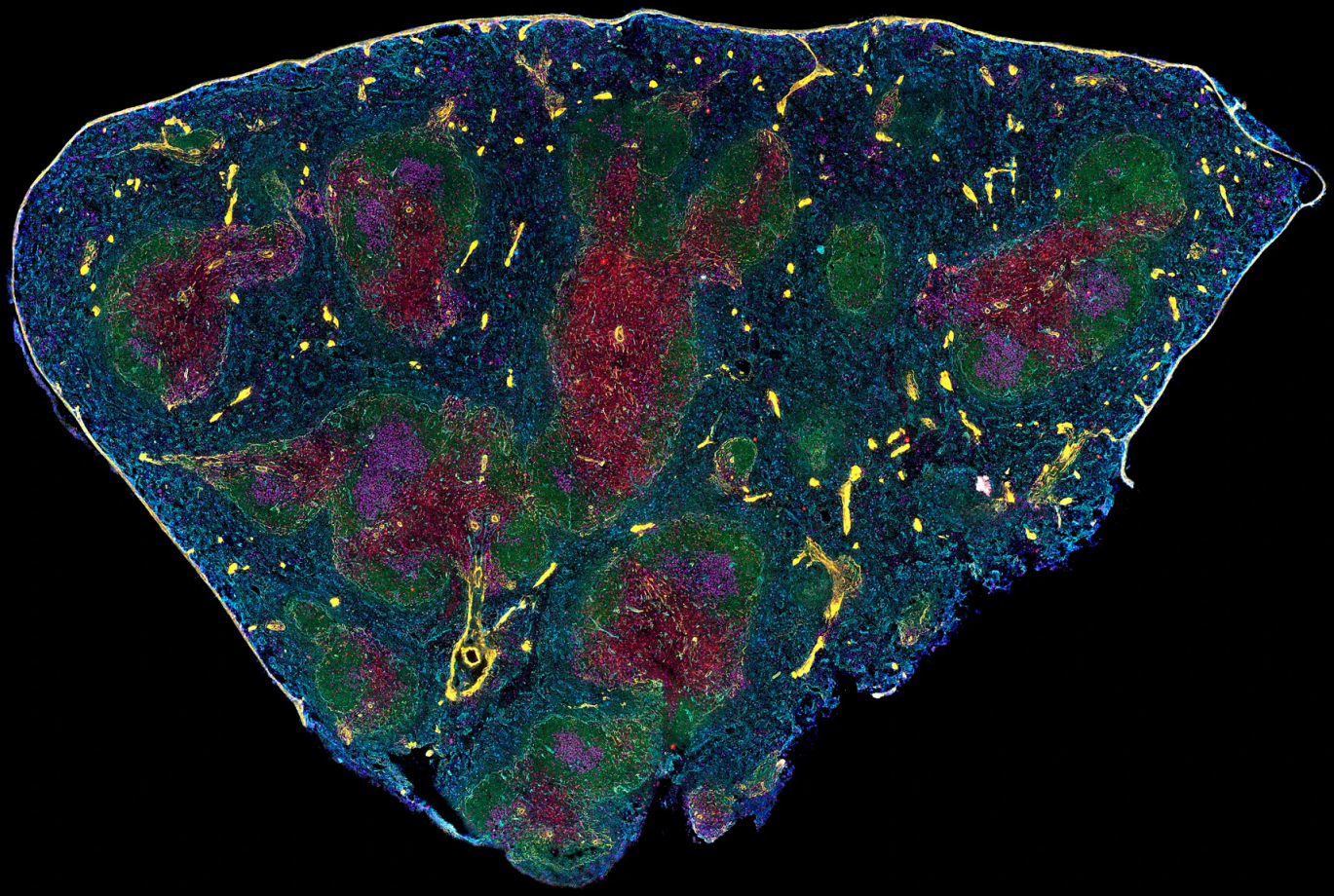
Fast and accurate multicolor imaging



ZEISS Filters and Filter Wheels

Gain More Spectral Information
without Sacrificing Productivity

ZEISS

Seeing beyond

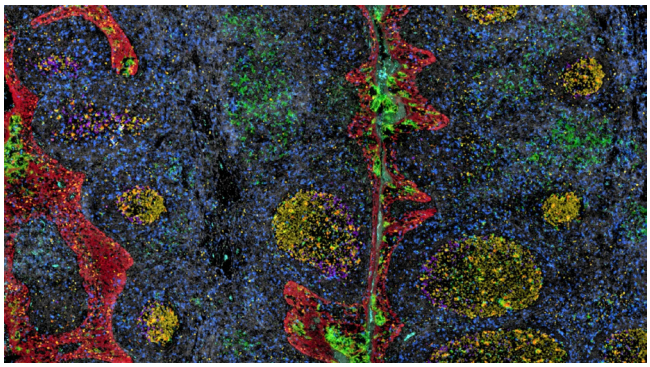
ZEISS Filters and Filter Wheels

Gain More Spectral Information without Sacrificing Productivity

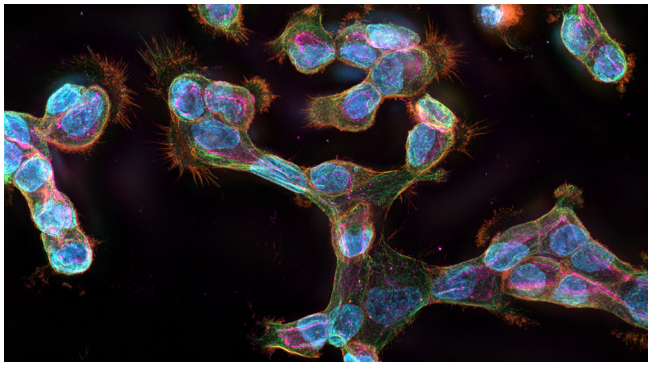
Separation of fluorescent labels is critical for distinguishing different structures. Filters block unwanted wavelengths of absorption and emission light, facilitating efficient separation of the originating fluorophores. ZEISS filters are optimized for high transmission and have sharp cut-off wavelengths for high signal intensities and effective separation. When incorporated in fast filter wheels, they minimize switching times for faster imaging of more labels or samples.

Fluorescent molecules are the most prominent way to label biological samples. Typically, a fluorophore is specifically attached to one region or component of a sample. However, most biological processes require an interplay of various proteins and structures. The structure and proximity of different organelles can influence protein pathways and cellular function. This complex machinery can only be observed if every involved