ZST, Z100, Z50, Z20, Z00		
SFA-KZ2-IND	Best Value Full System	kit
<b>ZST Full System Kit</b>		
Includes three wavelengths (UV + VI + RB), supports ZST and Z100		
SFA-KZST-IND	ZST Full System	each
<b>Basic Full System Kit</b>		
Includes three wavelengths (UV + VI + RB), supports Z00, Z20, Z50 only		
SFA-KZB-IND	Basic Full System	kit
<b>Z100 Full System Kit</b>		
Includes three wavelengths (UV + VI + RB), supports Z100 only		
SFA-KZ100-IND	Z100 Full System	kit
<b>Z1B Full System Kit</b>		
Includes three wavelengths (UV + VI + RB), supports Z00, Z20, Z50, and Z100		
SFA-KZ1B-IND	Z1B Full System	kit

Please contact us if you would like to order different configurations, i.e. a full set-up for just one or more wavelength, or add-on wavelength sets of any of the 5 available color sets.

# NIGHTSEA Stereo Microscope Fluorescence Adapter for Hirox Digital Microscope

Add versatile Hirox fluorescence capability with the NIGHTSEA adapter system

## Overview

The NIGHTSEA Model SFA Fluorescence Adapter system can add a versatile fluorescence imaging capability to the Hirox digital microscope. Visit our website for a full gallery of images made with the NIGHTSEA adapter and the Hirox microscope.

## Fluorescence solution

The key elements of any fluorescence system are:

- A light source that produces sufficient energy in the appropriate wavelength range to excite fluorescence in the sample of interest
- A barrier filter in the viewing path that blocks reflected excitation light while transmitting the fluorescence emitted by the sample

NIGHTSEA implements these for the Hirox system with:

- high intensity LED light sources available in five excitation wavelength ranges (see list further down page)
- emission barrier filters that can be added to the Hirox lenses easily and non-invasively

## Comprehensive Solution Kit

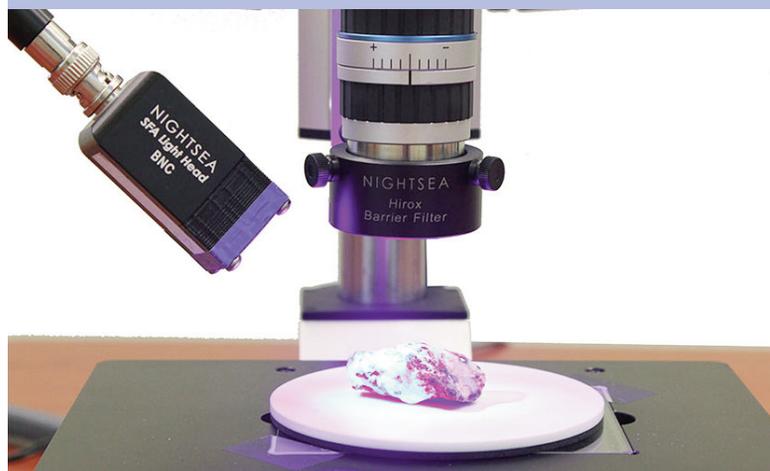
We have configured a versatile Hirox fluorescence adapter kit that includes the most useful excitation wavelengths for varied industry applications. The SFA-H-IND kit includes the following items, at a package price that is significantly less than purchasing the items separately:

- Three excitation light heads – Ultraviolet (UV), Violet (VI), and Royal Blue (RB). This recommendation is based on our experience with varied applications
- Three barrier filters paired to the excitation light heads
- Matching barrier filter glasses for each excitation wavelength
- Gooseneck lamp base with dimming control
- Universal power supply – 120/240VAC, 50/60Hz, with international plug set
- Packing/carrying case with custom-cut foam

We offer additional wavelength sets that may be of use for other applications. See table on next page.

