Unlock Your Best Imaging

ZEISS Microscope Objectives

Superior Optical Performance for Unsurpassed Microscopy and Imaging

zeiss.com/objectives

Seeing beyond

A high-performance microscope objective is key to achieving best images and best data from your samples. ZEISS has a long history of producing world class objectives – both for use in ZEISS microscopes and imaging systems as well as for OEM partners. Different objective types have been designed and optimized to be top performers for specific applications and emerging technologies.

First is an overview of different objective properties you should consider when selecting an objective for applications in both standard as well as emerging fields of work. For each property, a selection of particularly well-performing objectives is listed. Next is a reference for you to better understand your objectives in order to optimize your experimental design. Last you will find information regarding our commitment to the environment and information about the ZEISS Microscopy OEM Partner Program.

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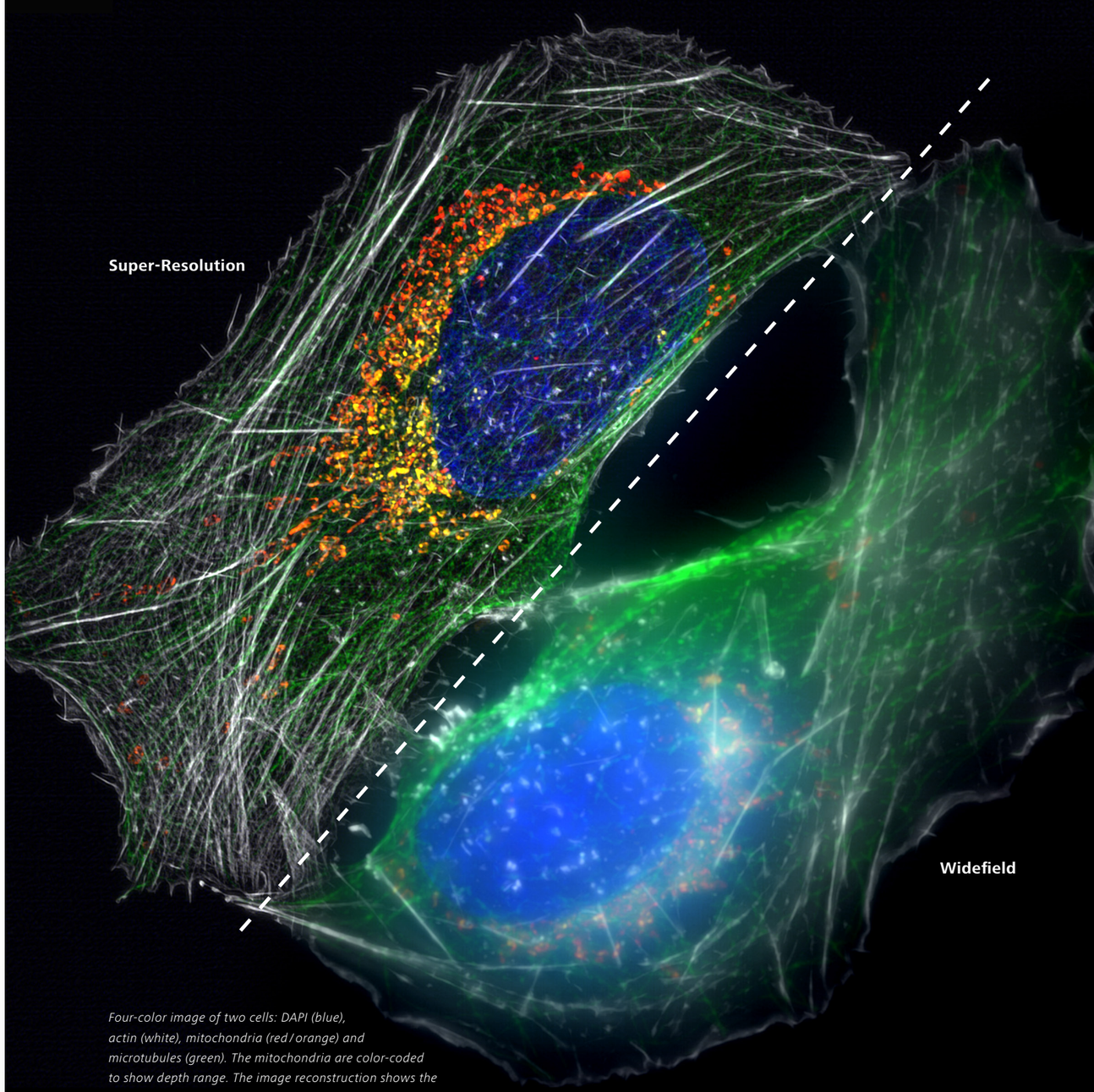
Magnification

Visualize Small Details.

Magnification is the ability of a microscope to produce an image of an object at a larger scale. This allows you to see fine details within the resolution limits of your system. For tracking of the tiniest structures with a digital camera, high magnifications are required to avoid under-sampling. This is particularly critical for applications such as single molecule tracking where a combination of high numerical aperture and high magnification is necessary to achieve the required high signal-to-noise ratio and excellent resolution.

ZEISS Plan-Apochromat 150×/1.35 DIC Glyc Corr M27
With a magnification of 150× and a high numerical aperture of 1.35, this well-corrected objective was designed for the highest resolution imaging when used with camera sensors with large sized pixels. The correction collar allows for fine adjustments to adapt to differences in cover glass thickness and temperature differences, resulting in excellent imaging of tiny structures within living samples.



Four-color image of two cells: DAPI (blue), actin (white), mitochondria (red/orange) and microtubules (green). The mitochondria are color-coded to show depth range. The image reconstruction shows the super-resolution structured illumination image on the left and the widefield, standard resolution image on the right. Courtesy of A. Pitre, St. Jude Children's Research Hospital, Memphis, USA

High-Magnification Objectives

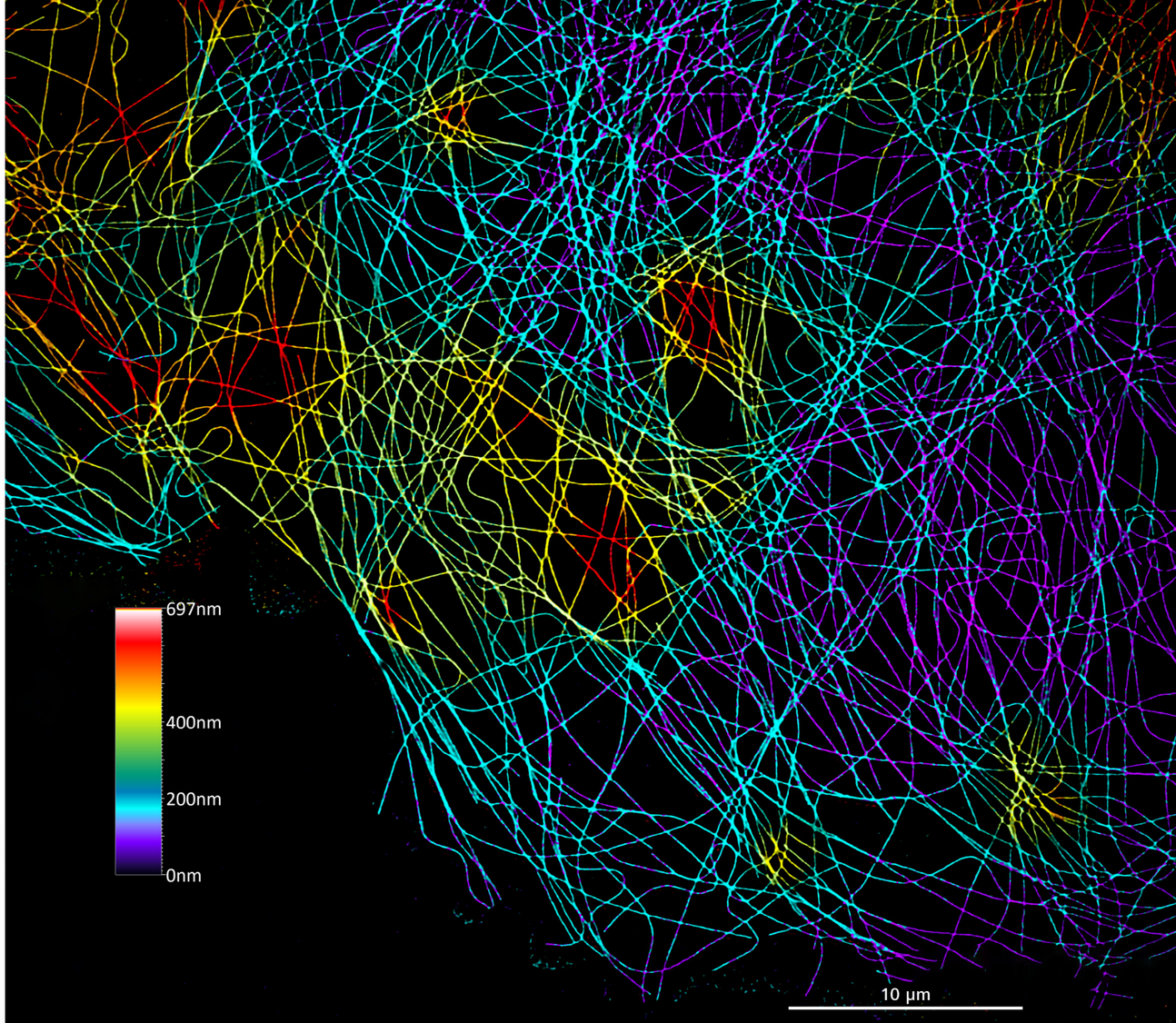
ZEISS C Apochromat 100×/1.25 W Corr	Designed with a high numerical aperture of 1.25 for water immersion and a correction collar for cover glass thickness correction, this objective is excellent for imaging living cells labelled with multiple fluorophores in aqueous media such as PBS.
ZEISS Plan-Apochromat 100×/1.40 Oil DIC	When working with fixed samples with multiple fluorophores, this objective offers incredible transmittance, a flat field and an excellent working distance of 0.17 mm. It can also be combined with DIC.
ZEISS EC Epiplan-Apochromat 150×/0.95 Oil DIC	Used for imaging samples without a cover glass using epi-illumination techniques across the visible light spectrum, this objective delivers the strict telecentricity necessary for precise measurements.