partner is labeled. This poses challenges as light from different fluorophores must be separated. To distinguish excitation and emission light for the different labels, filters optimized for various fluorophores are used.

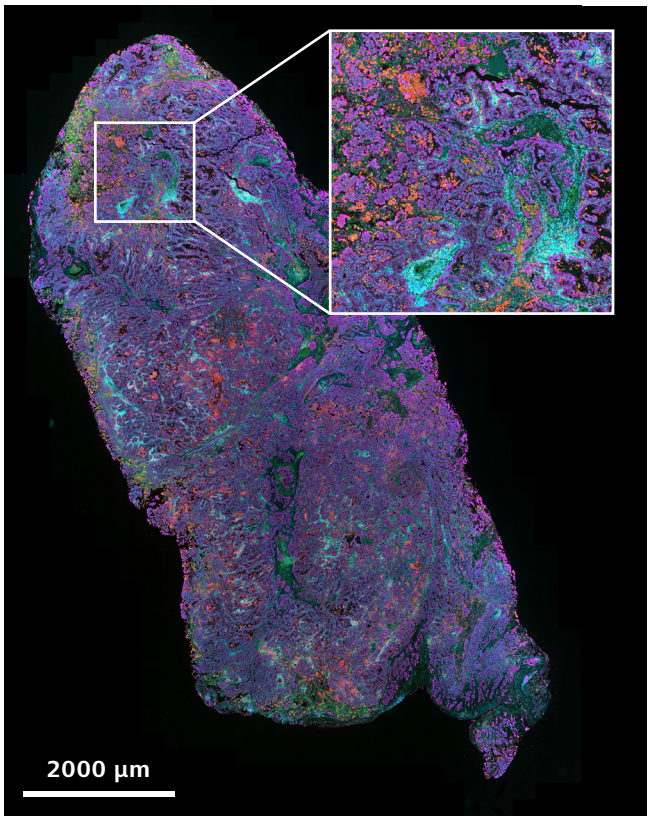
It's crucial to avoid exciting multiple fluorophores and to assign the detected signal to the correct label. ZEISS filters are perfectly matched to ZEISS light sources to excite different fluorescent probes and collect emission light with high transmission. This enables efficient imaging of large tissue areas stained with many fluorophores or acquiring multichannel time lapses with good temporal resolution in spatial omics, cancer research, cell biology and other fields of application. ZEISS filters and filter wheels help you to reduce dead times and improve productivity.



FFPE human tonsil section, stained with DAPI, CD8, PDL1, Ki67, CD68, CK, CD20. Sample courtesy: D. Martin, Genmab, Plainsboro, USA.



HEK cells stained with DAPI, phalloidin-488, tubulinA568 and WGA-A633 (maximum intensity projection after deconvolution).



Non-small cell lung cancer (NSCLC) tissue stained with UltiMapper I/O PD-L1 kit. Nuclear counterstain (blue), CD8 (green), CD68 (orange), PD-L1 (red), panCytoKeratin (magenta).