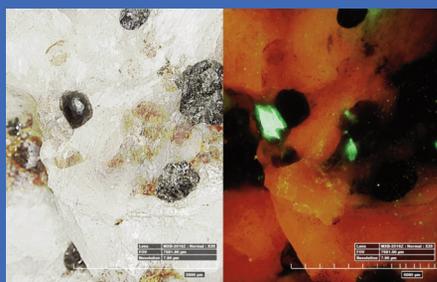


Hirox microscope with NIGHTSEA fluorescence adapter



Detail of NIGHTSEA light head and barrier filter with Hirox microscope

## Here are samples of what you can see:



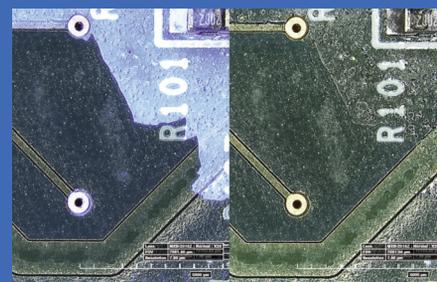
### Naturally fluorescent mineral

This mineral sample, collected at the Sterling Hill Mine in Ogdensburg, New Jersey, contains willemite (green fluorescence), calcite (red fluorescence) and franklinite (black-no fluorescence).



### Bone fragment

Small bone fragment in sand. Images made with Ultraviolet excitation (left) plus white light, and with white light alone



### Circuit board conformal coating

Conformal coating on a circuit board, with damage. Images made with Ultraviolet excitation (left) and white light.

### Why we recommend a set of three excitation wavelengths for industry needs

We have found that the combination of the Ultraviolet, Violet, and Royal Blue excitation/emission sets addresses a wide variety of industrial imaging challenges. The most common misconception we encounter is that fluorescence is uniquely associated with ultraviolet (UV) light and many customers immediately ask for that wavelength. However, we have found in several cases – even some in which UV was specifically recommended by a dye manufacturer – that either Violet or Royal Blue provided superior performance. For example:

A prospective customer wanted to image concrete thin sections impregnated with fluorescent dye. The dye supplier recommended UV, and it is true that UV will make the dye fluoresce nicely. We found that our Royal Blue excitation produced significantly brighter fluorescence.

Similar to above, except that a fluorescence epoxy had been used to highlight surface cracks in a test sample. Royal Blue excitation yielded brighter fluorescence.

A prospective customer sent us a sample of material that was known to fluoresce under UV. The goal was to see the distribution of non-fluorescent particles in a fluorescent matrix. While both UV and Royal Blue excited fluorescence in the sample, the best imaging contrast was achieved with Violet excitation.

Acquiring the three-color system will provide the highest chance of success and will equip you with a versatile toolkit to address new fluorescence imaging challenges as they arise. Contact us if you would like to discuss your application further.

### Wavelength Sets

There are five excitation/emission wavelength combinations available for the system.

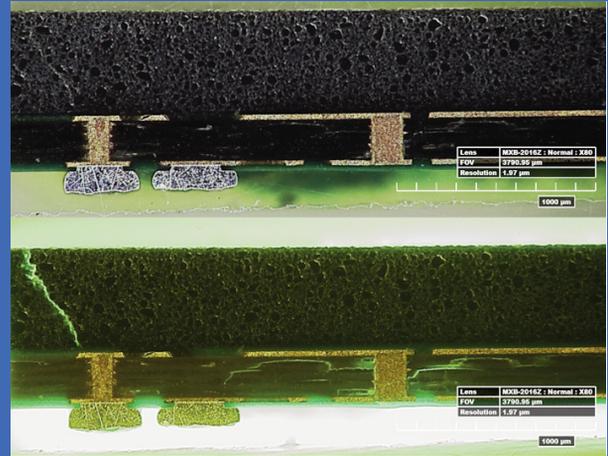
Color	Designation	Excitation	Emission
Ultraviolet	UV	360 - 380nm	415nm longpass
Violet	VI	400 - 415nm	450nm longpass
Royal Blue	RB	440 - 460nm	500nm longpass
Cyan	CY	490 - 515nm	550nm longpass
Green	GR	510 - 540nm	600nm longpass

### Ordering Information

Cat. No.	Description	Qty.
<b>Best Value Full System Kit</b>		
Includes three wavelengths (UV + VI + RB)		
<b>SFA-H-IND</b>	Best Value Full System	kit
<b>Single Wavelength Full Systems</b>		
Available in non-UV or UV wavelengths		
<b>SFA-H-UV</b>	Hirox Single Wavelength Full System - UV	kit
<b>SFA-H-VI</b>	Hirox Single Wavelength Full System - Violet	kit
<b>SFA-H-RB</b>	Hirox Single Wavelength Full System - Royal Blue	kit
<b>SFA-H-CY</b>	Hirox Single Wavelength Full System - Cyan	kit
<b>SFA-H-GR</b>	Hirox Single Wavelength Full System - Green	kit
<b>Add-on Single Wavelengths</b>		
Available in non-UV or UV wavelengths		
<b>SFA-H-LFS-UV</b>	Hirox Single Wavelength Add-On UV	each
<b>SFA-H-LFS-VI</b>	Hirox Single Wavelength Add-On - Violet	each
<b>SFA-H-LFS-RB</b>	Hirox Single Wavelength Add-On - Royal Blue	each
<b>SFA-H-LFS-CY</b>	Hirox Single Wavelength Add-On - Cyan	each
<b>SFA-H-LFS-GR</b>	Hirox Single Wavelength Add-On - Green	each