Numerical Aperture

Capture the Most Light.

Numerical aperture describes the angle of the cone of light that can be accepted from the objective. The higher the numerical aperture, the wider the cone and the more light the objective will collect from your sample. High numerical aperture is critical both for very dim fluorescence samples as well as for achieving the highest resolution possible of your microscope or imaging system. For the study of small and highly dynamic biological structures, high resolution and high frame rate are critical. This is only possible by using objectives with the highest numerical aperture.

ZEISS α Plan-Apochromat 100×/1.57 Oil-HI DIC Corr
With its numerical aperture of 1.57, high resolution is available at your fingertips. The optics of the objective have been designed for use with high refractive index immersion media and matching high refractive index special cover glasses, resulting in exceptional resolution. The correction collar also allows you to adjust to different cover glass thicknesses, so you can adjust the objective to your sample carrier.



Super-Resolution: Imaging Structures below the Diffraction Barrier
Studying the different components of the complex and dynamic cytoskeleton, such as the actin network, requires imaging below 100 nm. Crisp visualization requires objectives with the highest numerical aperture in combination with a super-resolution microscope.

The Lattice SIM² image of the actin network of Cos-7 cells labeled via immunofluorescence is shown as a color-coded depth projection. Acquired using ZEISS α Plan-Apochromat 100×/1.57 Oil-HI.

Objectives with High Numerical Aperture

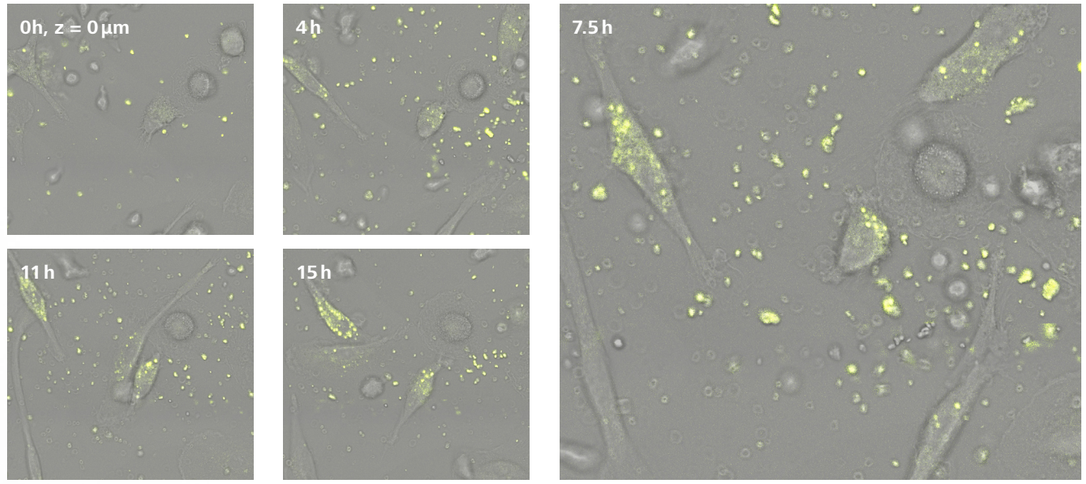
ZEISS α Plan-Apochromat 100×/1.46 Oil DIC	For super-resolution and single molecule location microscopy, this high numerical aperture objective provides the resolution you need. TIRF is also possible with a pitch-black background for clear visualization of the fluorophores excited in the evanescent field.
ZEISS α Plan-Fluar 100×/1.49 Oil	Exceeding the critical angle necessary for TIRF microscopy, this objective aids in the study of cell membrane events such as endocytosis, exocytosis, cellular adhesion, and more with an excellent signal-to-noise ratio.
ZEISS Plan-Apochromat 63×/1.4 Oil DIC	A true workhorse objective for imaging your fine-structured samples. When used in combination with Airyscan imaging modes on ZEISS confocals or Lattice SIM² on ZEISS Elyra 7, sub-organelle structures and their delicate organization become clear.

Refractive Index Adaptability

Aberration-Free Imaging of Living Samples

Light bends, and produces imaging artifacts, when it enters a media of different refractive indices. With fixed samples, the refractive index of immersion media and sample mounting media can be matched to the sample cover glass. However, with living samples, you may not be able to do this. Additionally, living samples may require higher temperatures, which also changes refractive index. All these factors can contribute to aberrations in the images of living samples. Specialized objectives have been designed to overcome these challenges.

ZEISS LD LCI Plan-Apochromat 40×/1.2 Imm Corr DIC
LCI objectives are optimized for imaging living cells and organisms. These objectives can be used with different immersion media including water, silicone oil, or glycerine to adapt your imaging set-up to the refractive index of your specimen. The correction collar allows for adjusting the objective for different temperatures, refractive indices, and cover glass thicknesses, resulting in the highest image quality.



Snapshot from a multi position time series of z-stacks acquired for 15 h at 37 °C to monitor the uptake of nanoparticles in macrophages. Sample courtesy: Francisco Páez Larios and Christian Eggeling

In Vivo Experiments

When imaging live cells, tissues, organoids or developing embryo experiments, it is crucial to create the physiological conditions they would experience in their native state. However, the refractive index of microscope components can be affected by these same environmental parameters, especially temperature. To achieve the highest image quality, the objective must be adaptable to the refractive index of these varying parameters such as temperature, sample media and/or immersion media.

Objectives Adaptable to Environmental Conditions

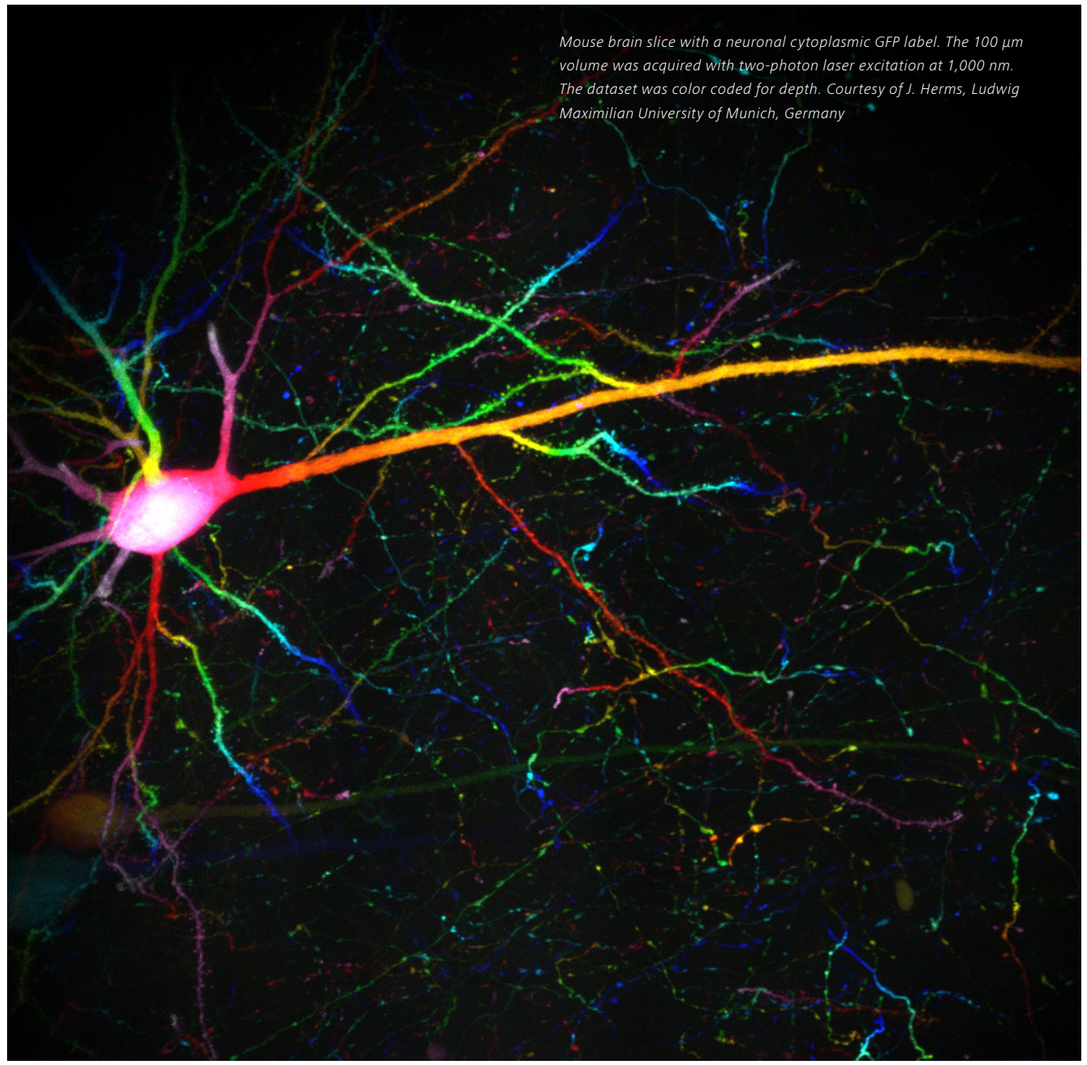
ZEISS LD LCI Plan-Apochromat 25× / 0.8 Imm Corr DIC	Live cell imaging can encompass a broad range of refractive indices dependent on your sample. This objective enables refractive index matching by your choice of immersion media including water, silicone oil, glycerin, and even oil. Compensate for spherical aberration by using the correction collar to achieve best imaging.
ZEISS LD LCI Plan-Apochromat 63× / 1.2 Imm Corr DIC	A sample with higher refractive indices from 1.43 to oil can be compensated by use of this objective correction collar for deeper imaging. Its 0.49 mm high working distance at 0.17 cover glass thickness is good for cleared samples such as organoids.
ZEISS LD C-Apochromat 40× / 1.1 W Corr DIC	When your living specimen demands high transmittance into the IR in combination with excellent color correction and incredibly long working distance of 0.62 mm, this is the objective you turn to for your imaging success.

