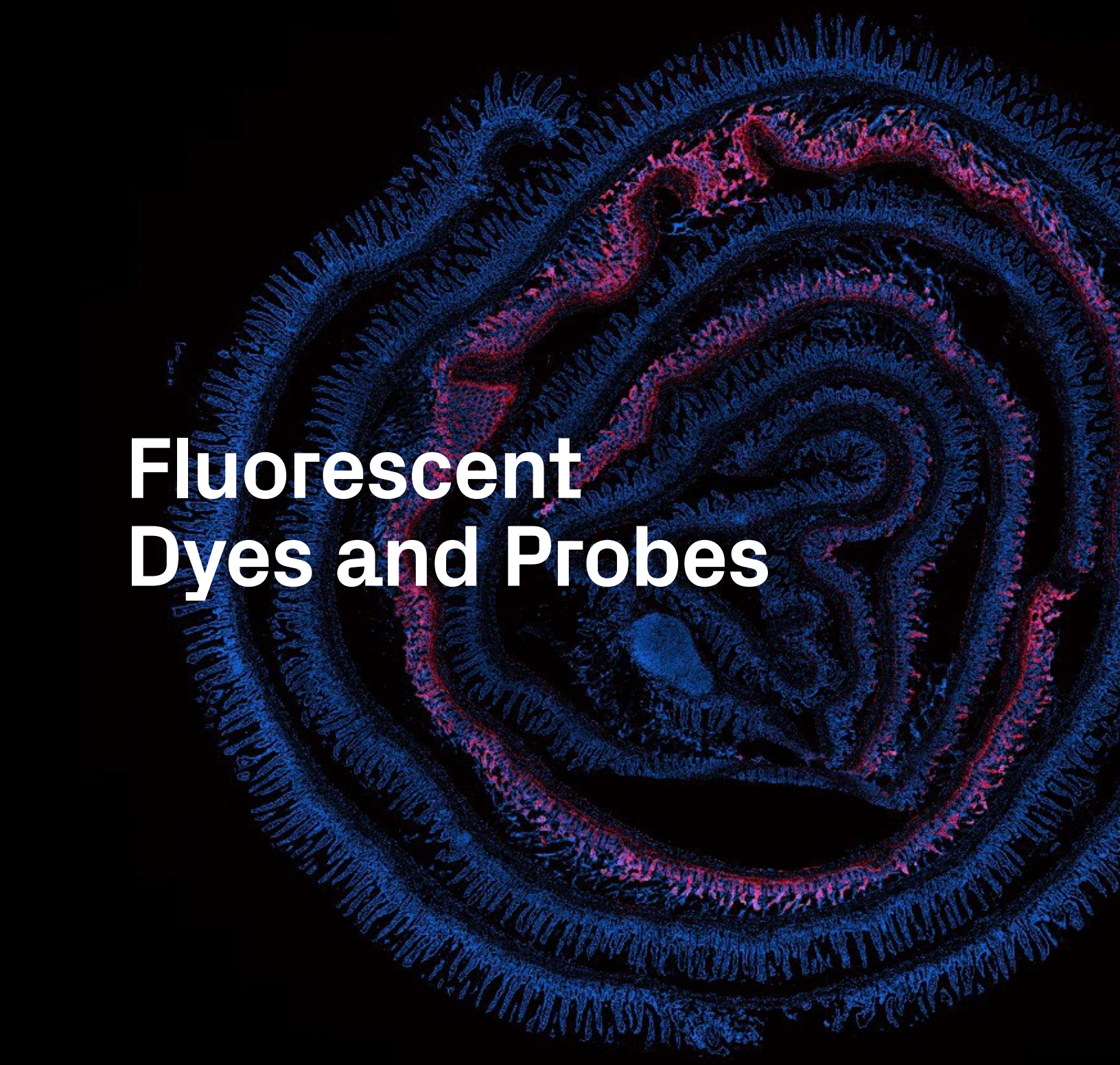
bio-techne® | TOCRIS

Product Guide
// Edition 03



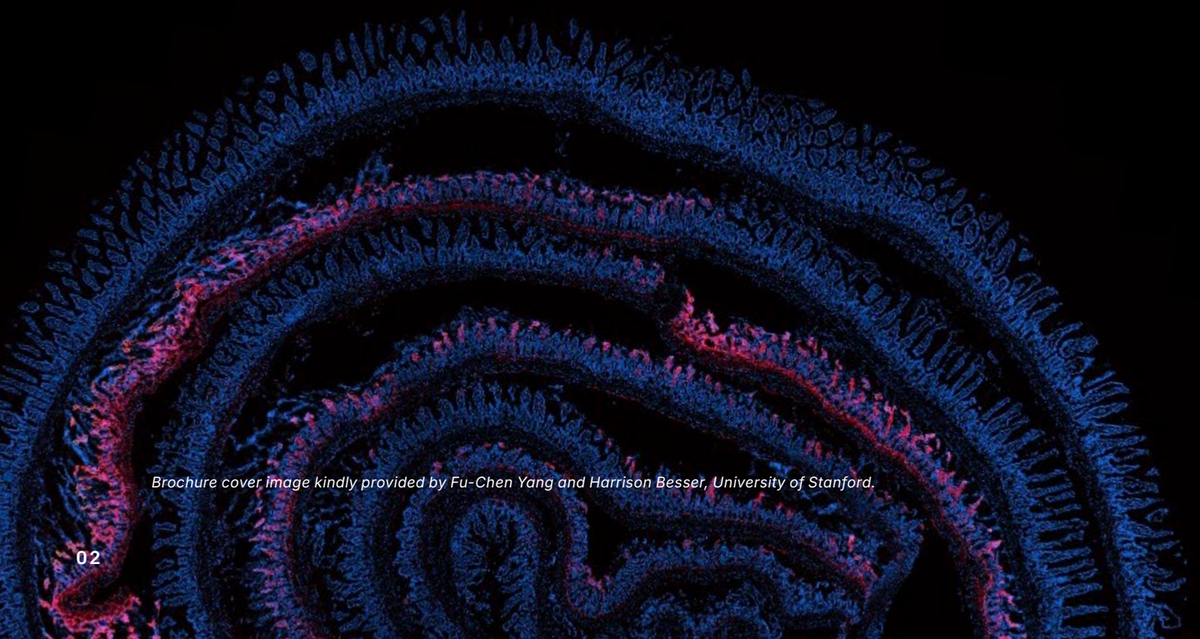
Fluorescent Dyes and Probes

Fluorescent Dyes and Probes

Bio-Techne, through the Tocris brand, offers a wide range of gold standard fluorescent dyes, as well as exclusive and spectrally enhanced dyes, designed and manufactured in-house. These include probes conjugated to the next generation Janelia Fluor® dyes, known for their brightness, superior photostability and applications in advanced microscopy and live cell imaging.

We also provide aptamer-based RNA imaging reagents, enhanced Tyramide Signal Amplification (TSA) reagents and kits for spatial biology, and fluorescent probes covering specific targets to facilitate the visualization of sub-cellular components in live and fixed cells as well as in organoids and 3D cells. Also in our portfolio are dyes and probes to support your in vivo, deep tissue, and bioluminescence imaging.

For up-to-date product listings, visit **tocris.com/fluorescent-imaging**. This brochure lists fluorescence imaging reagents conveniently organized by type for easy selection. Feature boxes throughout this listing identify the main principles of imaging technology and the application of corresponding product ranges.



Brochure cover image kindly provided by Fu-Chen Yang and Harrison Besser, University of Stanford.

Contents

List of Product Lines

Fluorescent Dyes

Fluorescent dyes, or fluorophores, enable researchers to identify, probe and visualize specific biological molecules using technologies including fluorescence microscopy and **flow cytometry**. Dyes can be classified according to some key features known as 'photophysical' properties, which include the maximum absorption and emission wavelengths (λabs/λem), and brightness, which is equal to extinction coefficient (ε) multiplied by quantum yield (φ). The Tocris range includes the **Janelia Fluor® Dyes**, which are bright, highly photostable and cell-permeable, making them ideal for confocal fluorescent imaging and **super-resolution microscopy** (SRM) techniques in live and fixed cells. Also included in our portfolio are novel fluorophores in the near-IR range, for deep tissue and in vivo imaging work, together with a comprehensive palette of well-known, gold standard dyes for all your imaging requirements.

Product Name	Reactive Group	Cat#	λ Abs (nm)	λ Em (nm)	Emission Color
3-Azido-7-hydroxycoumarin	Azide	**7664**	404	477	**Blue**
Ocean Blue	NHS ester	**6489**	405	455	
BDY FL	NHS ester	**5465**	502	510	**Green**
FITC	Isothiocyanate	**5440**	495	525	
Janelia Fluor® 525	NHS ester	**6296**	525	549	**Yellow**
HM Janelia Fluor® 526	NHS ester	**7312**	526	550	
Janelia Fluor® 526	NHS ester	**7316**	526	550	
PA Janelia Fluor® 549	NHS ester	**6149**	553	573	
	Maleimide	**8133**	650	664	
Janelia Fluor® 549	Maleimide	**6500**	549	571	
	Tetrazine	**6502**	549	571	
	NHS ester	**6147**	549	571	
	Free acid	**6503**	549	571	
Janelia Fluor® 585	NHS ester	**6418**	585	609	**Orange/Red**
Janelia Fluor® 635	NHS ester	**6419**	635	652	
	Maleimide	**8027**	645	664	
	Tetrazine	**8134**	635	652	
PA Janelia Fluor® 646	NHS ester	**6150**	651	665	
Janelia Fluor® 646	Maleimide	**6590**	646	664	
	Free acid	**6993**	646	664	
	Azide	**7088**	646	664	
	Tetrazine	**7279**	646	664	
	NHS ester	**6148**	646	664	
Cyanine 5	NHS ester	**5436**	649	666	
Janelia Fluor® 669	NHS ester	**6420**	669	682	**Far Red**
	Maleimide	**8097**	669	689	
FNIR-Tag	NHS ester	**7373**	765	788	**Near-IR**
Indocyanine green	-	**7510**	787	815	
NIR Dye s775z	NHS ester	**7626**	775	795	

BODIPY® is a registered trademark of Molecular Probes, Inc, a Thermo Fisher Scientific Company.