### Electronic component failure analysis

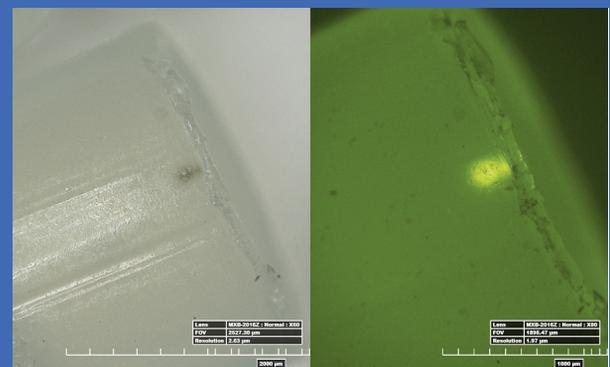
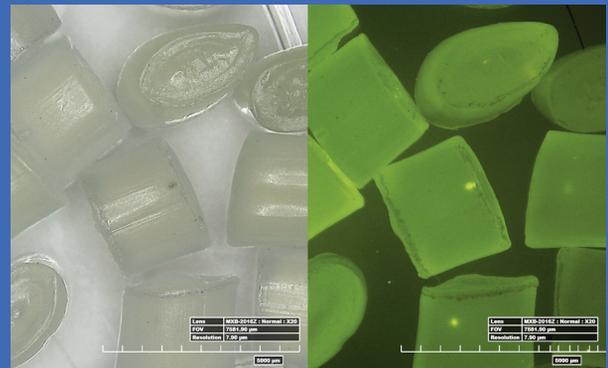
Examining an electronic component that was embedded in epoxy, cross-sectioned, polished, and highlighted with a fluorescent epoxy-like dye. While the manufacturer of the fluorescent dye recommended excitation with ultraviolet light, our Royal Blue light head was used for these images, and was found to be superior to ultraviolet.



Fluorescent penetrant highlighting cracks in integrated circuit, 80x, white light (top) and fluorescence under Royal Blue excitation.

### Gel defect in a nylon granule

Nylon 6,6 granules can manifest a process defect called “gel” and if there is too much of this in a production batch it can compromise downstream production. The gel shows up as a brighter fluorescent area within the fluorescing granule. Images made with Royal Blue excitation.



Nylon granules with gel defect, 20x (top) and 80x (bottom), white light and fluorescence under Royal Blue excitation.

## Stereo Microscope Fluorescence Adapter for Education

The NIGHTSEA Stereo Microscope Fluorescence Adapter (SFA) is a great way to use fluorescence in education. As soon as we introduced the SFA we had researchers saying “Now I can use fluorescence in my classes...”. Fluorescent transgenic animals are a great way to teach genetics, but without a way to visualize them you can’t take advantage of this. The big barrier to using fluorescence has been the cost and complexity of fluorescence microscopes. You are just not going to turn a group of inexperienced undergraduates loose on your \$25k or more lab system.

The NIGHTSEA SFA lets you put your existing stereo microscopes to use for fluorescence. You can acquire dozens of SFAs for the cost of just one research fluorescence microscope, and several universities have already done this – one purchased 28 and another purchased 30! The cost? Less than \$24k total for each of these purchases.