Water Dipping

Image Deep into Tissues without a Cover Glass.

For imaging deep into thick tissue, particularly in neuroscience, the experimental setup often requires imaging directly into the specimen without a cover glass. The objective lens must be designed to be physically dipped into the sample media or directly onto the aqueous sample. Additionally, multiphoton excitation is frequently used for these applications as infrared light can penetrate deeper into tissues. This requires the objective lens to effectively transmit wavelengths into the far infrared.

ZEISS W Plan-Apochromat 20×/1.0 DIC
This multiphoton-capable water dipping objective enables deep tissue penetration due to its high working distance. The large numerical aperture and optimized lens coating minimizes unwanted reflections, yielding the highest transmissions for superb light collection. Featuring an apochromatic correction from the visible through infrared light, this objective is also ready for label-free second or third harmonic generation applications.



Mouse brain slice with a neuronal cytoplasmic GFP label. The 100 µm volume was acquired with two-photon laser excitation at 1,000 nm. The dataset was color coded for depth. Courtesy of J. Herms, Ludwig Maximilian University of Munich, Germany

Deep Brain Imaging

Neurons can extend many millimeters through brain tissue, which is very dense and light-scattering. Multiphoton imaging is particularly suited for this application as far infrared light passes through tissues and only excites fluorophores in the focal plane. With the right objective lens, that can be dipped directly into the aqueous media and has a long working distance, crisp images of neurons can be visualized deep into brain samples.

Water-Dipping Capable Objectives

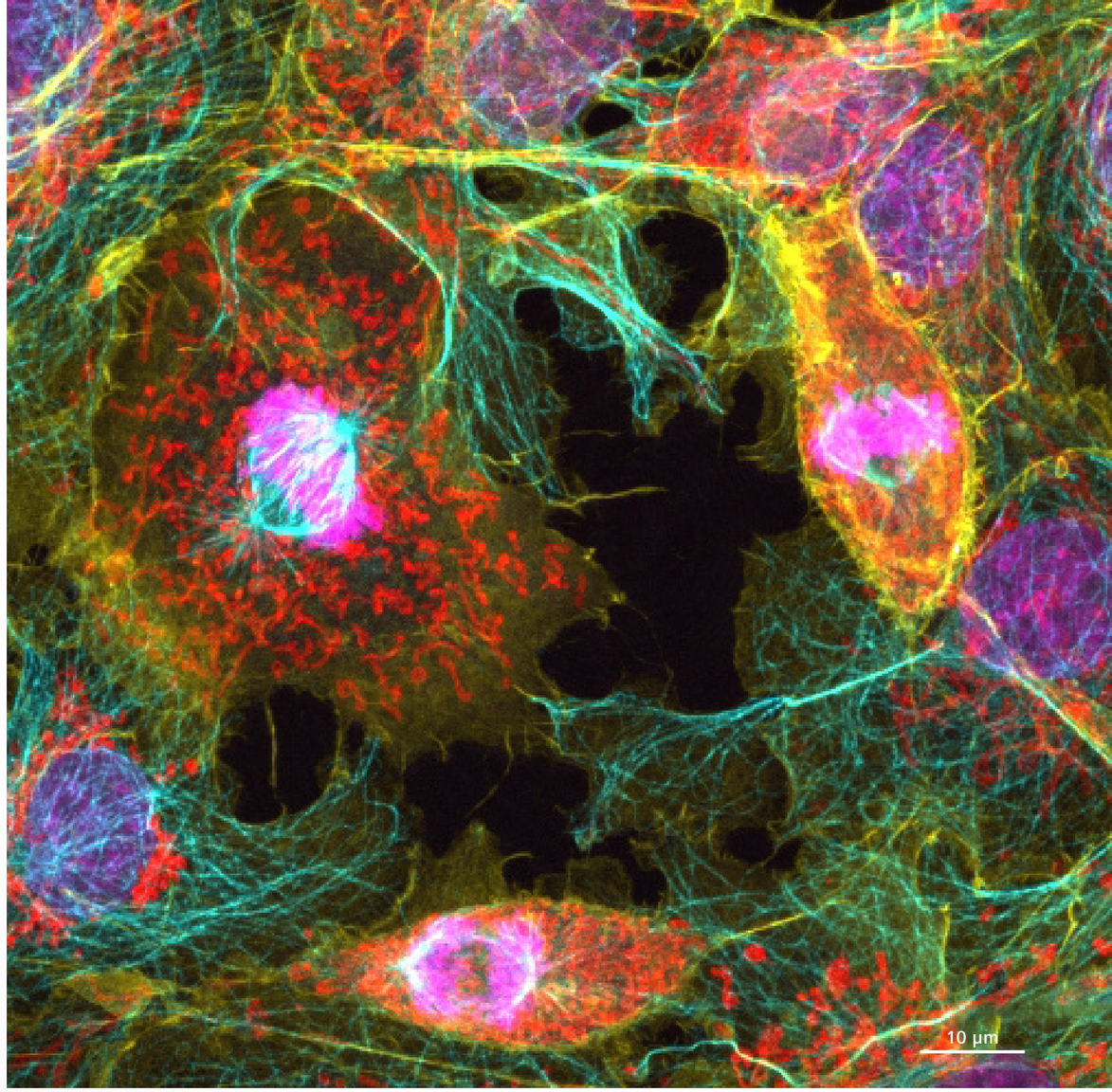
ZEISS W Plan-Apochromat 10×/0.5	A large flat field coupled with a high working distance of 3.7 mm and high numerical aperture makes this objective ideal for marine organisms, neuronal slices or other intravital specimens when used with upright microscopes or light-sheet systems.
ZEISS W Plan-Apochromat 20×/1.0 Corr	With its 2.4 mm working distance and adjustable correction collar for refractive indices from 1.33 to 1.36, this flat field corrected objective is excellent for reducing spherical aberrations when working deep in samples with light-sheet imaging.
ZEISS W Plan-Apochromat 40×/1.0 DIC	With a slender, inert polymer, conical-shaped, insulated tip, this objective delivers high transmittance and a high numerical aperture of 1.0 along with a 2.5 mm working distance making it ideal for multiphoton imaging of brain slices, intravital organs, electrophysiology, and more.

Spectral Range

Access Fluorophores into the Near Infrared.

Working with fluorescent labels in the near infrared (NIR) expands the total number of available fluorescent labels, allowing for more complex experiments. NIR fluorescent labels are less phototoxic for living samples due to the longer excitation and emission wavelengths. Additionally, NIR light is less scattered by dense tissue samples enabling increased penetration depth for imaging deeper.

ZEISS C Plan-Apochromat 63×/1.4
This objective combines high magnification and high numerical aperture with an excellent field and color correction. The advanced coating of the lenses ensures highest transmissions over the entire spectrum from ultraviolent (UV) to infrared (IR) making this objective a perfect candidate for demanding spectral and NIR applications in widefield, confocal and super-resolution microscopy.



Cos-7 cells labeled by immunofluorescence for TOM20 with Alexa Fluor 750 (red), tubulin with Alexa Fluor 568 (cyan), actin with phalloidin (yellow), and DAPI (magenta). The fluorescent signals were separated by linear unmixing, which facilitates clear separation between spectrally overlapping dyes. Courtesy of U. Ziegler and J. Doehner, University of Zurich, Switzerland.

Objectives with a Large Spectral Range

ZEISS C-Apochromat 63×/1.20 W	Apochromatically corrected for at least six wavelengths from UV to IR, for aqueous specimens and designed with a single correction collar to adjust for temperature and cover glass thickness variations, this objective ensures brilliant imaging.
ZEISS LD C-Apochromat 63×/1.15 W	When your experiment requires imaging deep into your specimen with a broad spectral range of fluorophores, choose this objective. With its long working distance of 0.6 mm, this objective is designed for high resolution for applications including expansion microscopy and living samples.
ZEISS C-Apochromat 10×/0.45 W	The C-Apochomat 10×/0.45 W with its 1.8 mm working distance, large field of view and broad spectral range reveals what is happening in a large, multi-cellular samples.