Single or Multi-Bandpass Filters

How to Select the Optimal Filter Set for Your Microscope

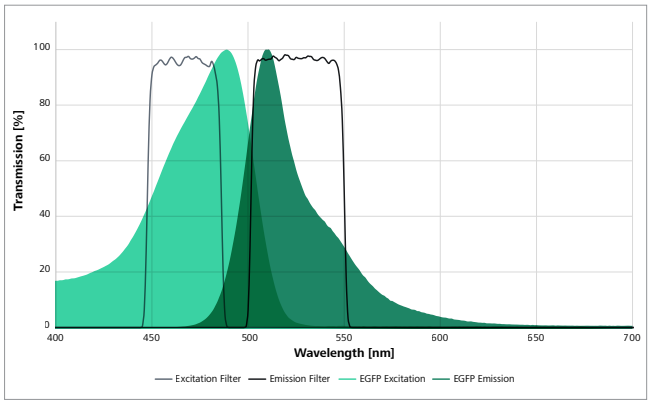
Choosing the optimal set of filters for a particular dye combination can be a challenge. A basic decision is whether to use single bandpass filters or multi-bandpass filters.

Single Bandpass Filters (SBF)

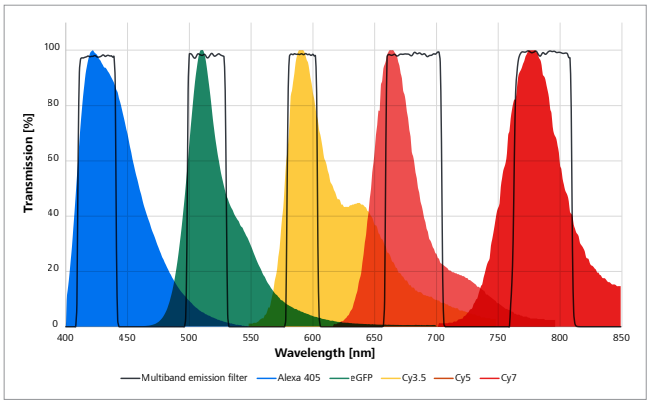
SBP filter sets offer a combination of excitation and emission filters per dye. They minimize crosstalk most efficiently and achieve the best spectral separation. However, in multicolor imaging, switching filters for each dye takes time, which reduces throughput and causes delays between channels.

Multi-bandpass filters (MBF)

MBF filter sets can overcome this limitation. Their excitation and emission filters have multiple windows through which they allow light to pass. However, since the excitation and emission spectrum of most dyes is relatively broad, crosstalk can occur due to unwanted co-excitation of other fluorophores and detection of their emission light.



Single bandpass filter for the selective imaging of a single dye. Excitation and emission spectra are shown to illustrate excitation and emission efficiency.



Multi bandpass filter for imaging multiple dyes with a single filter. Emission spectra and potential resulting crosstalk of three different dyes are shown.

ZEISS filter sets address these varying demands. Excitation and emission filters as well as dichroic mirrors are optimized for ZEISS light sources and microscopes. They follow a clear nomenclature that helps you select the optimal filter for your application and microscope configuration. For a given dye combination, two important questions need to be answered:

1. What type of light source is used for excitation: a white light source or a light source with individual LEDs?
2. Are single bandpass filters required for optimal spectral separation, or are multi-bandpass filters necessary to minimize switching times between colors?

For a light source with individual LEDs like ZEISS Colibri, a filter set with the term LED in its name is best suited. These light sources already have excitation filters integrated that are perfectly matched to the LED filter sets. Filter sets for white light sources lack the term LED and automatically contain band pass (BP) excitation filters.

In the light source ensuring always having the optimal excitation filter used. When a white light source is used, the filter set name lacks the term LED and automatically contains band pass (BP) excitation filters.

For white and multicolor LED light sources, it must then be decided whether single-bandpass (SBP) or multi-bandpass (MBP) filters, also called poly-bandpass (PBP) filters, should be used to filter the emission light. SBP and MBP emission filters are available for the white light and LED versions of a filter set.

Filter set	Item number	To be used with	Excitation filters	Emission Filters
Filter Set 112 SBP	489112-9010-000	White light source	Single Band Pass Filters	Single Band Pass Filters
Filter Set 112 HE LED	489112-9110-000	LED light source with individual LEDs (e.g. Colibri)	Part of the light source	Multi Band Pass Filter
Filter Set 112 LED SBP	489112-9120-000	LED light source with individual LEDs (e.g. Colibri)	Part of the light source	Single Band Pass Filters
Filter Set 112 MBP	489112-9130-000	White light source	Single Band Pass Filters	Multi Band Pass Filter

ZEISS Filter Wheels

Improving Spectral Flexibility and Throughput

With conventional filters located in reflector cubes, changing filters to separate fluorophores takes time. This results in lower throughput and slow frame rates for live imaging experiments. With filter wheels, switching can be sped up dramatically. Add fast excitation switching to your white light source by adding an excitation filter wheel. Alternatively, use light sources with single LEDs such as ZEISS Colibri to excite different fluorophores quickly and efficiently. Emission filters can be switched within milliseconds using the dual filter wheel. Combine it either with your white light or multi-LED light source for fastest channel switching. The ability to create user-defined virtual filter sets combining dual filter wheel and light source also greatly increases spectral flexibility for efficient detection of various dye combinations.