Here are comments from a faculty member at Colgate University:

*Students in Developmental Biology Lab were examining the effects of pharmacological agents on development of zebrafish embryos. In order to better visualize the development of the nervous system and vasculature, we used transgenic fish that expressed GFP either throughout their nervous system or in the developing vasculature. The NIGHTSEA system easily adapted to our dissection scopes and allowed students to observe the development of their fish at several different time-points. They could readily observe the transgene expression, and it helped solidify the phenotypes they were observing and allowed them to determine an optimal time to fix their fish for analysis under the compound microscope.*

*For quick screens it actually worked perfectly well in a bright room. For more intimate looking (more than presence/absence calls), we turned out the room lights. Worked better than I’d hoped it would.*

## Application: Using routine fluorescence to sort *Drosophila* larvae

### The Challenge

Dr. Laura Reed (Dept. of Biological Sciences, University of Alabama, Tuscaloosa) heads a research program to investigate whether mutations in specific genes in fruit flies, *Drosophila melanogaster*, affect triglyceride storage.

To gather sufficient material for analysis, Dr. Reed requires large numbers of larvae of each genotype. Her program involves testing 84 different genotypes and, for each genotype, 200 or more larvae. A special strain of fruit flies has been genetically engineered to express Green Fluorescent Protein (GFP) driven by an actin promoter (Figure 1). Only the flies without the mutations fluoresce. The clear difference between fluorescent and non-fluorescent larvae makes them easy to sort.

For best results, the larvae need to be collected, sorted, and frozen when at their largest, but before they pupate. However, they are at this stage for only about six hours. With 84 genotypes to test and 200+ larvae per genotype, sorting is a major challenge. While Dr. Reed has a large pool of undergraduates available for sorting, the greater challenge was that she only had access to borrowed time on another lab’s research fluorescence stereo microscope.

### The Practical Solution

Dr. Reed visited the NIGHTSEA booth at the annual *Drosophila* Research Conference and tested the Stereo Microscope Fluorescence Adapter (SFA) system.

She immediately realized the potential of putting both her undergraduates and four of her existing lab-grade stereo microscopes to work. The SFA provided a practical, economical solution for her limited equipment.

For Dr. Reed, the Royal Blue excitation/emission set provides excellent results (Figure 2, 3).

### SFA Advantages

NIGHTSEA’s Stereo Microscope Fluorescence Adapters offer a number of advantages. First, they require no modification to your existing microscope. They just click into place, making them easy to use and easy to exchange, either on one microscope or between different microscopes in the lab.

Secondly, SFAs are economical and expandable. Since Dr. Reed currently works only with GFP (blue excitation/green fluorescence), she only needed to purchase one version of SFA. However, as the needs of her lab grow, additional sets can readily be added.

Finally, as demonstrated by Figure 2, SFA’s bright illumination and excellent barrier filters allow many fluorescence experiments to be conducted under near-ambient lighting. In this case, the overhead lights were turned off and the blinds closed, but the room does not need to be in complete darkness.

As for Dr. Reed? Using NIGHTSEA’s SFA, she routinely has shifts of two to four undergrads at a time, sorting *Drosophila* larvae in parallel. 84 genotypes? 200 larvae per experiment? Problem solved!

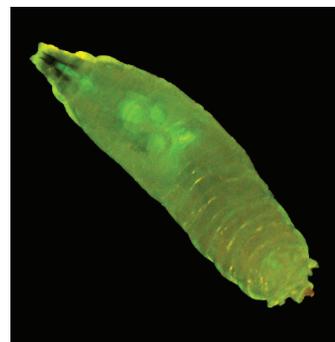


Figure 1. Non-mutant *Drosophila melanogaster* expressing GFP.



Figure 2. Larval sorting under ambient lighting.



Figure 3. Students sort larvae using NIGHTSEA’s SFA in Royal Blue. Dr. Reed now has shifts of two to four undergrads sorting in parallel.

## Application: Pre-Screening Samples for Fluorescence

The NIGHTSEA Model SFA Stereo Microscope Fluorescence Adapter can turn your routine laboratory stereo microscope into a valuable tool for pre-screening your sample preparations for fluorescence before moving on to higher resolution systems.

### The Challenge

High resolution imaging of biological samples is heavily based on fluorescence techniques. Confocal, 2-photon, and high resolution compound fluorescence microscopes are almost always a limited resource. They are often located only in imaging core facilities and accessible on a scheduled, pay-per-use basis.

The processes for introducing fluorophores to specimens are not always successful. Staining, introduction of GFP-bearing plasmids to cells, immunohistochemistry – all are fallible. It is not unusual to spend time searching for fluorescence on a high end system when there is not even any there to be found.