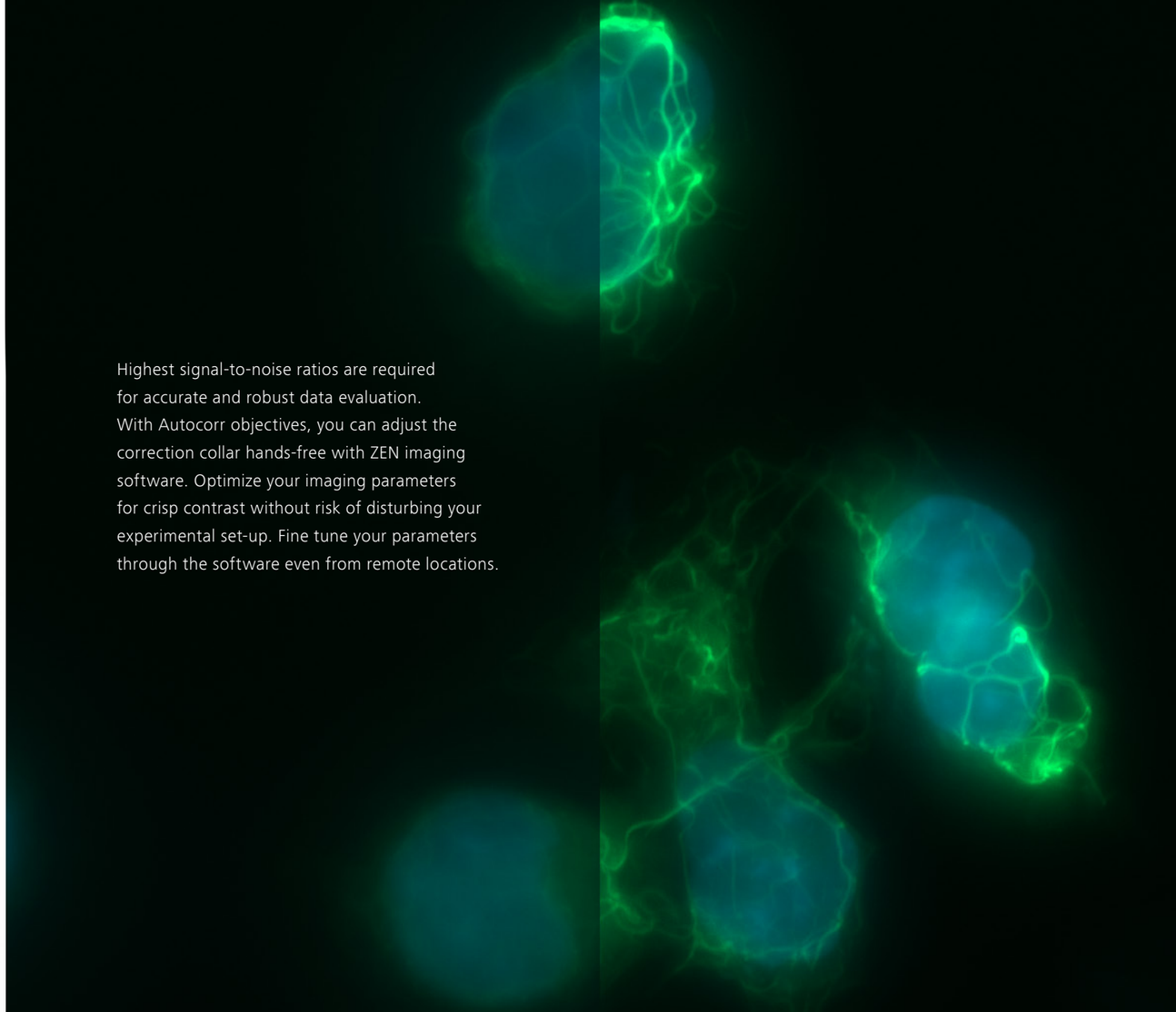
Motorization

Hands-Free Adjustments for Delicate Experimental Set-Ups

Creating the perfect environment for your living specimens may require elaborate set-ups including incubation components and tubing for sample media or gas. These set-ups can be easily disturbed when manually adjusting the correction collar of the objective lens. To achieve the highest resolution available with your system, correction collar adjustments are critical. Motorized correction collars allow you to adjust your objective through the software, leaving your sample and experimental set-up undisturbed.

ZEISS C-Apochromat 63×/1.2 W autocorr
This objective combines excellent chromatic correction with a motorized correction collar for adaptation to different cover glass thicknesses. Controlling the objective with ZEISS ZEN software means your incubator's internal environmental conditions remain undisturbed. The objective is designed for water as immersion media, which minimizes spherical aberrations for the highest image quality of aqueous samples.

Highest signal-to-noise ratios are required for accurate and robust data evaluation. With Autocorr objectives, you can adjust the correction collar hands-free with ZEN imaging software. Optimize your imaging parameters for crisp contrast without risk of disturbing your experimental set-up. Fine tune your parameters through the software even from remote locations.



DAPI (blue) and vimentin intermediate filaments labeled by immunofluorescence (green) in SK8 K18 mouse cells. The left image shows the effect when the objective is not matched to the cover slip thickness; the right image shows how the image can be improved by using the software to adjust the correction collar.

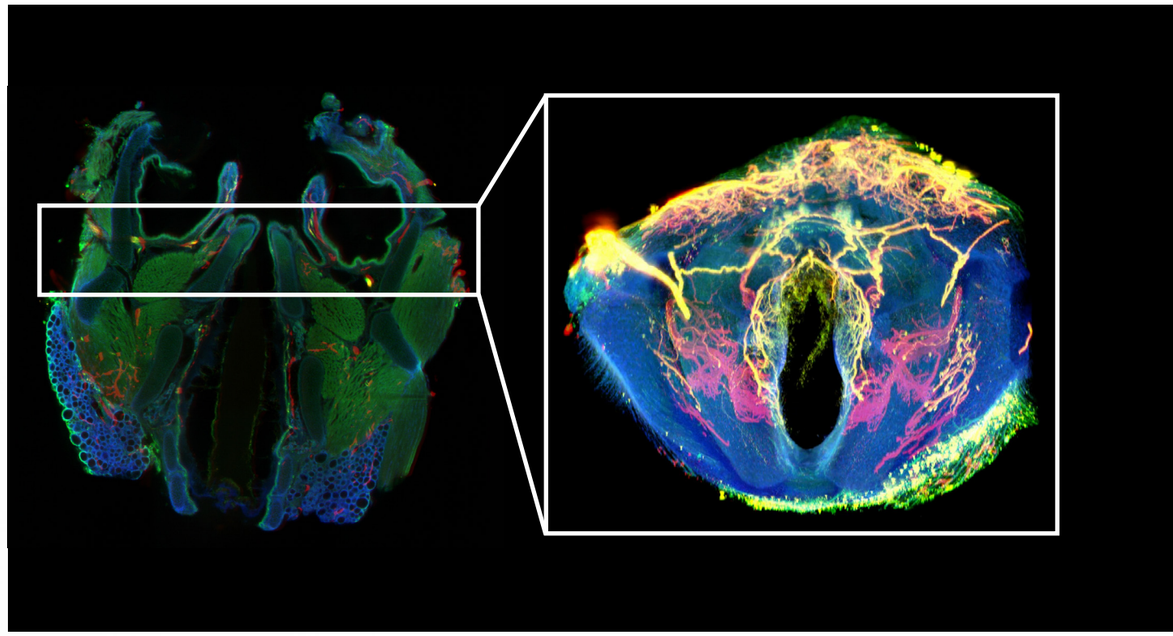
Motorized Objectives	
ZEISS LD LCI Plan-Apochromat 25×/0.8 Imm autocorr DIC	From plant root tips to brain slices to cell culture and more, this motorized, highly adaptable objective can adjust to your sample for optimal performance without disturbing your specimen or its experimental set-up. The objective works with water, silicone oil, glycerine, or immersion oil, making it highly versatile.
ZEISS LD LCI Plan-Apochromat 63×/1.2 Imm autocorr DIC	This high magnification objective works with immersion media with refractive indices ranging from glycerine to oil. With a high numerical aperture of 1.2 and a working distance of 0.49 mm, you can image thicker samples like biofilms, tissue samples, and more with ease.
ZEISS C -Apochromat 40×/1.2 W autocorr	Autocorr is key in remotely adjusting your objective to your sample for cover glass variation and temperature changes which impact spherical aberration. Live cell imaging, fluorescence correlation spectroscopy, Airyscan imaging, and more benefit from an undisturbed sample environment when improving your image by correction collar adjustment.

Very High Refractive Index

Work with Large, Chemically Cleared Samples.

With a large range of chemical methods now available, you can image entire brains, organs and / or embryos with amazing clarity, from cellular to subcellular resolution. Light sheet microscopy is typically used for this application due to its ability to efficiently image large samples. The objective lens used for imaging large, chemically cleared samples has two difficult challenges: (1) the refractive index of chemically cleared samples is often very high and (2) the working distance must be very large to accommodate sizeable samples.

ZEISS Clr Plan-Neofluar 20×/1.0 Corr nd=1.45
This objective is the perfect choice to image optically cleared organoids, spheroids, organs, brain, or other large specimens as it can match the high refractive indices of 1.42 to 1.48, which are commonly found with chemically cleared samples using FocusClearTM, CLARITY, and others. With its large working distance of 5.6 mm, it delivers bright and brilliant fluorescence when used with ZEISS light sheet systems or custom-built light sheet imaging systems.



Large (2.57 × 2.58 × 2 mm³), chemically cleared, P10 mouse trachea imaged at the high refractive index of 1.54. The anatomical organization of mechanosensory nerve fibers is shown: DAPI (blue), collagen IV (green), sensorial fibers (yellow), neurofilament protein NF200 (pink). Courtesy: P.-L. Ruffault, C. Birchmeier, Laboratory of Developmental Biology / Signal Transduction; A. Sporbert, M. Richter, Advanced Light Microscopy; M. Delbrück, Center for Molecular Medicine, Germany

3D Imaging of Cleared Samples

The imaging of entire organs or embryos allows the study of cellular structures within the context of their environment. With light sheet microscopy, large 3D volumes up to several millimeters in each dimension can be acquired easily and efficiently. The resulting three-dimensional renderings reveal a precise reconstruction with subcellular resolution.