Janelia Fluor® is a registered trademark of Howard Hughes Medical Institute.

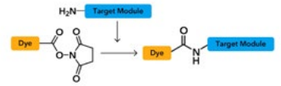
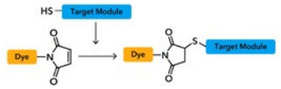
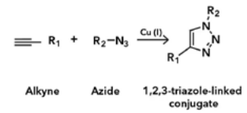
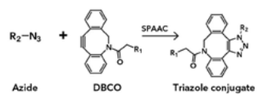
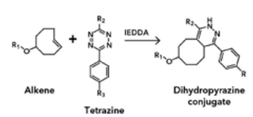
Fluorescent Dye Reactive Handles

Fluorescent dyes are available with a range of reactive handles to easily label various biomolecules. Common reactive groups include: succinimidyl esters (SE / NHS esters), maleimides, free acids and click handle groups including tetrazine and DBCO handles to support copper-free, bioorthogonal click chemistry, and azide / alkyne handles to support copper-catalyzed click chemistry.

Range of reactive handles groups and their reactivity are summarized in the table below.

Protocols for Fluorescent Dye Conjugation

Scan the QR Code or visit:
bio-techne.com

Handle Groups	Reactivity	Labeling Reaction
Succinimidyl Esters, (SE / NHS esters)	NHS ester derivatives are suitable for modifying primary amines, which are prevalent on the surface of antibodies and other proteins due to the lysine side chain.	
Maleimides	Maleimides react with thiols (sulfhydryl groups) and provide a convenient route to label cysteine residues in proteins and peptides.	
Free Acids	Free acid reactive groups are commonly used in the preparation of Halo- and SNAP-tag ligands via amide coupling reactions.	-
Click Handle Groups	**Cu(I)-catalyzed Azide-Alkyne Click Chemistry reaction (CuAAC):** The CuAAC reaction couples an alkyne with an azide using copper as a catalyst, forming a stable 1,4-disubstituted 1,2,3-triazole-linked conjugate.	
	Strain-promoted Azide-Alkyne Click Chemistry reaction (SPAAC) (copper-free): The SPAAC reaction avoids the use of copper by incorporating the triple bond into a cyclooctyne. The cyclooctyne, DBCO (dibenzocyclooctyne, also known as DIBAC) is commonly used as a reactive handle for this reaction providing relatively rapid reaction kinetics and good stability in aqueous buffers.	
	Tetrazine ligation based on Inverse-Electron-Demand Diels-Alder (IEDDA) chemistry: The IEDDA reaction is the ultrafast cycloaddition between a strained double bond (commonly trans-cyclooctene) and a labeled tetrazine.	

Janelia Fluor® Dyes

Developed by Professor Luke Lavis and his team at the Janelia Research Campus, **Janelia Fluor® dyes** provide scientists with an exceptional palette of bright, photostable fluorophores for a broad range of applications including super-resolution microscopy. The Janelia Fluor® range includes products with different specific and useful properties, such as: fluorogenicity; spontaneous blinking (for facile single-molecule localization microscopy (SMLM)); and photoactivation.

Janelia Fluor® Dye Key Features and Applications

- Exceptionally bright, highly photostable
- Cell permeable
- Especially well-suited to live-cell imaging
- Supplied with a choice of reactive groups for simple biomolecule conjugation
- Can be converted to relevant substrate for use in self-labeling tag systems, e.g. HaloTag® and SNAP-tag®
- Suitable for use in confocal microscopy, IHC, ICC, and flow cytometry
- Ideal for super-resolution techniques including STED and dSTORM
- Photoactivatable Janelia Fluor® dyes compatible with PALM microscopy

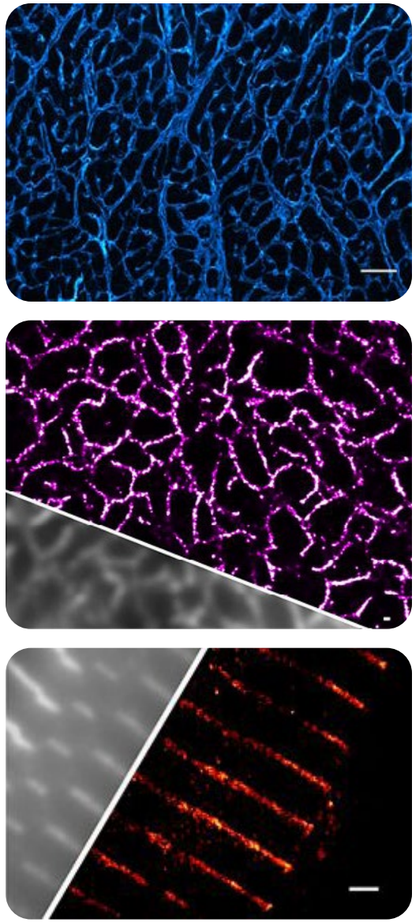
The full range of Janelia Fluor® dyes are available from Tocris with a selection of reactive groups for conjugation to biomolecules.

Hear exclusively from Luke Lavis, the inventor of Janelia Fluor® Dyes

In this episode of the **Back of the Napkin podcast**, discover how the work of Luke Lavis at the Janelia Research Campus has pushed the boundaries of fluorescence imaging. His development of Janelia Fluor® dyes has significantly improved live-cell and super-resolution imaging capabilities.

Conjugation Protocols

Scan the QR Code or visit:
bio-techne.com/protocols



Application of Janelia Fluor® Dyes in Cardiac Tissue:
Top — Widefield fluorescence image displaying the distribution of collagen VI in the interstitial space between muscle cells. Labeled with primary antibody against collagen VI and secondary antibody conjugated to Janelia Fluor® 549 (Cat# 6147). Scale: 50 µm. Middle — An adult pig heart tissue section, 10 µm thick, labeled with antibody against SERCA2ATPase, exhibits the intricate structure of the sarcoplasmic reticulum. A super-resolution image (top), obtained by exploiting spontaneous photo-switching of Janelia Fluor® 549 (dSTORM), shows superior detail to the diffraction limited widefield image (bottom). Scale: 200 nm. Bottom -Rat cardiomyocyte stained against α-actinin, displaying its periodic structure localized at the ends of sarcomeres (Z-discs). Widefield fluorescence of Janelia Fluor® 549 (left), prior to illuminating with a 561 nm laser to induce photoswitching and produce a dSTORM super-resolution image (right). Scale: 1 µm. All images kindly provided by Prof. Christian Soeller, University of Exeter; acquired by Alex Clowsley and Anna Meletiou.

What Researchers are Saying about Janelia Fluor® Conjugates

We have been using the Janelia Fluor® secondary antibodies and like them a lot for IHC. As advertised, they seem to be at least a little brighter and more photostable than the Alexa 647 and Cy3 dyes we had been using. We will probably switch over to these completely going forward.

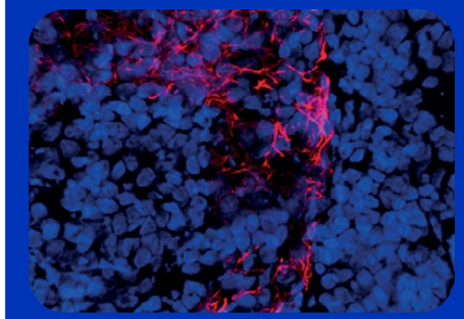
— Steve Stowes, PhD, Assistant Professor
Montana State University

It's a great antibody and great fluorophore by its signal sharpness and photostability.

— Anonymous

Custom Conjugation Service

In addition to a wide range of pre-conjugated options, including Janelia Fluor® - conjugated antibodies, Bio-Techne also offers custom conjugation services.



Learn More

Scan the QR Code or visit:
bio-techne/services/custom-antibody-services

Applications

1 Advanced Microscopy and Live Cell Imaging

Fluorescence imaging has benefited in recent years from breakthrough advances in technology and instrumentation that now enable visualization and tracking of individual biomolecules and biological structures in live cells.

Super-Resolution Microscopy

Super-resolution microscopy (SRM) techniques such as STED, STORM, dSTORM, PALM and FPALM provide far greater resolution images of cellular structures compared to traditional light microscopy. These techniques rely on the availability of advanced fluorescent dyes and probes that have been engineered to perform under a given set of experimental conditions.