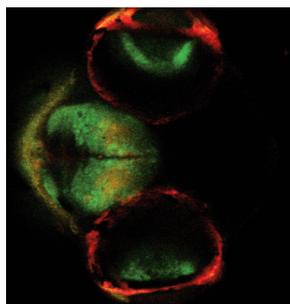
*Rabbit psoas muscle fibers stained with Alexa Fluor 488 Phalloidin, in white light and fluorescence. Images made using NIGHTSEA's white LED (top) and the Royal Blue excitation/emission light+filter set. Samples courtesy of Dr. Beth Brainerd and Natividad Chen, Brown University.*

### The Practical Solution

The NIGHTSEA SFA enables fluorescence pre-screening of specimens on a standard stereo microscope. The detail that you see is not important – the simple presence or absence and general location of fluorescence lets you know whether it is worth taking your specimen to the imaging core. Between the direct expense of the use fee and the time wasted to look at a non-fluorescent specimen it will not take many saved trips for the NIGHTSEA system to more than pay for itself.

One researcher's work requires staining rabbit psoas muscle fibers with Alexa Fluor 488 Phalloidin. There was some frustration with samples that did not take up the stain. After acquiring the SFA she wrote:

*"The NIGHTSEA fluorescence setup is a great way to quickly check whether the stain was successful before we try to image the muscle fiber at a higher magnification on the confocal."*



*Confocal image of brain of transgenic zebrafish (Dania rerio). Kaede protein – green is unconverted, red is photoconverted. Image courtesy of Robert Thorn, Creton Lab, Brown University.*

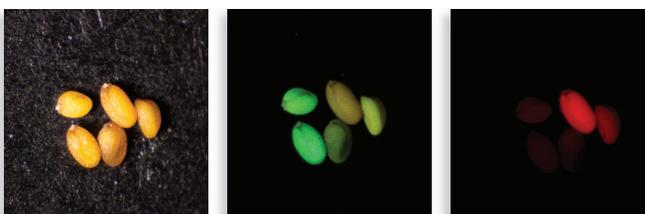
Another researcher uses zebrafish as a system to look at the way different toxicants (pharmaceuticals, pesticides, food additives, etc.) alter brain development. He writes:

*"Before using NIGHTSEA to screen my samples, I would have to select samples to mount, go to the confocal and then hope that some of my samples were actually fluorescent. Now that I use NIGHTSEA to prescreen my samples I save both time and money by making sure the only samples I image are fluorescent."*

## Application: Arabidopsis Seeds

*Arabidopsis thaliana* is a small flowering plant that is widely used as a model organism for a variety of genetic studies. Dr. Scott Poethig and colleagues at the University of Pennsylvania have developed a novel transgenic strain of *A. thaliana* that has chromosomal segments with eGFP on one end and dsRed at the other. The segments can be followed in genetic crosses and manipulated via recombination. The transgenic strains will enable a variety of experiments, including phenotypic analyses of mutations with weak or environmentally sensitive phenotypes. They are intended for use in both research and education.

Dr. Poethig was looking for a cost-effective way to sort the genetically modified seeds in a teaching setting. He learned about the new NIGHTSEA Stereo Microscope Fluorescence Adapter and sent a set of seeds for testing. There were five varieties - strong and weak green fluorescence, strong and weak red fluorescence, and non-fluorescent control. All of the variations were easy to see, even with the room lights on.

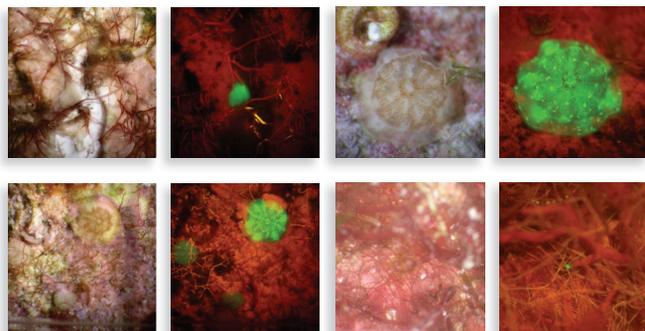


In the example above, the image on the left was taken with white light illumination, the image in the center with the Royal Blue excitation/emission combination, and the image on the right with the Green excitation/emission combination. Equipment - NIGHTSEA Stereo Microscope Fluorescence Adapter, Motic SMZ168 trinocular stereo microscope, Canon EOS Rebel T2i camera.