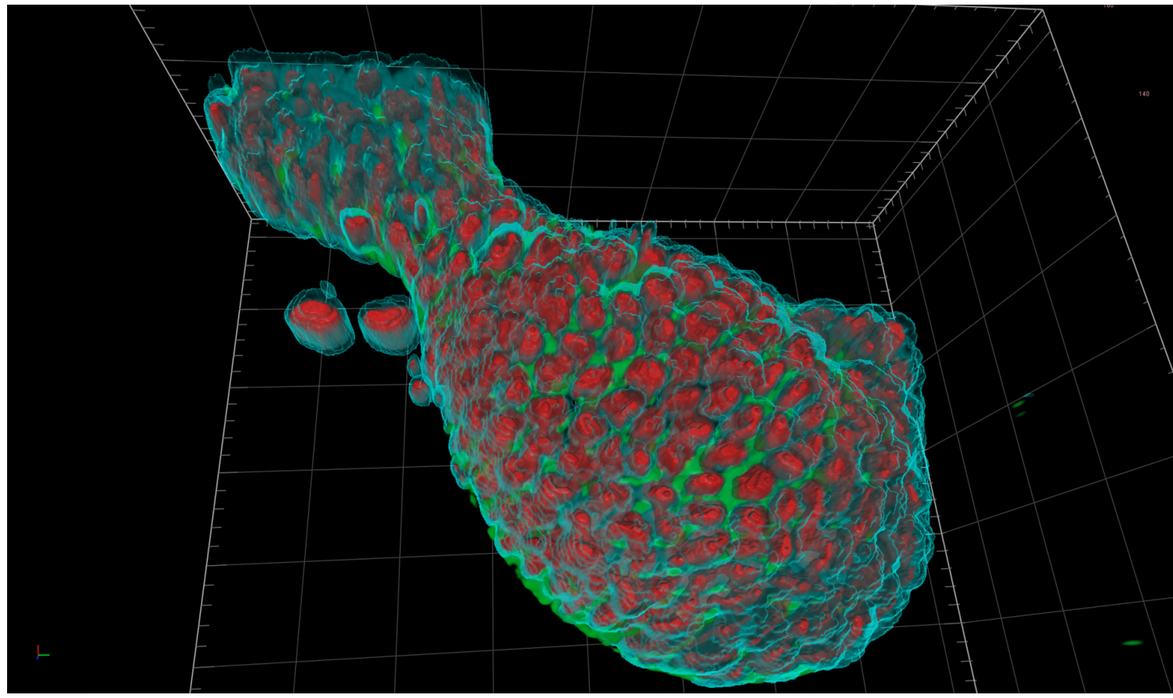
Objectives for Chemically Cleared Samples	
ZEISS Clr Plan-Apochromat 20×/1.0 Corr nd=1.38	With its high numerical aperture and working distance of 5.6 mm, this clearing objective corrects for spherical aberration with Scale or SCALEVIEW-A2.
ZEISS Clr Plan-Neofluar 20×/1.0 Corr nd=1.53	Capable for use with U.Clear, Ce3D, Cubic Cancer, and other chemical clearing methods with refractive indices that range from 1.38 to 1.6, this objective offers many possibilities. With a 6.4 mm working distance, large cleared samples become accessible.
ZEISS Clr Plan-Apochromat 10×/0.5 nd=1.38	Suitable for clearing methods with a refractive index of 1.38 and with a large field of view, this magnification objective provides 3.7 mm working distance to image very large samples.

Water Autoimmersion

Consistent Imaging for Living Specimens and Large Area Imaging

Water immersion media is needed for high resolution imaging of aqueous, living samples. However, when performing automated imaging of large areas or multiwell plates, the water immersion media may dry out as the sample moves across the objective. Additionally, water immersion media may evaporate over long-term, time-lapse experiments. Both occurrences will result in incomplete and/or unusable data sets. Automatic application of water immersion to objectives ensures your experiments are imaged to completion.

ZEISS Plan-Apochromat 50×/1.2 W
This Plan-Apochromat is an outstanding 50× water immersion objective with rapid, automated immersion supply and removal. An elastic silicon membrane simultaneously seals the sample chamber to avoid unnecessary airflow while protecting the system from potential liquid spillage. You no longer are challenged with tedious manual application of immersion media and re-immersion steps. Experience crisp images from your aqueous samples throughout your entire experiment.



Intestinal organoid grown in a multiwell plate and imaged using autoimmersion. The image labels are DAPI (blue), mem9 labeled with GFP (green), enterocytes labeled with Aldolase B-Alexa 647 (red).

Large Area Imaging of Aqueous Biological Samples

As automation and more powerful image analyses are enabling the understanding of larger and more complex datasets, there is a push to collect more data from aqueous, biological samples. This could be larger areas, more samples in multiwell plates and/or over longer periods of time. A stable supply of water immersion media is critical to ensure high resolution, high signal-to-noise images throughout the length of your experiment.

Water Autoimmersion Objectives

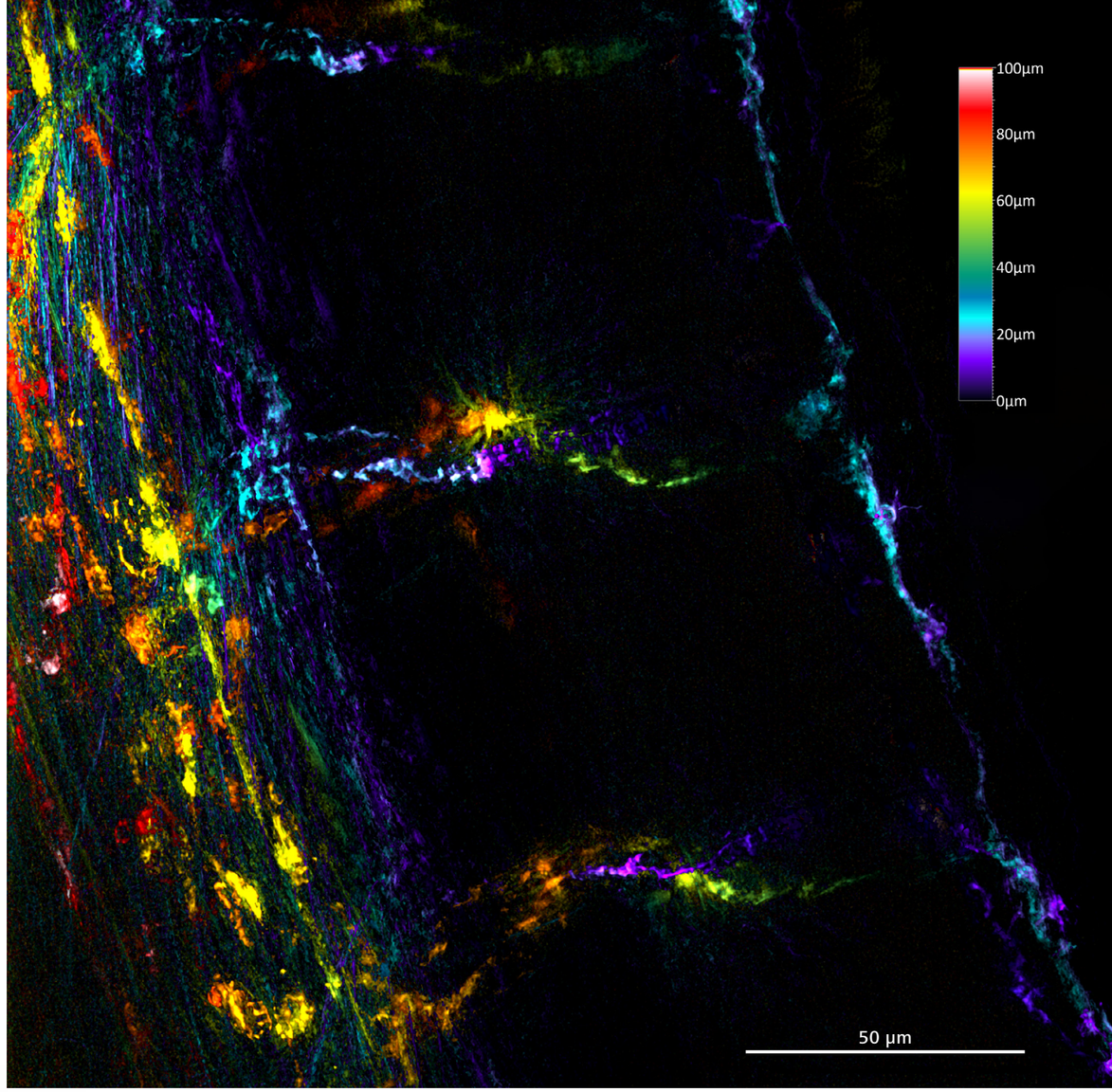
ZEISS C-Apochromat 40×/1.2 W Corr	Fluorescence correlation and cross correlation spectroscopy are highly sensitive techniques that benefit from this well color-corrected objective. Diffusion rates, concentrations, molecule localization and interactions can be measured non-invasively from within your living cell. It is also ideal for confocal and Airyscan super-resolution imaging of living specimens.
ZEISS LD LCI Plan-Apochromat 40×/1.2 Imm Corr DIC	This live cell imaging objective features one correction ring to compensate for spherical aberrations resulting from refractive index mismatch due to cover glass thickness, temperature changes, and immersion media (water, silicone oil, and glycerine).
ZEISS LD C-Apochromat 63×/1.15 W Corr	With its long working distance of 0.6 mm, water immersion compatibility, a numerical aperture of 1.15, and excellent color correction into the IR, this objective is ideal for confocal and widefield microscopy imaging of live organisms, cell cultures, and more.

Working Distance for Research Grade Microscopes

Work with Thicker Specimens.

Microscopy in life science research often requires the use of large model organisms and specimens. While organoid research is an emerging topic, the use of zebrafish, *Drosophila*, *C. elegans* and *Arabidopsis* along with other trending model organisms is widespread in biological imaging. When imaging these samples, a large working distance is often required to image deep enough within the sample to find your region of interest.

ZEISS LD LCI Plan-Apochromat 25×/0.8 Imm Corr DIC
The versatility of this objective makes it the ideal choice for labs that perform imaging of large biological specimens. Its large working distance of 0.57 mm with excellent optical properties for different immersion media such as water, silicone oil, glycerine and immersion oil make the LD LCI Plan-Apochromat 25× ideal for set-ups with varying life science applications.
The large chromatic correction range allows the use of fluorophores over a broad spectrum. The correction collar adapts the objective for use with different immersion media with and without cover glass in place.



Zebrafish embryo expressing the vascular marker fli1-EGFP was imaged over a depth of 100 µm. The SIM² processed image shows the color-coded projection of the volume data.
Courtesy of Haass Lab Munich Center for Neurosciences, University of Munich, Germany

Objectives with High Working Distance for Research Grade Microscopes

ZEISS Plan Apochromat 20×/0.8	With well-balanced resolution and transmittance in combination with 0.55 mm working distance, this immersion-free objective is a good choice for samples ranging from *C. elegans* to *Arabidopsis*, neuronal tissue, and more.
ZEISS LD Plan-Neofluar 20×/0.4 Corr	With a working distance of 7.9 mm, this objective is capable of imaging organoid formation and growth, developing organisms, biofilms and more. With a correction collar to adjust for the presence or absence of cover glass, it is adaptable to many different cell culture dishes, plates and slides.
ZEISS C Epiplan-Apochromat 20×/0.7 DIC	Samples requiring a higher numerical aperture in combination with strict telecentricity will benefit from this objective with a 0.7 NA and a working distance of 1.1 mm. This objective provides the high contrast required for precise topography measurements.