Benefit from attractive pricing for filter and filter wheel combinations.
Since your experiments may change over time, ZEISS offers full flexibility.
Choose from a wide range of filters and combine them according to your needs.
Filter wheels and filters are compatible with various ZEISS microscopes.

	Filter wheel type	Used with
452358-9000-000	Filter wheel excitation 8-pos. mot. for filters d = 25 mm; CAN	White light source
452358-9011-000	Dual filter wheel mot. for beam splitting and emission; CAN	White light or multi-LED light source

Single Band Pass Filter	For white light source	Used in:
489056-9010-000	Filter Set 56 SBP GFP+DsRed	Excitation- and Dual Filter Wheel
489090-9010-000	Filter Set 90 SBP DAPI+GFP+DsRed+Cy5	Excitation- and Dual Filter Wheel
489091-9010-000	Filter Set 91 SBP CFP+YFP+AF594	Excitation- and Dual Filter Wheel
489092-9010-000	Filter Set 92 SBP DAPI+GFP+AF594	Excitation- and Dual Filter Wheel
489110-9010-000	Filter Set 110 SBP DAPI+GFP+AF594+Cy7	Excitation- and Dual Filter Wheel
489112-9010-000	Filter Set 112 SBP DAPI+GFP+DsRed+Cy5+Cy7	Excitation- and Dual Filter Wheel
489114-9140-000	Filter Set 114 FRET CFP/YFP for filter wheels	Excitation- and Dual Filter Wheel
489117-9140-000	Filter Set 117 FRET GFP/mCherry for filter wheels	Excitation- and Dual Filter Wheel

Multi Band Pass Filter	For white light source	Used in:
489056-9130-000	Filter Set 56 MBP GFP+DsRed	Excitation Wheel and Reflector Turret
489090-9130-000	Filter Set 90 MBP DAPI+GFP+DsRed+Cy5	Excitation Wheel and Reflector Turret
489091-9130-000	Filter Set 91 MBP CFP+YFP+AF594	Excitation Wheel and Reflector Turret
489092-9130-000	Filter Set 92 MBP DAPI+GFP+AF594	Excitation Wheel and Reflector Turret
489110-9130-000	Filter Set 110 MBP DAPI+GFP+AF594+Cy7	Excitation Wheel and Reflector Turret
489112-9130-000	Filter Set 112 MBP DAPI+GFP+DsRed+Cy5+Cy7	Excitation Wheel and Reflector Turret

Single Band Pass Filter	For Colibri	Used in:
489056-9120-000	Filter Set 56 LED SBP GFP+DsRed	Colibri and Dual Filter Wheel
489090-9120-000	Filter Set 90 LED SBP DAPI+GFP+DsRed+Cy5	Colibri and Dual Filter Wheel
489091-9120-000	Filter Set 91 LED SBP CFP+YFP+AF594	Colibri and Dual Filter Wheel
489092-9120-000	Filter Set 92 LED SBP DAPI+GFP+AF594	Colibri and Dual Filter Wheel
489110-9120-000	Filter Set 110 LED SBP DAPI+GFP+AF594+Cy7	Colibri and Dual Filter Wheel
489112-9120-000	Filter Set 112 LED SBP DAPI+GFP+DsRed+Cy5+Cy7	Colibri and Dual Filter Wheel

Conventional Filter Sets	For Colibri or White light source	Used in:
489118-9100-000	Filter Set 118 YFP	Reflector Turret
489121-9100-000	Filter Set 121 mCherry	Reflector Turret
489115-9100-000	Filter Set 115 Cy7	Reflector Turret

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Image more structures and proteins without losing temporal resolution.
With ZEISS filters, you get optimized components for accurate separation of different fluorophores. Improve your imaging speed for a given number of fluorophores with the fast excitation and emission filter wheel. This allows you to observe dynamic processes with more fluorophores than before.

ZEISS excitation filter wheel

Dual filter wheel for ZEISS Axio Observer

Title image: *Mouse spleen showing germinal center reactions that lead to production of highly specific antibodies. A cocktail of 6 fluorochrome labelled antibodies targeted towards different immune markers and vessels are added. Sample courtesy: L. Szeponik, Gothenburg University, Gothenburg, Sweden.*