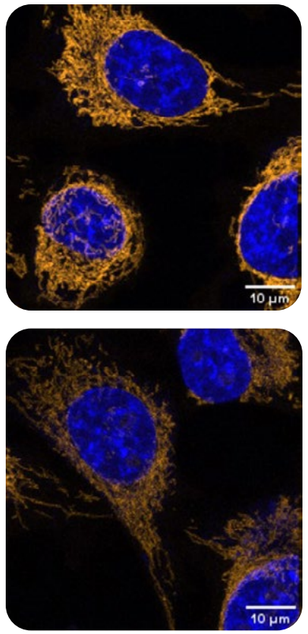
Bright and highly photostable, Janelia Fluor® dyes are ideal for super-resolution microscopy and are especially suited for live-cell imaging.

MitoBrilliant™ Probes

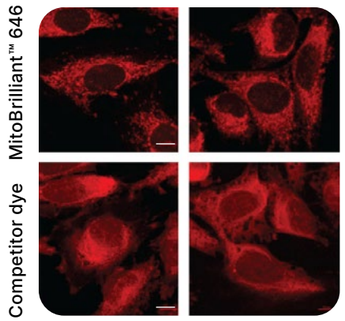
MitoBrilliant™ probes are next-generation fluorescent stains for the localization and tracking of mitochondria in both live and fixed-cells. The MitoBrilliant range harnesses **Janelia Fluor® dye technology,** conferring some of the properties of these dyes into mitochondrial stains.

The 'MitoBrilliant Live' dyes accumulate in the mitochondria of live cells in a mitochondrial membrane potential (Δψm) dependent manner. Upon loss of the mitochondrial membrane potential, the dyes disperse, providing a dynamic assessment of the mitochondrial membrane potential in live cells. Two MitoBrilliant Live dyes are available: MitoBrilliant™ Live 646 (Cat# 7417; red emission) and MitoBrilliant™ Live 549 (Cat# 7693; yellow/orange emission). They are suitable for use in flow cytometry, imaging and high-content screening.

MitoBrilliant™ 646 (Cat# 7700; red emission) is a corresponding probe suitable for both live and fixed-cell staining. It is retained in mitochondria following fixation with exceptionally bright staining and is suitable for use in flow cytometry, imaging, high-content screening and STED super-resolution microscopy.



Mitochondrial probe brightness comparison: HeLa cells incubated with 100 nM of MitoBrilliant™ live 549 (top) or 100 nM of a leading competitor dye (above), for 40 min. Cells were counter-stained with DAPI (Cat# 5748). Image taken using an LSM880 Confocal with a 63X objective with the same setting for both images.



Performance of MitoBrilliant™ 646 after fixation: HeLa cells incubated with 100 nM of MitoBrilliant™ 646 or competitor dye for 40 min, then fixed for 10 min in 4% PFA. Images taken using an LSM880 Confocal and 63x oil objective. Scale bar = 10µm.

Product Name	Cat#	Description	λ Abs (nm)	λ Em (nm)
MitoBrilliant™ 646	7700	Fluorescent mitochondrial probe for live and fixed-cell imaging (red emission)	655	668
MitoBrilliant™ Live 549	7693	Fluorescent mitochondrial probe for live-cell imaging (yellow/ orange emission)	550	568
MitoBrilliant™ Live 646	7417	Fluorescent mitochondrial probe for live-cell imaging (red emission)	648	662

MitoBrilliant™ Research Product Guide

Our guide highlights the use of MitoBrilliant in different research applications and provides background information on mitochondria.

Download here

Scan the QR Code or visit:
bio-techne.com/resources/literature/mitobrilliant-dyes-product-guide

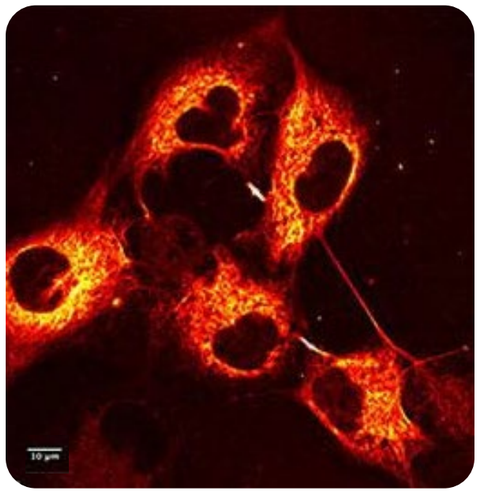
Microtubule Probes

Featured Microtubule Probe - Taxol Janelia Fluor® 646

Taxol Janelia Fluor® 646 is a red-fluorescent taxol derivative for direct imaging of the microtubule cytoskeleton. This fluorogenic dye fluoresces only once bound to microtubules, enabling hassle-free no-wash experiments. Excitation maximum = 655 nm; emission maximum = 671 nm.

Protocol Available

Scan the QR Code or visit:
bio-techne.com/resources/protocols-troubleshooting/protocol-taxol-janelia-fluor-646



Application of Taxol Janelia Fluor® 646, dye on COS7 cells: COS7 cells were labeled with 3 µM Taxol Janelia Fluor® 646 for one hour at 37°C. Images were taken on a Leica TCS SP8 Confocal Laser Scanning Microscope. All images kindly provided by Prof. Christian Soeller, University of Exeter; acquired by Evelina Lucinskaite, Anna Meletiou and Alexander Clowsley.

Product Name	Cat#	Description	λ Abs (nm)	λ Em (nm)
Flutax 1	2226	Fluorescent taxol derivative; binds microtubules	495	520
Flutax 2	6254	Green-fluorescent taxol derivative; binds microtubules	496	526
Taxol Janelia Fluor® 526	7315	Green-fluorescent taxol derivative; probe for microtubule staining	531	549
Taxol Janelia Fluor® 549	6267	Yellow-fluorescent taxol derivative; probe for microtubule staining; protocol available	556	575
Taxol Janelia Fluor® 646	6266	Red-fluorescent taxol derivative; probe for microtubule staining; protocol available	655	671

Fluorescent DNA Probes

Featured Fluorescent DNA Stain - Hoechst Janelia Fluor® 646

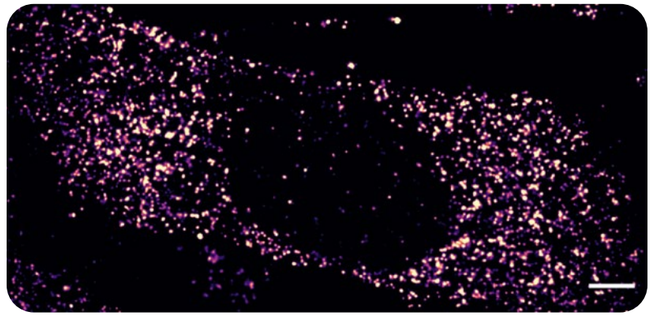
Hoechst Janelia Fluor® 646 is a fluorogenic red-emitting DNA probe; it preferentially stains and binds minor grooves of AT-rich regions. It can be combined with fluorogenic green-emitting DNA probe Hoechst Janelia Fluor® 526 for multiplexing experiments. This dye can also be combined with Hoechst Janelia Fluor® 526 to perform dual-color stimulated emission depletion microscopy (STED) using the same depletion laser (λdep = 775 nm). This dye is a desirable alternative to large oligonucleotide-conjugated antibodies for PAINT (points accumulation for imaging in nanoscale topography) experiments, particularly for bacterial studies. The compound fluoresces only once bound to DNA, i.e. it is fluorogenic, enabling hassle-free, no-wash experiments. It is suitable for multicolor microscopy experiments and for use in live-cell imaging.

Application of Hoechst Janelia Fluor® 646: Fixed U2OS cells were stained with Hoechst Janelia Fluor® 646 (1 µM) for 1 hour and imaged without an intermediate washing step on a LSM980 confocal microscope (Zeiss) using the following configuration: excitation: 633 nm / emission: 638–759 nm. Image kindly provided by Prof. Luke Lavis, Howard Hughes Medical Institute, Janelia Research Campus.

Product Name	Cat#	Description	λ Abs (nm)	λ Em (nm)
Acridine Orange	5092	Nucleic acid binding dye	502 (double strand)	525
			460 (single strand)	650
			475 (acidic conditions)	590
7-Aminoactinomycin D	7121	Fluorescent DNA stain	549	655
DAPI	5748	Fluorescent DNA stain	350	470
Hoechst 33342	5117	Fluorescent dye for labeling DNA	350	461
Hoechst Janelia Fluor® 526	7313	Fluorogenic, green-emitting DNA probe	531	549
Hoechst Janelia Fluor® 646	6804	Fluorogenic, red-emitting DNA probe	655	670
Propidium Iodide	5135	Red-fluorescent DNA stain; membrane impermeant to live cells. PI staining differentiates live and dead cells	535	617

Spontaneously Blinking Janelia Fluor® Dyes

Spontaneously Blinking Janelia Fluor® Dyes allow facile single-molecule localization microscopy (SMLM) in cells and dense biomolecular structures, without the need for photo activation or redox buffers. These spontaneously blinking dyes harness Janelia Fluor® technology to deliver dyes that automatically cycle between 'off' and 'on' states with an ideal duty cycle for super-resolution microscopy experiments.