Working Distance for Stereo Microscopes

Crisp Stereoscopic Images of Large, Structured Samples

Objectives for stereo microscopes are used for observing large samples over a larger depth of field. They are often used to study the surfaces of specimens or to carry out delicate work, such as dissections or microsurgeries with biological specimens, circuit board manufacture or inspections, or quality assurance inspections in manufacturing. For all these applications, clear and precise 3D visualization is essential and relies strongly on utilizing a quality stereo microscope objective. These objectives create aberration-free, true stereoscopic images over the full field of view.

ZEISS Plan Apo S 0.63× FWD 80mm
This objective for the ZEISS SteREO Discovery line of stereo microscopes delivers high-quality, 3D images in the eyepieces, making it ideal for observations and documentation.

Three-dimensional, relief contrast image with oblique illumination of a sea urchin embryo. Even faint structures in transparent objects will appear in the form of reliefs in front of a bright background, making it particularly well-suited to unstained samples.

Objectives for Stereo Microscopes

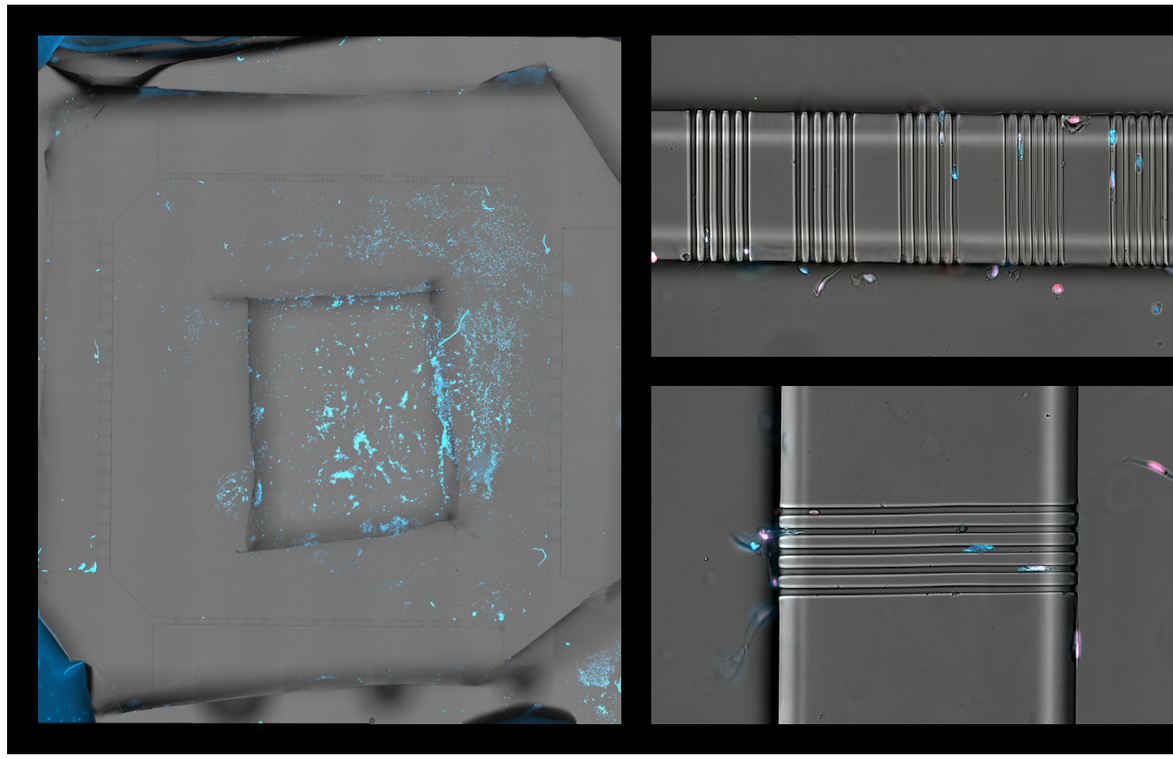
ZEISS Plan Apo S 1.0× FWD 60 mm	An apochromatic objective with excellent flat-field correction and zero chromatic aberration which delivers consistently sharp images. This objective is perfect for your screening, sorting, and sample preparation needs.
ZEISS Plan S 1.0× FWD 81 mm	When measurements are required, this very good, flat-field corrected objective is exceptional for observing and digitizing samples such as semiconductors.
ZEISS Achromat S 0.3× FWD 253 mm	When extreme working distances are required in combination with very large samples, this objective delivers a high contrast image with incredible three-dimensional structure.

Field of View for Research Grade Microscopes

See More with One Image. Acquire Large Areas Faster.

As experiments become more complex, requiring an understanding across multiple scales of data, it is often necessary to acquire overview images for navigation, orientation, and subsequent high-resolution imaging of selected regions within the entire dataset. Using an objective with a low numerical aperture and large field of view increases your efficiency both for faster focus and acquisition of large sample areas. An excellent correction to the edge of the field of view is important for achieving your best image quality.

ZEISS Fluar 2.5×/0.12
With its 25 mm large field of view, this objective is designed to find your sample quickly and obtain large overview images. Whether the sample requires transmitted light or fluorescence, large area images are quickly acquired.



MDA-MB-231 cells on the PDMS chip move through channels with different diameters; these morphological changes are observed during the process. Detailed images (right) were acquired with Plan-Apochromat 20× / 0.8 M27. Courtesy of A. Meid and J. P. Spatz, Max-Planck-Institute for Medical Research, Germany

More Information at Once

When selecting a region of interest for imaging with higher magnification or to collect more data, perhaps in 3D or with additional fluorescent labels, an overview image allows you to quickly identify the relevant areas for subsequent imaging.

Objectives with Large Fields of View for Research Grade Microscopes

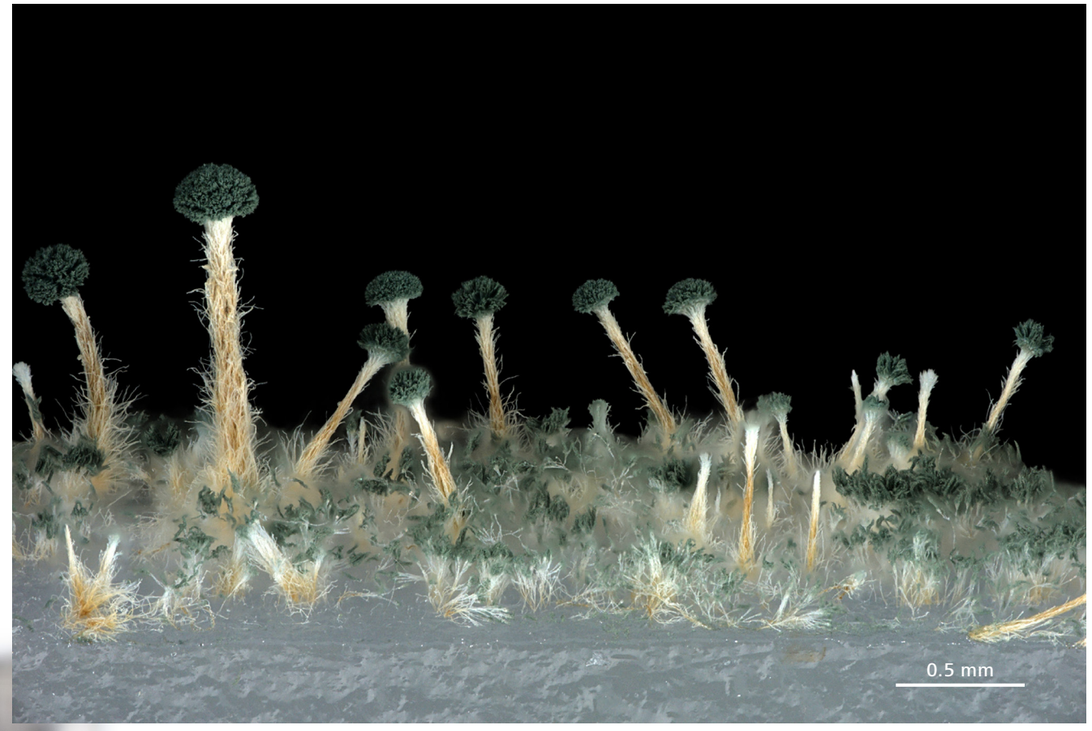
ZEISS EC Plan-Neofluar 1.25×/0.03	When a bigger picture is required, this objective provides a large overview image to give you the details you need. Applications such as cellular migration studies are possible with this large field of view objective.
ZEISS EC Plan-Neofluar 2.5×/0.085	From developmental imaging of a zebrafish larva to explants, organs, *C. elegans* locomotion and more can be easily imaged with this low magnification objective which offers a large field of view.
ZEISS Fluar 5×/0.25	This low magnification 5× objective captures dim fluorescent signals due to its high numerical aperture of 0.25. Digitize your pathology slides, image fly wings, and more with this objective.

Field of View, Zoom, and Stereoscopy Combined

3D Imaging of Entire Model Organisms

With its doubled basic aperture, the ZEISS AxioZoom.V16 fluorescence microscope not only achieves a 2.5 times higher resolution than classic stereo microscopes, but also 10 times brighter fluorescence in comparable object fields. This means that 3D imaging methods can also be used on entire model organisms. Moreover, a stereoscopic effect is still available through the eyepieces and can be easily switched on or off at the ergo photo tube.

ZEISS Apo Z 1.5×/0.3 FWD 30 mm
This objective offers the best compromise between higher resolution and working distance for sample preparation and manipulation. It is the professional choice for best possible image quality due to its consistently sharp images with no chromatic aberration.