## Application: Coral Recruitment Through The Microscope

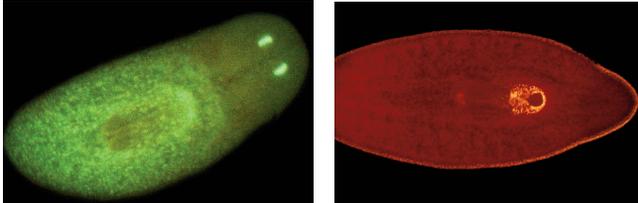
Fluorescence is a valuable tool for coral recruitment research and one of the ways to apply it is to use a stereo microscope to examine corals on settlement tiles or other surfaces. The NIGHTSEA Stereo Microscope Fluorescence Adapter is an economical system that adds fluorescence capability to existing stereo microscopes and is rugged enough for use in field laboratories in remote locations.

The images below are coral polyps viewed through a stereo microscope, with each pair, white-light (left) and fluorescence (right) showing the same area on settlement tiles. These were made by Dr. Alina Szmant (UNCW) during a research project with NIGHTSEA's Charles Mazel to develop fluorescence tools for coral recruitment research.



## Application: Screening FISH-Labeled Planarian (*Schmidtea mediterranea*)

FISH (fluorescence in situ hybridization) is routinely used to label features in planarians (*Schmidtea mediterranea*). The NIGHTSEA Model SFA Stereo Microscope Fluorescence Adapter can be added to just about any existing stereo microscope to create a practical system for screening samples for successful preparation prior to moving to higher resolution imaging techniques.

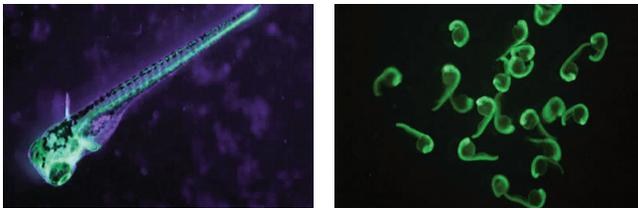


*Opsin and wntP-2 labeled with FITC (fluorescein isothiocyanate). Specimen courtesy of Lauren Cote, Reddien Laboratory, Whitehead Institute, MIT.*

*NB.22.1e labeled with rhodamine, highlighting the mouth and the dorsal-ventral boundary. Specimen courtesy of Lauren Cote, Reddien Laboratory, Whitehead Institute, MIT.*

## Application: Fluorescing Zebrafish

These pictures of fluorescing zebrafish embryos and juveniles were taken using the NIGHTSEA Stereo Microscope Fluorescence Adapter.

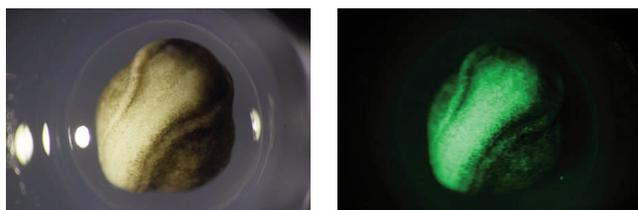


*Zebrafish – GFP fluorescence*

*Zebrafish embryos – histone H2B-Dendra2*

## Application: Fluorescent Axolotl

These pictures of GFP-expressing transgenic neurula stage axolotl (*Ambystoma mexicanum*) embryos were taken using the NIGHTSEA Stereo Microscope Fluorescence Adapter for illumination, with an iPhone 5 camera held up to the eyepiece. It's a convenient way for students to take photos during labs! Access to specimens courtesy of Dr. Kristi Wharton and Kathy Patenaude, Brown University.

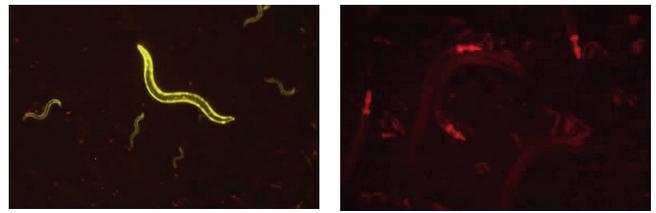


*Axolotl (*Ambystoma mexicanum*), white light.*

*Axolotl (*Ambystoma mexicanum*), fluorescence.*

## Application: Fluorescing *C. elegans*

These pictures of fluorescing transgenic *C. elegans* were taken using the NIGHTSEA Stereo Microscope Fluorescence Adapter.