Application of Janelia Fluor® 646b, NHS ester: SOFI RNA-FISH image of mouse embryo fibroblast cells expressing MS2 in the 3' UTR of the beta-actin gene and labeled with Janelia Fluor® 646b-oligonucleotide from Janelia Fluor® 646b, NHS ester; scale bar: 5 µm. Image kindly provided by Luke D. Lavis, Janelia Research Campus.

Product Name	Cat#	Reactive Group	Description	λ Abs (nm)	λ Em (nm)
Janelia Fluor® 630b, Maleimide	8154	Maleimide	Blinking fluorescent (thiol reactivity). Application: super-resolution microscopy including SMLM	651	666
Janelia Fluor® 635b, Maleimide	8156			651	667
Janelia Fluor® 646b, Maleimide	8158			662	674
Janelia Fluor® 630b, NHS ester	8155	NHS ester	Blinking fluorescent dye for the labeling of primary amines. Application: super-resolution microscopy including SMLM	654	671
Janelia Fluor® 635b, NHS ester	8157			654	671
Janelia Fluor® 646b, NHS ester	8159			662	679

JFX™ Dyes

JFX™ dyes are deuterated fluorescent Janelia Fluor® dyes which show enhanced brightness, photostability, and chromostability. NHS ester or maleimide reactive groups can be conjugated to proteins, antibodies, or converted to a relevant substrate for use in self-labeling tag systems, e.g. HaloTag® and SNAP-tag®. Suitable for confocal microscopy, super-resolution microscopy (SRM) techniques including dSTORM (in both live and fixed cells), and STED.

Product Name	Cat#	Reactive Group	Description	λ Abs (nm)	λ Em (nm)
JFX™ 554, Maleimide	8160	Maleimide	Deuterated fluorescent dye (thiol reactivity). Application: confocal microscopy, SRM including dSTORM & STED. Suitable for live cell imaging	554	576
JFX™ 650, Maleimide	8162			650	667
JFX™ 554, NHS ester-coming soon!	8161	NHS ester	Deuterated fluorescent dye for the labeling of primary amines. Application: confocal microscopy, SRM including dSTORM & STED. Suitable for live cell imaging	554	576
JFX™ 650, NHS ester	8163			650	667

Self-labeling Tags

Self-labeling tags (such as HaloTag®, SNAP-tag® or dTAG) are genetically encoded protein systems for labeling proteins of interest in live cells for a variety of applications such as protein-protein interactions and cellular localization.

Self-labeling tag systems can bind to Janelia Fluor® dye ligands offering several advantages:

- Can be used for fixed and live cell imaging
- Allows use of different fluorophores (multicolor imaging)
- Suitable for confocal imaging and SRM
- Higher brightness and photostability

Tocris offers two categories of fluorogenic dye ligands for live cell imaging of self-labeling tags: Janelia Fluor® Haloalkanes and dTAG Janelia Fluor® dyes.

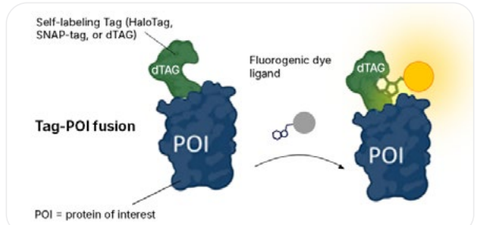


Illustration of self-labeling Tag protein (Halo Tag®, SNAP-tag® or dTAG) fused to a protein of interest (POI) and labeled with a fluorogenic dye ligand.

Janelia Fluor® Haloalkane Dyes

Janelia Fluor® Haloalkane dyes are cell-permeable fluorogenic fluorescent dyes with a chloroalkane handle. They can be used for live-cell imaging as a self-labeling tag substrate. Suitable for confocal microscopy, light sheet microscopy, and super-resolution microscopy (SRM) techniques, including dSTORM (in both live and fixed cells). They are stable to fixation, show a high degree of fluorogenicity, and exhibit low non-specific background staining.

Product Name	Cat#	Reactive Group	Description	λ Abs (nm)	λ Em (nm)
Janelia Fluor® 525, Haloalkane	8805	Chloroalkane	Cell-permeable fluorogenic fluorescent dye. Application: live-cell imaging as a self-labeling tag substrate. Suitable for confocal microscopy, light sheet microscopy, SRM techniques including dSTORM	525	549
Janelia Fluor® 549, Haloalkane	8806			549	571
Janelia Fluor® 585, Haloalkane	8807			585	609
Janelia Fluor® 635, Haloalkane	8808			635	652
Janelia Fluor® 646, Haloalkane	8809			646	664
PA Janelia Fluor® 646, Haloalkane	8815			646	664

dTAG Janelia Fluor® Dyes

Janelia Fluor® dyes together with genetically encoded, self-labeling tags (such as HaloTag® and SNAPTag®) enable researchers to visualize and track individual proteins within cells.

dTAG Janelia Fluor® dyes are fluorogenic srTAG probes for live cell imaging of FKBP12$^{F36V/L}$ fusion proteins.

HaloTag is a trademark of Promega Corporation. SNAP-tag is a trademark of New England BioLabs, Inc.

Product Name	Cat#	Description	λ Abs (nm)	λ Em (nm)
dTAG Janelia Fluor® 635	8101	Fluorogenic srTAG probe for live cell imaging of FBKP12 (F36V/L) labeled proteins	640	665
dTAG Janelia Fluor® 525	8102	Fluorogenic srTAG probe for live cell imaging of FBKP12 (F36V/L) labeled proteins	530	560
dTAG Janelia Fluor® 585	8103	Fluorogenic srTAG probe for live cell imaging of FBKP12 (F36V/L) labeled proteins	590	620

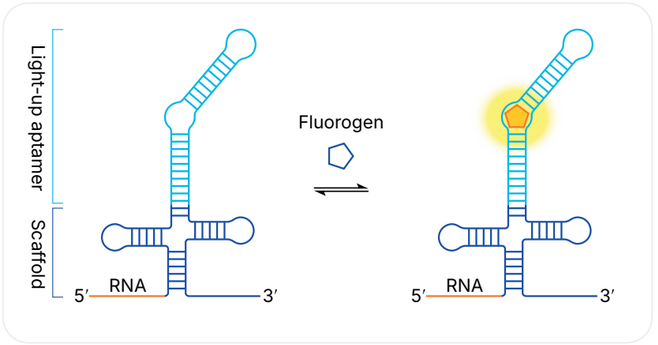
Aptamer-based RNA Imaging Technology

Light-up aptamers or fluorescent light-up aptamers (FLAPs) are a genetically encoded RNA imaging platform. They are designed to bind specific fluorogenic dyes that 'light-up' only in the bound state. This property of 'fluorogenicity' means that fluorescence can be 'switched on' upon RNA expression.

Light-up aptamer systems offer several advantages over traditional MS2 and GFP imaging systems:

- Fluorogenic nature produces exceptionally high signal-to-noise ratio
- Very bright fluorescent signal
- Light-up aptamers are small RNA tags, thus have a lower propensity to interfere with cellular functions
- Enable direct, fast measurement of gene transcription at the RNA level, providing a more accurate real time observation of RNA localization and promoter activity; GFP can take up to 30 minutes after stimulation to be translated into protein

Light-up Aptamer Principles



Example of Light-up Aptamer Application for Monitoring Gene Expression: RNA with a light-up aptamer coded (light blue structure) is expressed, a fluorogen (orange pentagon) binds and becomes highly fluorescent. Image adapted from Neubacher and Hennig (2019). PMID:30102012.

Aptamer-based RNA Imaging Reagents

Product Name	Cat#	Description	λ Abs (nm)	λ Em (nm)
BI dihydrochloride	7466	DFHBI derivative for imaging of RNA in living cells that bind Broccoli aptamers	470	505
DFHBI	5609	GFP fluorophore mimic for imaging RNA in living cells; activated by binding Spinach2 and Broccoli aptamers	447	501
DFHBI 1T	5610	GFP fluorophore mimic for imaging RNA in living cells; activated by binding Spinach2 and Broccoli aptamers	482	505
DFHO	6434	RFP fluorophore mimic for imaging RNA in living cells; activated by binding Corn aptamers	505	545
DMHBO+	7764	Fluorescent upon binding to Chili aptamer; for imaging RNA in cells	456	592
HBC 530	7277	GFP fluorophore mimic for imaging RNA in live cells; activated by binding to Pepper aptamers; suitable for confocal and two-photon microscopy	485	530
SiRA 2	7544	Fluorogen for SiRA light-up aptamer. Application: confocal microscopy, SRM (including STED)	649	662
TBI	7660	Fluorogenic ligand for Broccoli RNA aptamer	485	524

Anti-Fade Reagents

Anti-fade reagents provide protection against fading or photobleaching for most common fluorophores used in live and fixed cell fluorescent imaging.

Product Name	Cat#	Description
L-Ascorbic acid	4055	Commonly used anti-fade reagent in live cell microscopy; naturally occurring antioxidant
Trolox	6002	Anti-fade reagent; antioxidant vitamin E derivative; cell permeable and water soluble

2 Spatial Biology

Spatial biology (also called “spatial omics”) is the study of molecular and cellular components in three-dimensional space. It provides the precise location of biomarkers and cell types within tissues and helps to understand how they interact and organize in the tissue environment.