Depth of Field combined images of fungi grown on standardized media.
Sample courtesy: C. Visagie, Forestry and Agricultural Biotechnology Institute, University of Pretoria, South Africa

Objectives for Zoom Microscopes

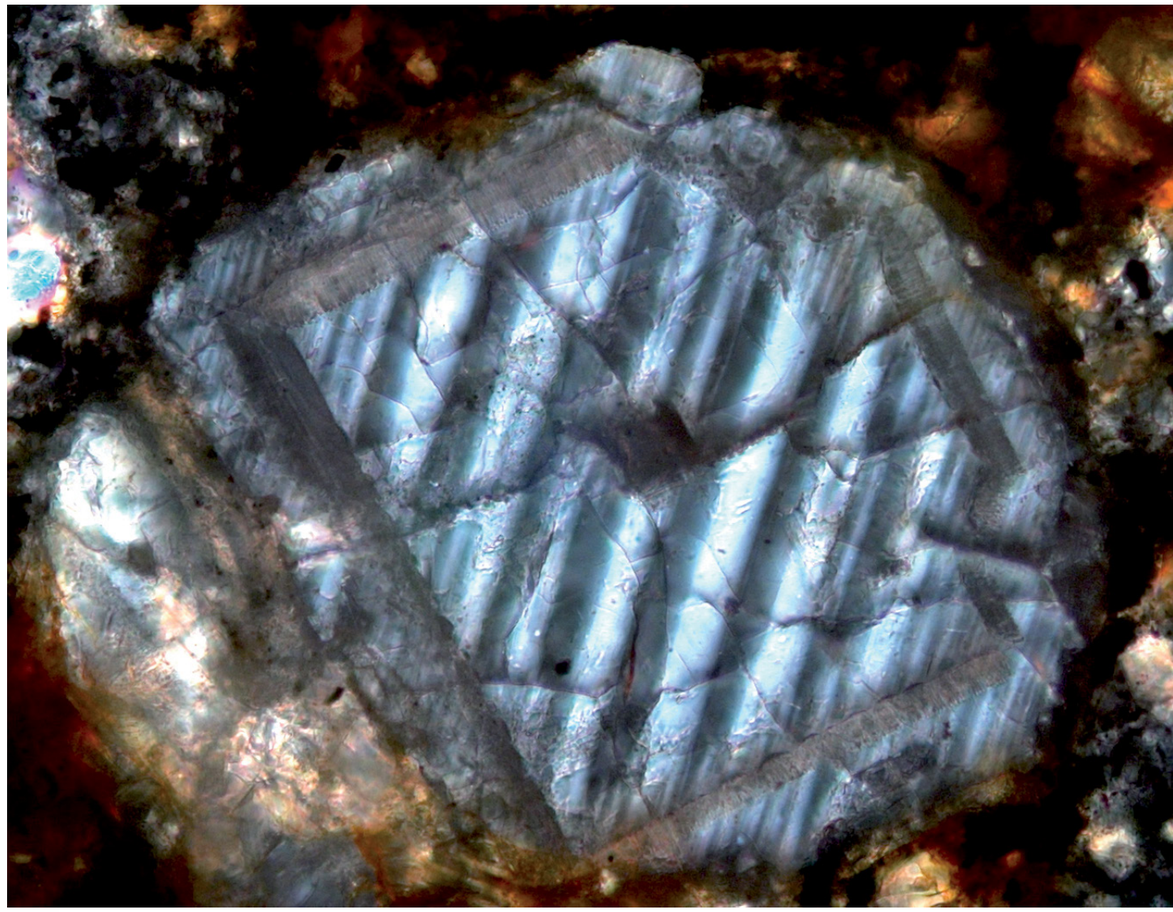
ZEISS PlanApo Z 0.5×/0.125 FWD 114 mm	This apochromatic objective with flat-field correction and no chromatic aberration delivers consistently sharp and stunning images. It's the choice for the highest image quality in research labs as well as for excellent image documentation and 3-dimensional imaging needs.
ZEISS Plan Neofluar Z 2.3×/0.57 FWD 10.6 mm	An achromatic objective that is ideal for use with fluorescence applications such as fluorescently labelled zebrafish, *Drosophila*, *Arabidopsis* and many other transgenic or fluorescently labeled specimens.

Advanced Contrast Imaging

Reveal the Hidden Properties within Your Samples.

A range of reflected and transmitted light contrast techniques are used in materials research and routine imaging of geological samples. Objectives must support a broad range of contrasts to overlay different modalities for a comprehensive analysis of samples. ZEISS objectives for material and geological applications provide you with the freedom to analyze samples the way you want without compromising image quality.

ZEISS EC Epiplan-Neofluar 50×/1.0 Oil Pol
This objective is ideal for measurements with its strict object side telecentricity. It also offers flexibility for reflected light applications such as bright field, polarization, differential interference contrast, circular differential interference contrast, total interference contrast as well as transmitted light polarization.



Polarized, transmitted-light pyroxene-rich chondrule fragment in Dar al Gani 327. Sample courtesy of Dr. Jutta Zipfel, Meteorite Search Section, Senckenberg Research Institute and Natural History Museum, Frankfurt am Main, Germany

Special Contrast Enhancing Objectives

ZEISS LD Plan-Neofluar 40×/0.6 Corr Ph2	With its long working distance, this phase contrast objective enables visualization of unstained samples using phase shifts caused from refractive index differences within your specimen. With its correction collar, it can be adjusted optically for a range of different specimen carriers.
ZEISS LD LCI Plan-Apochromat 40×/1.2 Imm Corr DIC	This differential interference contrast objective utilizes polarized light and two birefringent prisms to provide contrast to your unstained sample. Able to provide pseudo three-dimensional appearance and excellent resolution, DIC complements your fluorescence labelled sample.
ZEISS EC Plan-Neofluar 100×/1.3 Oil Iris	With its adjustable iris aperture, bright field or dark field images are possible. Dark field enables fine details, at times below the resolution power, to be revealed from unstained samples such as bacteria, living cells, and yeast.

Understanding Objective Labels

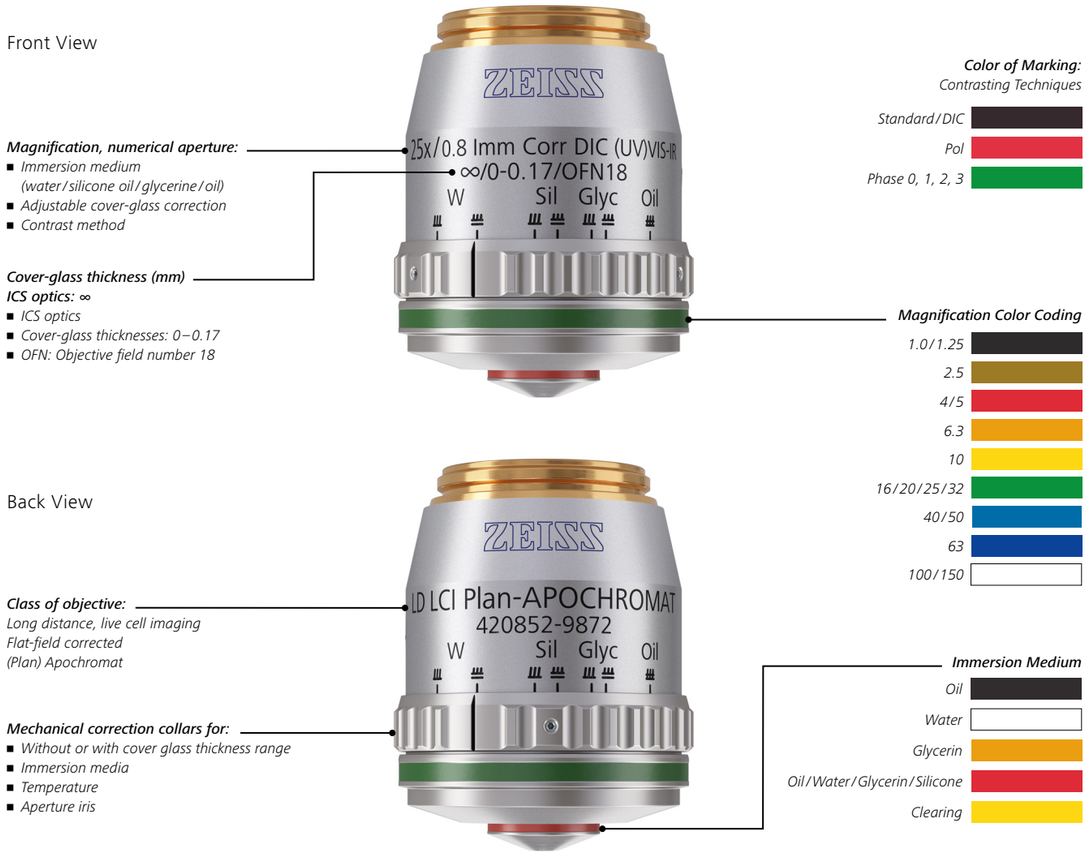
Optimize Your Experimental Design.

Many researchers use microscope equipment that they did not personally purchase. As such, the microscope at your disposal may be equipped with a variety of objectives, but you may not know what you can (or cannot) expect from that objective in terms of performance power or features. Understanding your objectives is critical for you to know as you consider how to prepare your samples for imaging experiments as well as for your later image analyses.

ZEISS uses a standardized schematic that is shown on the objective's surface. Your objective's label shows its performance power and capabilities. This includes parameters such as magnification, numerical aperture, immersion media capabilities and/or special contrasts.

The label on ZEISS objectives provides you with all the information you need to understand your objectives and prepare your samples and experimental design accordingly.

Markings on the Objective



Adjusting the Correction Collar

Precise for the Highest Imaging Quality

Many ZEISS objectives are designed with a correction collar. Depending on the objective, this correction collar can improve image quality by compensating for spherical aberrations due to immersion media, cover glass or sample carrier thickness or materials, and/or sample mounting media. If you have an objective with a correction collar, it is important that you adjust it properly in order to achieve the highest resolution for your experiments.