*YFP *C. elegans*.*

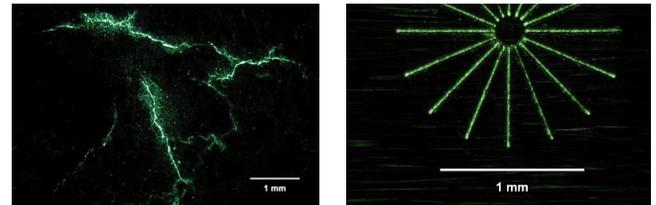
*mCherry *C. elegans*.*

## Application: Crack and Failure Analysis with Fluorescence

Fluorescence is a valuable tool for failure analysis, helping investigators see what they might otherwise miss. Fluorescence indicators of various types – including fluorescent penetrants, magnetic particles, and other fluorescent dyes – are commonly used to highlight cracks or defects that would otherwise be difficult or impossible to see. The fluorescence makes them stand out in high contrast. The NIGHTSEA fluorescence adapter systems can be used with microscopes at a variety of scales for detailed examination of these features. Here we show images made with a stereo microscope and with a Keyence digital microscope.

Note that all of the images below were made using the Royal Blue excitation/emission option. While this kind of analysis is normally associated with Ultraviolet, we find that the Royal Blue option is an excellent choice for working with a wide variety of fluorescent indicators.

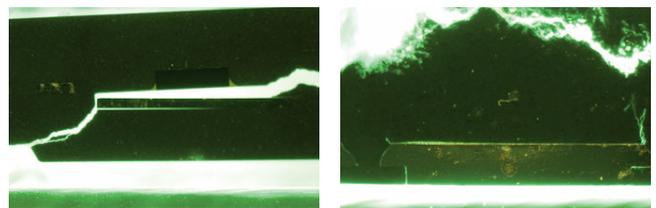
First, some small cracks highlighted with fluorescent penetrants and fluorescent magnetic particles.



*Cracks in Sonaspection test plate, fluorescent penetrant*

*TAM panel starburst with fluorescent penetrant*

Next we show some cross sections of electronic components that were embedded in epoxy, cross-sectioned, and polished, after which indications were highlighted with an epoxy-like dye with Morton Fluorescent Yellow G as the fluorescent ingredient.



## NIGHTSEA DFP™

### Dual Fluorescent Protein Excitation Flashlights

Rapid screening of your fluorescent transgenic experiments

The Model DFP Dual Fluorescent Protein Flashlights include two different, switch-selectable high intensity LEDs for excitation of fluorescent proteins. For years the most popular fluorescent colors have been green (GFP, eGFP, fluorescein, etc.) and red (DsRed, TdTomato, etc.), and we offered only one version of the DFP, with a combination of blue and green LEDs for exciting these fluorophores. This is still our 'standard' DFP product, but we are now offering build-to-order combinations using any two of the excitation colors that are available with our popular Model SFA Stereo Microscope Fluorescence Adapter.

With every DFP light you will receive two pairs of barrier filter glasses and a convenient storage case. The glasses are well matched to the excitation so that they block the reflected excitation light while transmitting the fluorescence with high efficiency, providing excellent viewing contrast.

<b>Dimensions:</b>	13 x 8 x 5 cm (5 x 3 x 2 in.)
<b>Battery Type:</b>	4 C-cell
<b>Bulb Type:</b>	Two high intensity 3W LED
<b>Burn Time:</b>	4 hours at full power
<b>Lamp Life:</b>	10,000 hours



### Wavelength Sets

Filter Set	Excitation	Emission	Fluorophores
UV - Ultra Violet	360-380nm	415nm LP	DAPI...
VI - Violet	400-415nm	460nm LP	BFP, CFP...
RB - Royal Blue	440-460nm	500nm LP	GFP, fluorescein, lucifer yellow...
CY - Cyan	490-515nm	550nm LP	YFP, Venus...
GR - Green	510-540nm	600nm LP	DsRed, TdTomato, RFP...