Spatial biology combines the domains of spatial transcriptomics and spatial proteomics, offering insights into RNA and protein expression within a tissue. This field has become increasingly important in recent years, thanks to advances in imaging technologies including fluorescence *in situ* hybridization (FISH). In FISH, fluorescent probes are designed to bind to specific genetic sequences, showing the precise location of target sequences in cells and tissues.

A challenge commonly encountered in spatial biology (particularly spatial transcriptomics) is the detection of low abundance targets. Technologies such as Tyramide Signal Amplification (TSA) is a powerful method to efficiently enhance signal and detection in immunocytochemistry (ICC), immunohistochemistry (IHC), and in situ hybridization (ISH) applications.

TSA Reagents for Enhancing IHC, ICC & FISH Signals

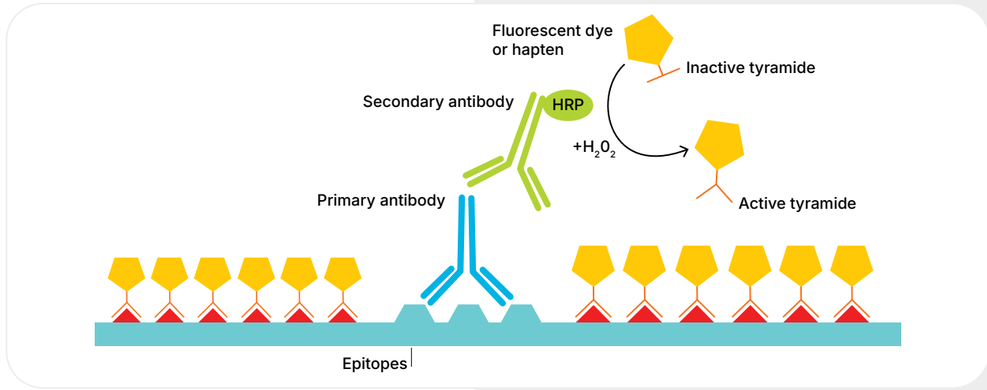
Tyramide Signal Amplification (TSA), also known as Catalyzed Reporter Deposition (CARD), offers an effective way to efficiently enhance signal and detection capabilities for low-abundance targets in immunocytochemistry (ICC), immunohistochemistry (IHC), and *in situ* hybridization (ISH) applications.

Tyramide Signal Amplification Principles

A primary and secondary antibody are used to label a tissue or cell sample. The secondary antibody is pre-conjugated to horseradish peroxidase (HRP), which in the presence of H_2O_2, catalyzes a labeled tyramide substrate into a highly reactive species that covalently binds to tyrosine residues on the proteins in close proximity to the antibodies and HRP, thus providing signal amplification.

Key Features of Tyramide Signal Amplification

- Allows detection of low-abundance targets
- Enhances signals in IHC, ICC, and FISH
- Reduces the amount of primary antibody required
- 100-fold more sensitive than conventional methods
- Simple, flexible, and easy to incorporate into IHC, ICC, and FISH workflows
- Compatible with fluorescent multiplex systems



Tyramide Signal Amplification (TSA) Reagents

Product Name	Cat#	Description	λ Abs (nm)	λ Em (nm)
Biotinyl Tyramide	6241	Reagent widely used for signal amplification in IHC and FISH	-	-
Cyanine 3 Tyramide	6457	Orange-fluorescent reagent widely used for signal amplification in IHC and FISH	550	563
Cyanine 5 Tyramide	6458	Red fluorescent reagent widely used for signal amplification in IHC and FISH	651	665
Digoxigenin Tyramide	7236	Reagent used for Tyramide Signal Amplification in IHC, ICC, and ISH	-	-
Fluorescein Tyramide	6456	Green-fluorescent reagent widely used for signal amplification in IHC and FISH	494	517

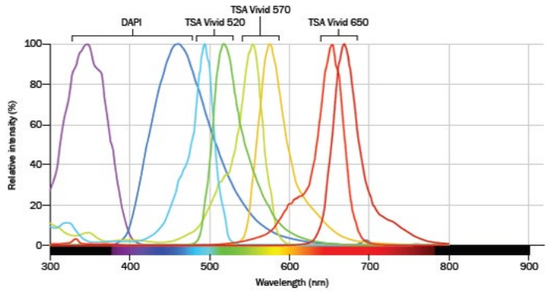
TSA Vivid™ Fluorophore Kits

TSA Vivid™ Fluorophore Kits demonstrate increased brightness and improved performance in ICC, IHC, and FISH applications. They are specifically designed for exceptional signal-to-noise performance in the RNAscope™ Multiplex Fluorescent v2 Assay, enabling visualization of gene expression at the single cell level.

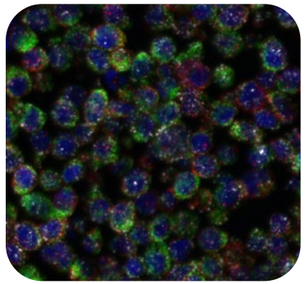
TSA Vivid™ Fluorophore Kits Key Features and Applications

- Brighter than equivalent competitor fluorophores
- Deliver leading performance with the RNAscope Multiplex Fluorescent v2 Assay
- Suitable for multiplexing
- Can be combined with DAPI counter staining

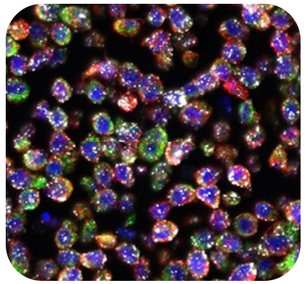
Optical data for DAPI, TSA Vivid™ 520, 570 and 650



Leading Competitor



TSA Vivid™



TSA Vivid™ brightness comparison: 3-plex RNAscope Multiplex Fluorescent v2 Assay plus DAPI counterstain (Cat# 5748) on HeLa cells with TSA Vivid™ dyes (520, 570, 650, bottom) and the corresponding leading competitor dyes (top). All dyes were used at 1:1500 dilution. Markers shown are Polr2a in green, PPIB in red, and UBC in white.

What Researchers are Saying about TSA Vivid™

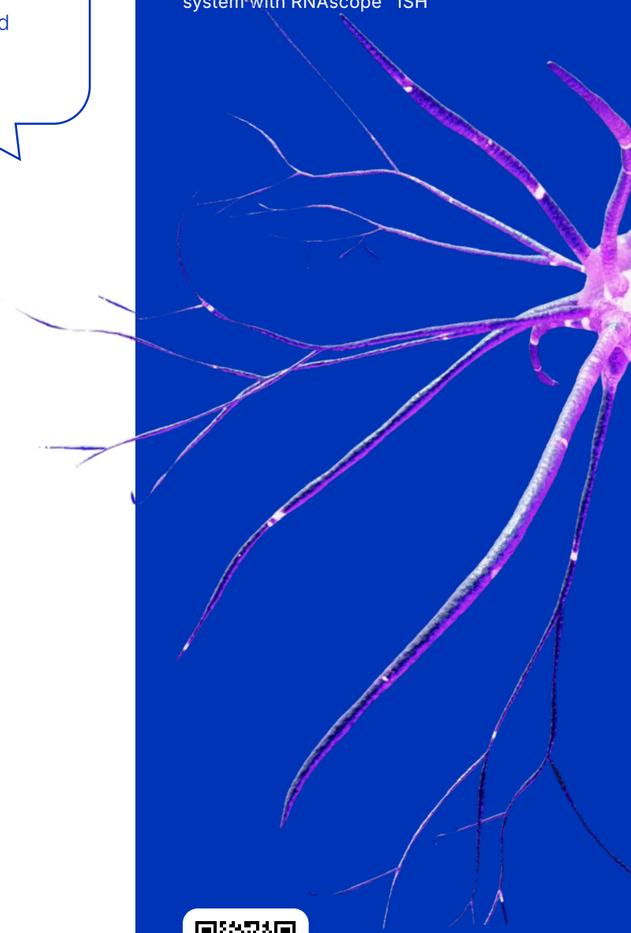
We tested the Tocris TSA Vivid™ dyes in our RNAscope multiplex fluorescence assay and were very pleased to find that they slotted into the protocol with no changes necessary. No optimization was required, and we were able to substitute our usual dyes at the same concentration. We are impressed with the results and how bright the dyes are.

— Dr.Julia Jones, Senior Scientific Officer,
Cancer Research U.K.