How to Manually Adjust an Objective Correction Collar:

1. Set the correction collar to the default position for your specimen of interest by selecting the refractive index of the immersion media used or the assumed cover glass thickness of your sample carrier.
2. Using the fine focus knobs on the microscope, focus on a small structure with high contrast. A point-like structure works best for this.
3. Carefully turn the objective correction collar in one direction and see if small structure image contrast improves. Use the fine focus knobs to sharpen image if sharpness is lost.
4. If image becomes worse, try turning objective correction collar in the opposite direction until an exceptional contrast, sharp image is obtained.

Motorized Correction Collars

If you have an objective with a motorized correction collar, adjust the slider in the software until your image achieves the highest contrast.

See pages 14/15 for information on ZEISS objectives with correction collars.

ZEISS C-Apochromat 63x/1.2 W autocorr

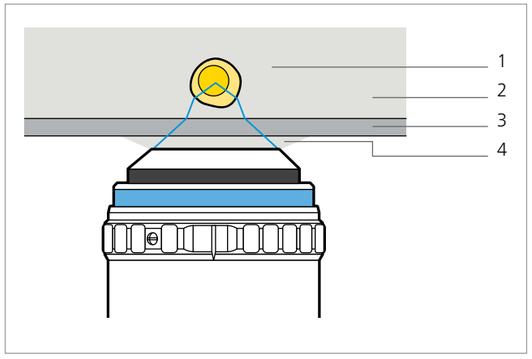
For minimizing aberrations, correction collars can be adjusted either manually or motorized. Motorized objectives provide the highest flexibility adjusting objective parameters with a simple slider in ZEN imaging software.

Set Your Microscopy Experiment Up for Success

Some Common Factors That Cause Imaging Artifacts in High Resolution Imaging

Crisp images with high resolution are the result of the perfect interplay of all components in the light microscope. However, when designing experiments using high resolution objectives, there are a few factors that should be considered to minimize imaging artifacts.

For many high-resolution, fluorescence microscopy set-ups, excitation light leaves the objective, passes through the immersion medium, passes through a cover glass or sample chamber, and then travels into the mounting or sample media before it reaches the specimen. Then the emission light passes back through all the same materials before it can reenter the objective. Each time the light passes through a different media, it will deflect if the refractive indices of the media are not matched. Refractive index mismatch results in low contrast and low signal-to-noise images. Additionally, adding heat — as is commonly done for living sample experiments — will change the refractive index of all components and further degrade image quality.



Light path between sample and objective.
1) Specimen: n = 1.33 – 1.58; 2) Mounting media: n = 1.33 – 1.58;
3) Cover glass: n = 1.52; 4) Immersion oil: n = 1.52

Designing an experiment that will result in the highest quality image requires you to take into consideration your microscopy equipment, your sample preparation, and how you can best optimize your set-up.

Understand your objectives
ZEISS objectives use a schematic to inform you of their properties. This includes their requirements for immersion media, such as oil, water immersion, silicone oil, or glycerine. Refer to page 30/31 to understand how to read the labeling on your ZEISS objective.

- If you are fixing your samples, check the refractive index of the sample mounting media and compare it to the refractive index of the immersion media required by the objective you plan to use.
  - If there is a large mismatch, can you adjust the sample preparation protocol to use a fixative that is a closer match? If not, should you consider investing in an objective that fits your needs in order to improve your image quality?
- If you are working with living specimens in aqueous solutions, check if you have a water immersion objective. These objectives are designed to be used with water immersion media, which has a refractive index that is more closely matched to the aqueous solutions typically used with living samples. If you don't have such an objective, then your microscopy imaging quality may be limited by this. To learn more about water immersion objectives, see page 18/19.
- If you are adding heat to your experiment, as is commonly done with living samples, check if the immersion media you are using is optimized for use at your experimental temperature. Additionally, you may want to consider an objective with a correction collar that adjusts for refractive index changes caused by the temperature. To learn more about those objectives, see page 8/9.

ZEISS Immersion Media
When designing your experiment, consider both immersion media type and optimize for best performance temperature.

- Immersol HI 661 for 23 °C
- Immersol 518 F for 37 °C fluorescence free
- Immersol 518 F for 30 °C fluorescence free
- Immersol 518 F for 23 °C fluorescence free
- Immersol G for 23 °C
- Immersol Sil 406 for 23 °C
- Immersol W 2010 for 23 °C
- Immersol 518 N for 23 °C
- Immersol M for 23 °C

Consider your cover glass or sample carrier
If you are working with higher numerical aperture in combination with higher refractive index immersion media then the cover glass can have a significant impact on your image quality. Most high-resolution objectives, including ZEISS objectives, are designed to be used with a #1 ½ cover glass which haves a thickness of 0.17 mm and a refractive index of 1.5255. ZEISS uses high performance cover glasses with these parameters.

If you are working with fixed samples, be sure you are using the correct cover glass thickness for the objective you are using.

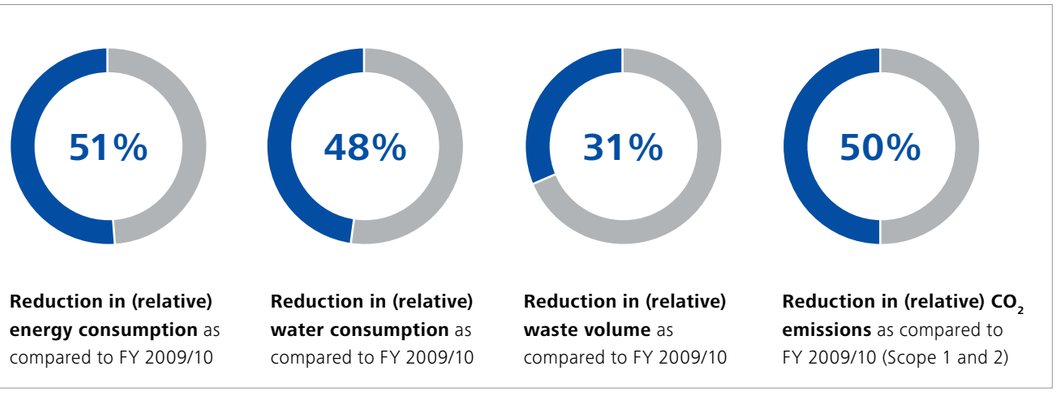
If you are imaging through the bottom of sample plates, petri dishes or multiwell plates, confirm the thickness and refractive index of the material you are placing into your light path. Is your objective compatible with these materials? If not, can you change the sample carrier you are using? Is it worth to invest in an objective that compensates for your experimental design requirements?

Objectives with correction collars
If you have an objective equipped with a correction collar, you may be able to use it to adjust your objective to compensate for refractive index mismatches caused by immersion media, cover glass thickness variations or sample chambers, and/or sample media. See pages 14/15 to learn about ZEISS objectives with correction collars or see page 31 to learn how to adjust an objective correction collar.

Protecting the Environment

Setting the Highest Standards for Design and Productivity

The importance of sustainability becomes larger every day. Efforts over the entire product life cycle are important for protecting the environment. The best way of achieving this is to design reliable, long-lasting components which can be used on multiple systems. ZEISS objectives are made for continuous use with excellent performance across systems and for multiple product generations.



Reduction in (relative) energy consumption as compared to FY 2009/10

Reduction in (relative) water consumption as compared to FY 2009/10

Reduction in (relative) waste volume as compared to FY 2009/10

Reduction in (relative) CO_2 emissions as compared to FY 2009/10 (Scope 1 and 2)

KPIs from fiscal year 2019/20 (1 October 2019 through 30 September 2020)

Efficient use of natural resources

ZEISS aligns its business processes with environmental and economic aspects, working towards using fewer and fewer resources. Modern production lines for objectives recycle water for cleaning and substances for grinding and polishing of optical surfaces. Manufacturing equipment is updated regularly to conserve resources and energy. Environmental aspects are also considering during product development to minimize the CO_2 footprint and energy consumption. The coatings used for ZEISS objectives avoid toxic metals whenever possible. Clean room facilities for optics production are designed according to the newest standards to conserve energy.

Globally Carbon-Neutral by 2025

As a company owned by a foundation with sustainability as one of its statutes, ZEISS business success and sustainability are inextricably linked. ZEISS aims to operate in a carbon-neutral way, worldwide, by 2025. This supplements the company's existing goal of switching to green power at its sites worldwide.

ZEISS Microscopy OEM Partner Program

Add the ZEISS Brand to Your Imaging System

Combine your fresh ideas for microscopy systems with proven quality optics from ZEISS. Choose the perfect microscope objective, light path, or stand to complete your innovative product. Whenever you need detailed technical specifications, or your ideas demand customized components that don't even exist yet: Talk to us to find the ideal optics for your system. Decide for OEM components from ZEISS and enhance your product with a strong and trusted brand.

ZEISS Plan Apochromat Objectives

Each ZEISS objective is a masterpiece of optical engineering – bringing together 175 years of experience, high quality components and precise manufacturing skills.

Contact an OEM specialist at ZEISS Microscopy to learn how we might work together. **Email:** oem.microscopy@zeiss.com

ZEISS OEM Options

High Quality Components

Objectives, tube lenses, condensers, nose pieces, reflector turrets, light sources, even whole beam paths—the modular design of ZEISS microscope parts offers a wealth of options for your integration. Choose your component or get in contact to discuss your needs for new designs with our experts.

Customizable Microscopes

Choose the perfect stand for your customer's applications out of a complete portfolio—from compact manual light or stereo microscopes to fully integrated research platforms—it's your choice!

A Global Network of Support Experts

Wherever on the globe you are working on new microscope projects, your ZEISS expert is there to help. Talk to our well-trained service and support engineers to discuss even the earliest ideas for new designs and concepts. We can help you save time and cost with our expertise in microscopy.

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