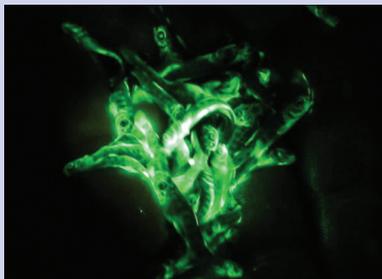
Cat No.	Description	Qty.
<b>DFP-1</b>	DFP Flashlight with RB and GR LEDs, matching filter glasses, carrying case	each
<b>DFP-CG</b>	DFP Flashlight with CY and GR LEDs, matching filter glasses, carrying case	each
<b>DFP-RC</b>	DFP Flashlight with RB and CY LEDs, matching filter glasses, carrying case	each
<b>DFP-VC</b>	DFP Flashlight with VI and CY LEDs, matching filter glasses, carrying case	each
<b>DFP-VG</b>	DFP Flashlight with VI and GR LEDs, matching filter glasses, carrying case	each
<b>DFP-VR</b>	DFP Flashlight with VI and RB LEDs, matching filter glasses, carrying case	each
<b>DFP-UC</b>	DFP Flashlight with UV and GR LEDs, matching filter glasses, carrying case	each
<b>DFP-UG</b>	DFP Flashlight with UV and CY LEDs, matching filter glasses, carrying case	each
<b>DFP-UR</b>	DFP Flashlight with UV and RB LEDs, matching filter glasses, carrying case	each
<b>DFP-UV</b>	DFP Flashlight with UV and VI LEDs, matching filter glasses, carrying case	each

## Calcein Fluorescence with the NIGHTSEA BlueStar

Calcein-stained goby imaged with BlueStar light © Greg Andraso and Kelly Grant, Gannon U



Calcein-stained rainbow trout illuminated by BlueStar light © Heidi Isner



## NIGHTSEA BlueStar™ Flashlight



The BlueStar flashlight combined with the matched barrier filter glasses is a convenient, powerful tool for exciting fluorescence in many subjects.

The BlueStar uses the latest in high intensity LED technology combined with specialized optics to produce an ultra-tight, ultra-bright 10-degree beam pattern for maximum excitation of fluorescence.

Comes with adjustable, cushioned wrist lanyard, rubber glare guard. Made in USA.

### Specifications

<b>Bulb Type</b>	High intensity 1W LED Royal Blue - 440 - 460nm
<b>Burn Time</b>	6 hours at full power
<b>Lamp Life</b>	>10,000 hours
<b>Battery</b>	3 C-cell

Cat No.	Description	Qty.
<b>BLS-1</b>	BlueStar light plus style FG-RB-1 filter glasses	each
<b>BLS-2</b>	BlueStar light plus style FG-RB-2 filter glasses	each
<b>BLS-3</b>	BlueStar light plus style FG-RB-3 filter glasses	each

### NIGHTSEA Barrier Filter Glasses

Filter glasses for use with Royal Blue excitation available in 3 styles (below). Styles 1 and 2 fit over eyeglasses, Style 3 does not. Glasses for all other wavelengths only available in Style 2.

Glasses meet ANSI Z87.1 impact standards for safety glasses.



**NOTE:** Glasses Description refers to the excitation light source with which they are to be used.

Cat No.	Description	Qty.
<b>FG-UV</b>	Filter glasses, Ultra Violet	each
<b>FG-VI</b>	Filter glasses, Violet	each
<b>FG-RB-1</b>	Filter Glasses, Royal Blue, style 1	each
<b>FG-RB-2</b>	Filter Glasses, Royal Blue, style 2	each
<b>FG-RB-3</b>	Filter Glasses, Royal Blue, style 3	each
<b>FG-RB-GO</b>	Filter glasses, Green Only	each
<b>FG-CY</b>	Filter glasses, Cyan	each
<b>FG-GR</b>	Filter Glasses, Green, style 2	each

# The NIGHTSEA Stereo Microscope Fluorescence Adapter in Action...

...at the National Xenopus Resource (NXR) at the Marine Biological Laboratory in Woods Hole, MA — special thanks to NXR Director and Bell Center Scientist Dr. Marko Horb and his postdoctoral scientist Dr. Matthew Salanga. The fluorescence adapter system worked great for visualizing all of the fluorescence, both injected and transgenic, in the specimens. In addition to seeing the fluorescence through the eyepieces, you could easily distinguish presence/absence and relative strength of expression just by looking through the filter shield. This mode can easily be used for selecting specimens.



Collection of Stage 37-38 *X. laevis*, messenger RNA injected ubiquitous GFP and membrane RFP viewed through shield filter for sorting.



Collection of Stage 37-38 *X. laevis*, messenger RNA injected ubiquitous GFP and membrane RFP viewed through shield filter for sorting.

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