Product Name	Cat#	Description	λ Abs (nm)	λ Em (nm)
TSA Vivid™ Fluorophore Kit 520	7523	Signal amplification kit for use in ICC, IHC, FISH	494	517
TSA Vivid™ Fluorophore Kit 570	7526	Signal amplification kit for use in ICC, IHC, FISH	555	577
TSA Vivid™ Fluorophore Kit 650	7527	Signal amplification kit for use in ICC, IHC, FISH	654	668

Visualize Multiple Markers Simultaneously in Tissue

Detect, characterize and localize mRNA in the nervous system with RNAscope™ ISH



Learn More

Scan the QR Code or visit:
bio-techne.com/reagents/rnascope-ish-technology

Tissue Clearing

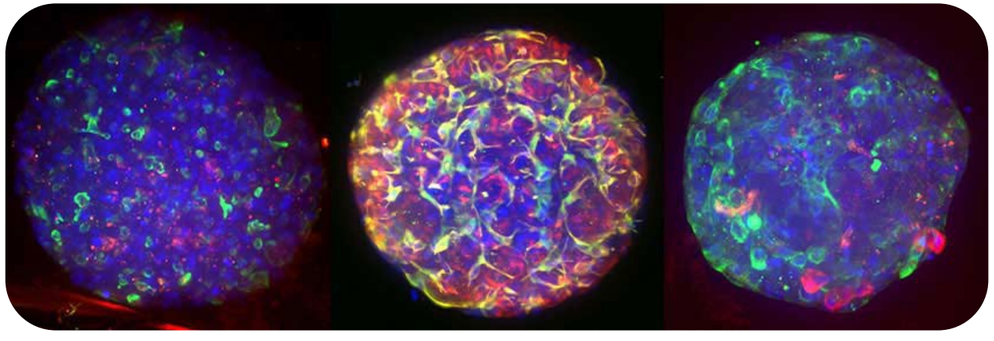
Tissue Clearing Pro and Tissue Clearing Pro-Organoid

Tissue Clearing Pro and Tissue Clearing Pro-Organoid are easy-to-use kits that allow rapid, effective, non-destructive, and reversible tissue clearing and staining of whole tissues (Tissue Clearing Pro) or organoids, 3D cell cultures, and microtissues (Tissue Clearing Pro-Organoid). Tissue Clearing Pro and Tissue Clearing Pro-Organoid are solvent-based tissue clearing techniques, comparable to BABB and DISCO. Tissue Clearing Pro-Organoid does not cause significant shrinkage or tissue damage and does not use as harsh a solvent as other solvent based techniques.

Key Features of Tissue Clearing Pro and Tissue Clearing Pro-Organoid

- Rapid, easy to use, reversible, and non-destructive
- Compatible with fluorescent protein, immunolabeling, and small molecule dye staining techniques
- Suitable for use with all standard dyes and buffers
- Following 3D imaging, Tissue Clearing Pro can be reversed for follow-up 2D histology staining
- Tissue Clearing Pro can clear a whole mouse brain of up to 8 mm thickness in 24 hours or 2 hours for 1 mm thick sections
- Tissue Clearing Pro-Organoid allows 3D cell cultures up to 500 µm thick to be cleared in minutes

Product Name	Cat#	Description
Tissue Clearing Pro	7389	Tissue clearing reagent kit
Tissue Clearing Pro Reagent 1	7563	Tissue clearing reagent
Tissue Clearing Pro-Organoid	7390	3D cell culture clearing reagent kit



Tissue Clearing Pro-Organoid Applications. Tissue Clearing Pro-Organoid Kit (Cat# 7390) was applied to liver HepaRG spheroids, labeled with DAPI, and structure stained. Left: DNA, MRPII and MDRI; Middle: DNA, CD68, Albumin and Vimentin; Right: DNA, panCK and CD31.

3 Organoids and 3D Cell Culture Imaging

Organoids and 3D primary cell cultures create a more physiologically relevant environment for studying cell-cell interactions and cellular responses than traditional 2D monolayer cultures. They offer a powerful new platform for studying organ development, modeling disease and screening for drug toxicity.

3D cell cultures are derived from primary cells and grown in a 3D matrix; they maintain the characteristics of the original tissue. In comparison, organoids are generated in vitro from primary tissue, embryonic **stem cells** (ESCs), or induced pluripotent stem cells (iPSCs) and can self-organize and differentiate into miniaturized versions of organs.

Bio-Techne offers a wide range of fluorescent products to help in the analysis of organoids and 3D cell cultures, enabling visualization of cellular structures, tracking of dynamic processes, and assessment of various functional parameters like viability, proliferation, and differentiation. Below is an overview of different types of fluorescent products and their uses in organoid and 3D cell culture research.

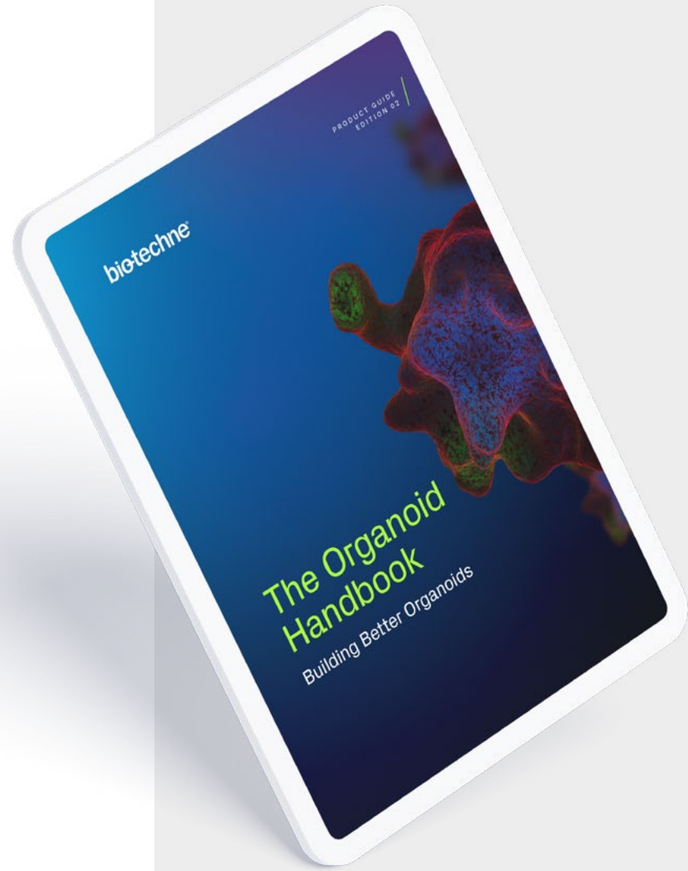
Probes and Reagents for Organoids and 3D Cell Culture Imaging

	Product Name	Cat#	Description	λ Abs (nm)	λ Em (nm)
Cell Viability, Apoptosis, and Proliferation Probes	**Acridine Orange hydrochloride**	5092	Nucleic acid binding dye. Cell permeable. Used for: cell cycle and apoptosis determination. Application: flow cytometry, fluorescence microscopy	502 (double strand) 460 (single strand) 549 (acidic conditions)	525 650 655
	Annexin V Apoptosis Kit [FITC]	NBP2-29373	Apoptosis Kit. Application: flow cytometry, immunocytochemistry, immunofluorescence	-	-
	7-Aminoactinomycin D	7121	Red-fluorescent DNA stain, membrane impermeant to live cells. Used for: apoptosis detection, cell viability staining. Application: flow cytometry, fluorescence microscopy	549	655
	Calcein AM	5119	Cell permeable non-fluorescent compound: green-fluorescent in living cells once hydrolyzed. Used for: cell tracing and cell viability monitoring. Application: fluorescent microscopy and flow cytometry	495	515
	Cell Counting Kit-8	7368	Cell viability and proliferation assay test solution		
	Hoechst 33342	5117	Used to quantify DNA in viable cells; blue-fluorescent dye for DNA staining	350	461
	Propidium iodide	5135	Red-fluorescent DNA stain, membrane impermeant to live cells. Used for: apoptosis detection, nuclear counterstaining, viability staining. Application: flow cytometry, confocal microscopy, fluorescence microscopy	535	617

	Product Name	Cat#	Description	λ Abs (nm)	λ Em (nm)
DNA Probes	**DAPI**	5748	Blue-fluorescent DNA stain / dye. Used for: nuclear counterstain, fixed and live-cell staining, assessing apoptosis. Application: flow cytometry, confocal microscopy, immunofluorescence (IHC, ICC), ISH	470	405
	Hoechst 33342	5117	Blue-fluorescent dye for DNA staining. Cell permeable. Used for: nuclear counterstain, apoptosis analysis, fixed and live-cell staining. Application: flow cytometry, confocal microscopy	350	461
Ion Indicators	**DAF FM diacetate**	7756	Cell permeable photostable nitric oxide (NO) fluorescent indicator	495	515
	Fluo-4 AM	6255	Cell-permeable, fluorescent Ca^{2+} indicator	494	506
	FURA-2AM	2220	Fluorescent Ca^{2+} indicator	371	474
	ING-2 AM	7870	Fluorescent sodium ion (Na+) indicator, membrane permeable	525	545
	IPG-4 AM	7871	Fluorescent potassium ion (K^+) indicator, membrane permeable	525	545
	Mag-Fura-2 AM	7855	Magnesium (Mg^{2+}) indicator, membrane permeable	369	511
	MQAE	7856	Fluorescent Cl- indicator; membrane permeable	355	460
	OG 488 BAPTA-1 AM	6256	Cell-permeable, fluorescent Ca^{2+} indicator	494	523
Mitochondrial Probes	**MitoBrilliant™ 646**	7700	Universal red fluorescent mitochondrial stain for both live and fixed cells	655	668
	MitoBrilliant™ Live 549	7693	Orange-fluorescent mitochondrial stain for live cells, Δψm dependent	550	568
	MitoBrilliant™ Live 646	7417	Red-fluorescent mitochondrial stain for live cells, Δψm dependent	648	662
	Mito-HE	7641	Red-fluorescent mitochondrial superoxide indicator. Used for: live cell imaging. Application: confocal microscopy, flow cytometry	510	580
	MitoPY1	4428	Fluorescent mitochondrial hydrogen peroxide indicator. Used for: live cell imaging. Application: confocal microscopy	510	530
ROS Probes	**H2DCFDA**	5935	Fluorescent ROS indicator; cell permeable	490	520
Stem Cell Probes	**ALDH Detection Reagent - BAAA-DA**	7556	Fluorescent ALDH substrate and detection reagent. Used for: identification of cells with high ALDH activity. Application: flow cytometry, fluorescent-activated cell sorting (FACS)	505	512
	Kyoto Probe-1	7419	Fluorescent probe that selectively identifies undifferentiated iPS/ES cells	515	529
Voltage Sensors	**Di 4 ANEPPS**	7324	Voltage-sensitive probe; used to detect changes in membrane potential in electrophysiology protocols	465	635
Tissue Clearing	**Tissue Clearing Pro-Organoid**	7390	3D cell culture clearing reagent kit	465	635

The Organoid Handbook

This handbook is the must have resource for research using organoids and 3D cell cultures. It includes key publications, protocols, reagents, and troubleshooting recommendations for culturing, maintenance, and imaging of different types of organoids.



Download Here

Scan the QR Code or visit:
bio-techne.com/resources/literature/organoid-handbook

4 In Vivo, Deep Tissue, and Bioluminescence Imaging

In Vivo and Deep Tissue Imaging

Non-invasive imaging in vivo and in deep tissue comes with some challenges that require fluorescent dyes and probes designed with specific properties to enable data generation.

The main limitations for tissue imaging are first, the autofluorescence from intrinsic biomolecules can interfere with detecting specific fluorescent signals. Secondly, because tissues are extremely heterogeneous, fluorescence is scattered or absorbed, limiting its effectiveness for imaging in larger organisms or deep tissues.

Near Infrared (NIR) fluorescent dyes have emission wavelengths in the NIR range (650-1,700 nm) and offer several advantages over visible-range light dyes (400-700 nm) such as deep tissue penetration, low tissue background autofluorescence, and minimum phototoxicity for biological components due to the longer excitation wavelengths required. They are therefore an ideal choice for in vivo fluorescence imaging.

Bio-techne offers a selection of probes and NIR fluorescent dyes for non-invasive imaging in vivo and deep tissue imaging.

Near Infrared (NIR) Fluorescent Dyes

Product Name	Cat#	Description	λ Abs (nm)	λ Em (nm)
FNIR-Tag, NHS ester	7373	Near-infrared fluorescent dye for labeling of amines; supplied as NHS ester	765	788
ICG-d7	7749	Near-infrared (NIR) fluorescent dye; partially deuterated form of **Indocyanine Green** (Cat# 7510), suitable for in vivo imaging.	794	818
Indocyanine green	7510	Near-infrared fluorescent dye; suitable for in vivo imaging	787	815
NIR Dye s775z, NHS	7626	Near-infrared fluorescent dye supplied with an NHS ester reactive group for the labeling of primary amines. Suitable for in vivo imaging.	775	795

SCOTfluor Probes

SCOTfluors are small-sized fluorophores for non-invasive and real-time tracking imaging of essential metabolites in live cells and in vivo.

Product Name	Cat#	Description	λ Abs (nm)	λ Em (nm)
SCOTfluor 510, fluoro	7446	Amine-reactive fluorescent probe precursor for live cells and in vivo imaging	510	606
SCOTfluor 510 Fmoc-Dapa-OH	7900	Fmoc protected fluorescent amino acid. Used as a building block in solid-phase peptide synthesis to prepare PAINT imaging probes	488	601
SCOTfluor glucose probe 510	7447	Fluorescent glucose probe for visualizing glucose uptake in vivo	490	605
SCOTfluor lactic acid probe 510	7448	Fluorescent lactic acid probe for imaging lactic acid metabolism in vivo	485	605

Amyloid β Probes

Amyloid plaques resulting from the accumulation of amyloid-β peptide fibrils in the brain is one of the main hallmarks of Alzheimer's disease, the most common neurodegenerative disorder. Our blood-brain-barrier-penetrant fluorescent probes allow the detection and quantification of β amyloid plaques for in vitro and vivo imaging.

Fluorescent Amyloid β Probes

Product Name	Cat#	Description	λ Abs (nm)	λ Em (nm)
Methoxy-X04	4920	Blood-brain barrier penetrant fluorescent amyloid β probe. Used for: detection and quantification of plaques, tangles and cerebrovascular amyloid. Application: confocal microscopy, suitable for in vivo imaging	370	452
QM-FN-SO3	7958	Blood-brain barrier penetrant, NIR aggregation-induced emission active probe of amyloid β plaques. Used for: in vitro, *in situ* and in vivo imaging of amyloid β plaques. Application: confocal microscopy and in vivo imaging	488	680

Substrates for Bioluminescent Imaging

Bioluminescent substrates are commonly utilized for non-invasive monitoring of biological processes, for example in bioluminescence imaging (BLI) in both in vivo and in vitro settings. Luciferase substrates emit light when they become oxidized, which can be detected using fluorescence microscopy.

Firefly luciferase (Fluc) and D-Luciferin

The Firefly luciferase (Fluc) and D-Luciferin BLI system has long been utilized in standard lab techniques such as monitoring tumor growth and intracellular signaling activity in vitro and in vivo. While this system is very useful for many applications, it is less suitable for experiments requiring detection in deep tissue because of the relatively short emission wavelength produced by D-Luciferin (λmax= 562 nm). This wavelength is very similar to those of melanin (λmax = ~600 nm) and hemoglobin (λmax = 415-577 nm), making signal detection of D-Luciferin emanating from deep within tissue challenging to detect.

Deep Tissue Bioluminescent Imaging: TokeOni

In bioluminescent imaging, effective deep tissue imaging requires the emission of red-shifted light in the NIR region.

A breakthrough towards developing brighter bioluminescence in the desired near-IR region has been the development of engineered luciferases (Akaluc), which permit higher accumulation inside cells with lower toxicity, and modified luciferin substrates such as TokeOni (Cat# 6555, also known as AkaLumine HCl, λmax= 677 nm). TokeOni allows for deep tissue imaging in the near-IR region and exhibits excellent tissue distribution, including good brain permeability when orally administered.

The improved properties of luciferin substrates combined with engineered luciferases open these substrates up to many in vivo applications including monitoring stem cell fate, tumor growth, metastasis and assessing gene-editing technologies.

Bioluminescent Substrates

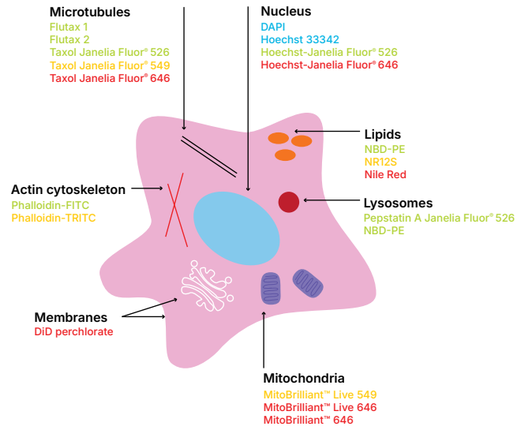
Product Name	Cat#	Description	λ Em (nm)
BL_{660}-NO	7753	Nitric oxide activity-based sensing NIR bioluminescent probe	660
D-Luciferin	5427	Firefly luciferase substrate; cell permeable	562
TokeOni	6555	NIR-emission luciferin analog; orally bioavailable and brain penetrant	677

5 High Content Imaging

High Content Imaging (HCI), also known as High Content Screening (HCS), is an advanced technique used in cellular and molecular biology to automate the collection, analysis, and interpretation of microscopic images from biological samples. It allows high-throughput screening of cellular phenotypes in response to diverse changes in fixed or live cells.

HCS multiplexed images can be performed using fluorescent probes for cellular and subcellular components that are suitable for multiplexing. The data capture of the labeled cells gives quantitative phenotypic profiles of cell morphology without the need for specific antibody labeling.

Bio-Techne provides a range of probes to help you to label cellular or subcellular components in living cells such as mitochondria, microtubules, nucleus, membranes, actin cytoskeleton, lipids and lysosomes.

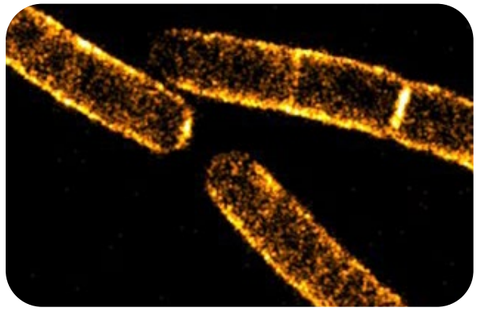


Fluorescent Probes for Cellular or Subcellular Components and their Emission Colors

Cell Organelles	Blue	Green	Yellow/Orange	Red
Actin cytoskeleton		**Phalloidin-FITC** (Cat# 5782)	**Phalloidin-TRITC** (Cat# 5783)	
Lipids		**NBD-PE** (Cat# 7538)	**NR12S** (Cat# 7509)	**Nile Red** (Cat# 7387)
Lysosomes		• **Pepstatin A Janelia Fluor® 526** (Cat# 7314) • **NBD-PE** (Cat# 7538)		
Microtubules		• **Flutax 1** (Cat# 2226) • **Flutax 2** (Cat# 6254) • **Taxol Janelia Fluor® 526** (Cat# 7315)	**Taxol Janelia Fluor® 549** (Cat# 6267)	**Taxol Janelia Fluor® 646** (Cat# 6266)
Mitochondria			**MitoBrilliant™ Live 549** (Cat# 7693)	• **MitoBrilliant™ Live 646** (Cat# 7417) • **MitoBrilliant™ 646** (Cat# 7700)
Membranes				**DiD perchlorate** (Cat# 5702)
Nucleus	• **DAPI** (Cat# 5748) • **Hoechst 33342** (Cat# 5117)	**Hoechst Janelia Fluor® 526** (Cat# 7313)		**Hoechst Janelia Fluor® 646** (Cat# 6804)

6 Imaging Bacteria

Fluorescent probes for imaging bacteria are useful for advancing bacterial research and antibiotic design. Fluorescent D-amino acids (FDAAs) are an essential tool for studying peptidoglycan synthesis and dynamics, and our range now spans the visible light spectrum giving you more options for multiplexing. FDAAs efficiently label peptidoglycans in bacterial cell walls *in situ*, allowing you to investigate and visualize cell morphology and formation, as well as bacterial growth. They can be used in gram-negative and gram-positive bacteria, and they are suitable for use with super-resolution microscopy (SRM).



Application of sCy5DA: Single molecule localization microscopy (SMLM) image of *Bacillus subtilis* cells labeled with 100 µM sCy5DA (Cat# 7834).

Fluorescent Probes for Imaging Bacteria

Product Name	Cat#	Description	λ Abs (nm)	λ Em (nm)
Click N-Acetylmuramic acid - alkyne	6798	Bacterial peptidoglycan derivative; suitable for 'click'-conjugation to fluorescent dyes	-	-
Click N-Acetylmuramic acid - azide	7506	Bacterial peptidoglycan derivative; suitable for 'click'-conjugation to fluorescent dyes	-	-
EDA-DA	7714	Unnatural dipeptide building block with alkyne group for functionalizing peptidoglycan	405	450
HADA	6647	Blue-fluorescent D-amino acid for labeling peptidoglycans in live bacteria	405	450
NADA-green	6648	Fluorescent D-amino acid for labeling peptidoglycans in live bacteria	450	555
OGDA	7408	Green-fluorescent D-amino acid; compatible with STED microscopy	501	526
RADA	6649	Orange-red TAMRA-based fluorescent D-amino acid for labeling peptidoglycans in live bacteria	554	580
Rf470DL	7406	Blue rotor-fluorogenic fluorescent D-amino acid for labeling peptidoglycans in live bacteria	470	620
RMR-Tre	8013	Far-red fluorogenic trehalose probe for live mycobacteria imaging	549	571
sBADA	7860	Green-fluorescent D-amino acid for labeling peptidoglycans in bacteria	490	510
sCy5DA	7834	FDAA for super-resolution microscopy of bacteria	646	665
sCy5DL-amide	7835	FDAA for super-resolution microscopy of bacteria	646	666
Se-NADA	7449	Orange-fluorescent benzoselenadiazole D-amino acid (FDAA) for imaging bacteria; also, photosensitizer	470	590
6 TMR Tre	6802	Fluorescent trehalose; selectively labels mycobacterial cell envelope	532	580
YADA	6650	Green-yellow lucifer yellow-based fluorescent D-amino acid for labeling peptidoglycans in live bacteria	426	535

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Other Fluorescent Probes and Stains

Fluorescent probes and stains enable visualization and study of cellular and subcellular components. They can either function as specific markers for single molecules, organelles, or cells, or can monitor environmental factors such as pH or polarity.

They enable researchers to detect components of complex biomolecular assemblies, such as microtubules, with high sensitivity and selectivity allowing the exploration of cell structure and function. Bio-Techne offers a wide selection of fluorescent probes, covering organelle probes and cell viability stains.

Fluorescent and bioluminescent reagents enable highly sensitive and selective visualization of biological events, from single molecule tracking in vitro, through to in vivo imaging. Discover our exclusive range of fluorescent probes, indicators, dyes, and stains.

Alternatively, they might provide a functional read-out, such as live versus fixed cell staining.

Fluorescent Probes and Stains

	Product Name	Cat#	Description	λ Abs (nm)	λ Em (nm)
Enzyme Probes and Enzyme Substrates	**ALDH Detection Reagent - BAAA-DA**	7556	ALDH Detection Reagent - BAAA-DA	-	-
	BDY FL VH032	7483	High-affinity VHL fluorescent probe	502	510
	DiFMUP	6882	Fluorescent phosphatase substrate	358	455
	7-Ethoxyresorufin	6204	Fluorometric CYP450 substrate	-	-
	FAM-DEALA-Hyp-YIPD	7287	Fluorescent HIF-1α peptide	485	520
	Fluorescein-NAD+	6574	Fluorescent NAD^+; substrate for ADP-ribosylation for use in PARP assays	-	-
	GF-AFC	8143	Cell permeable fluorogenic substrate cleaved by cytosolic aminopeptidases for non-lytic high throughput cell viability assays	-	-
	PARPi-FL	6461	Potent fluorescent PARP inhibitor; cell permeable	-	525
	Thalidomide-Cyanine 5	7288	Fluorescent cereblon probe	650	665
Fluorescent Cholesterol Probes	**Filipin III**	6250	Fluorescent cholesterol stain; polyene antibiotic	405	420-480
Fluorescent Cell Indicators and Sensors	**Calcein AM**	5119	Cell permeable compound; hydrolyzed to become fluorescent in living cells	495	515
	DA ZP1	7444	Fluorogenic Zn (II) sensor for isolation of stem cell-derived β cells	490	522
	DAF FM diacetate	7756	Cell permeable photostable nitric oxide (NO) fluorescent indicator	495	515
	Di 4 ANEPPS	7324	Voltage-sensitive probe; used to detect changes in membrane potential in electrophysiology protocols	465	635
	H2DCFDA	5935	Fluorescent ROS indicator; cell permeable	490	520
	L 012 sodium salt	5085	Chemiluminescent ROS and RNS indicator	-	-
	Mito-HE	7641	Fluorescent mitochondrial superoxide indicator in live cells	510	580
	MitoPY1	4428	Fluorescent mitochondrial hydrogen peroxide indicator	510	530
	2-NBDG	6065	Fluorescent glucose uptake indicator	467	542
	Peroxy Orange 1	4944	Fluorescent hydrogen peroxide indicator	545	750
	Sulfidefluor 7 AM	4943	H_2S fluorescent probe	495	520
Fluorescent Integrin Probes	**BOP-JF646**	6997	Red fluorescent dual α9β1/α4β1 integrin inhibitor; fluorogenic	655	647
	LDV FITC	4577	Fluorescent ligand for α4β1 (VLA-4)	-	-
Fluorescent Receptor Probes	**CELT-133**	7952	Selective hα1A adrenergic receptor fluorescent antagonist	560	571
	CELT-211	7953	Fluorescent serotonin $5HT_{2B}$ receptor ligand for HTS	589	616
	CELT-327	7954	Potent and selective hA2B/A3 adenosine receptor fluorescent antagonist	589	616
	CELT-426	7955	Potent and partially selective hD_2 dopamine receptor fluorescent antagonist	560	571
	DC 271	6873	Fluorescent retinoic acid analog; solvochromatic probe	351	442
	LDV FITC	4577	Fluorescent ligand for $\alpha_4\beta_1$ (VLA-4)	-	-
	Tocrifluor T1117	2540	Fluorescent cannabinoid ligand; fluorescent form of AM 251 (Cat# 1117)	543	590
	tri-GalNAc-C5-AF647	7901	Fluorescent ASGPR ligand. Application: flow cytometry, fluorescence microscopy	663	684
	HB-2-30	8831	Fluorescent TG2/LRP1 substrate for imaging endocytosis	-	-
Fluorescent RNA Probes	**RNA Imaging Probe 1c**	8813	Fluorogenic RNA imaging probe	556	608
Fluorescent Transporter Probes	**Evans Blue**	0845	Dye for assessing cell viability and blood brain barrier permeability; EAAT inhibitor and iGluR antagonist	-	680
	FFN 102	5200	Selective fluorescent substrate of DAT and VMAT2	340	435
	FFN 200	5911	Selective fluorescent VMAT2 substrate	352	451
	FFN 206	5043	Fluorescent VMAT2 substrate	369	464
	FFN 270	6717	Fluorescent substrate for NET and VMAT2	320	475
	2-NBDG	6065	Fluorescent glucose uptake indicator	467	542
	SCOTfluor glucose probe 510	7447	Fluorescent glucose probe	490	605
Histology Stains	**SynaptoRed™ C2**	5118	Fluorescent dye; stains synaptic vesicles	510	750
Neuron & Astrocyte Probes	**Sulforhodamine 101**	5146	Red fluorescent dye; selective astrocyte marker	586	606
	SynaptoRed™ C2	5118	Fluorescent dye; stains synaptic vesicles	510	750

Contact Us

Global info@bio-techne.com, bio-techne.com/find-us/distributors
North America TEL 800 343 7475
Europe // **Middle East** // **Africa** TEL +44 (0)1235 529449
China info.cn@bio-techne.com, TEL 400.821.3475

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