QIOPTIQ
Photonics for Innovation

Medical & Life Sciences

Company Profile

Qioptiq designs and manufactures photonic products and solutions, serving a wide range of markets and applications in the medical and life sciences, industrial manufacturing, defense and aerospace, and research and development sectors.

The company is known for its high-quality standard components, products and instruments, custom modules and assemblies, leading-edge innovation, precision manufacturing and responsive global sourcing. Due to a series of acquisitions, Qioptiq has an impressive history and pedigree, benefiting from the knowledge and experience of LINOS, Point Source, Rodenstock Precision Optics, Spindler & Hoyer, Gsänger, Optem, Pilkington, Avimo and others. With a total workforce exceeding 2,300, Qioptiq has a worldwide presence with locations throughout Europe, Asia and the USA.

1877	1898	1966	1969	1984	1991
RODENSTOCK	SPINDLER & HOYER		Gsänger	OPTEM INTERNATIONAL	POINT SOURCE
Rodenstock founded	Spindler & Hoyer founded	Pilkington PE Ltd. founded, which later becomes THALES Optics	Gsänger Optoelektronik founded	Optem International founded	Point Source founded

Index

1996

LINOS

LINOS founded through the merger of Spindler & Hoyer, Steeg & Reuter Präzisionsoptik, Franke Optik and Gsänger Optoelektronik

2000

RODENSTOCK

Rodenstock Präzisionsoptik acquired by LINOS

2001

AVIMO

AVIMO Group acquired by THALES

2005

Qioptiq founded as THALES sells High Tech Optics Group

2006 / 2007

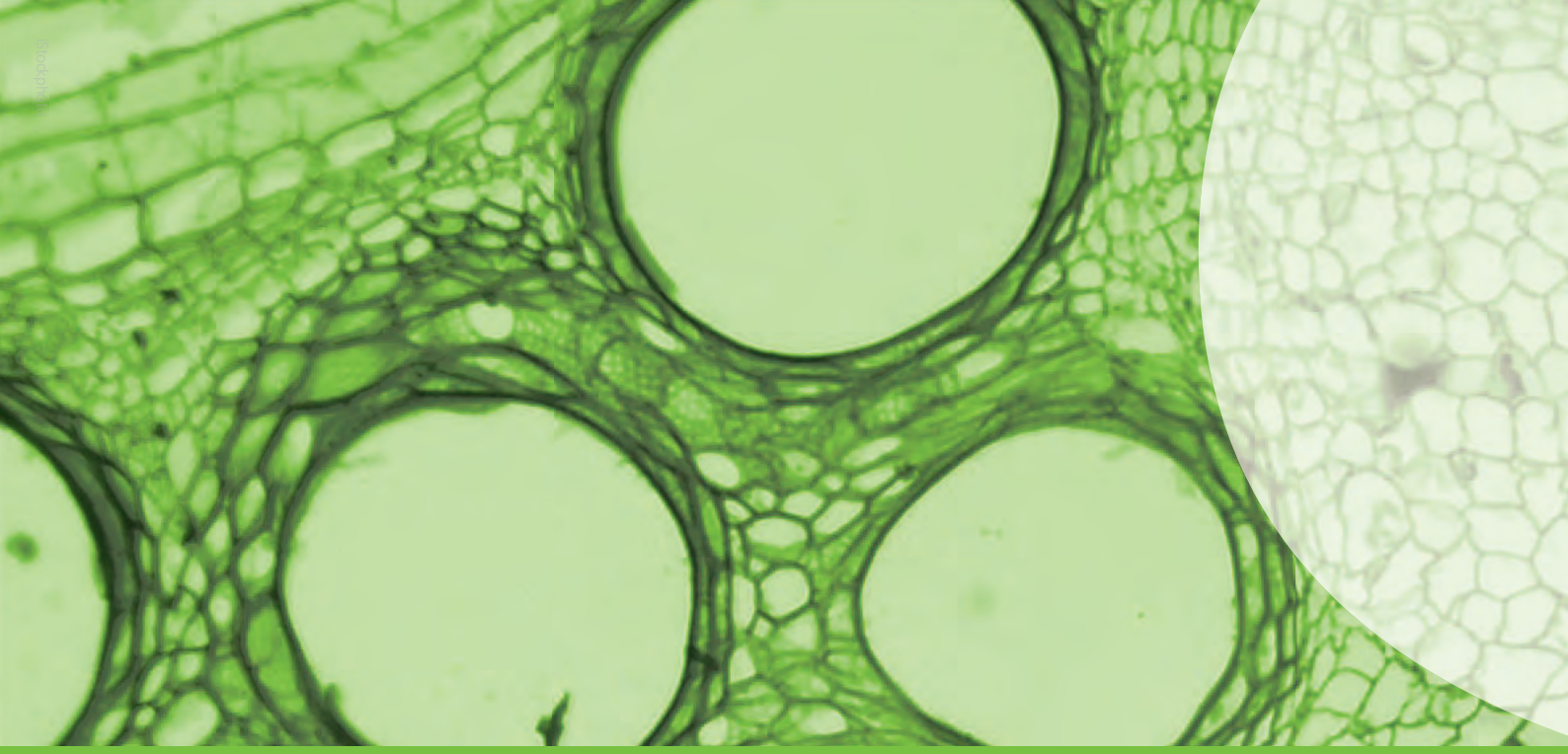
QIOPTIQ Optics with Intelligence

Qioptiq acquires LINOS and Point Source as "members of the Qioptiq group"

2010

QIOPTIQ Photonics for Innovation

The new Qioptiq consolidates all group members under one brand



Core Competencies

Qioptiq offers the most comprehensive set of technologies and knowledge to fulfill the demands of almost any modern application in the field of photonics.

Our decades of interdisciplinary experience in many markets enable us to provide a portfolio of design, technologies and manufacturing capabilities suitable for your specific application. We can supply a solution that will boost your competitive edge and support your efforts to optimize your products. Our components, modules and systems have superior specifications – such as optimum optical resolution, highest transmission, superior beam quality and much more.

Design

- Optical system design
- Mechanical design
- FEM-analysis including thermal effects
- Electronic and software design
- Illumination design
- Stray light analysis
- Advanced tolerance analysis and yield simulation
- Coating design including process development

System engineering

- Design simulation on system level
- Managing the tolerance budget
- Development of dedicated test procedures and equipment
- Implementation of multiple cross-linked beam paths
- Deep understanding of customer's application beyond optics
- Photonics Engine concept: integration of optics, light sources, motorized elements, sensors, data analysis, etc. to complete systems

Assembly technologies & system integration

- Development of in-house processes for precision assembly of optical elements
- Bonding, optical contacting and gluing procedures
- Fit mounting techniques
- Self-centering methods
- Diamond adjustment turning
- Active adjustment during online quality measurement
- Clean-room and flow box assembly, (class 10,000 and 1000)

Core Competencies

Coatings

- Coating design and process development
- From conventional deposition up to ion-beam-sputtering
- In-situ monitoring of deposition process
- Spectral range: DUV, UV, VIS, NIR and IR
- Broad- and narrow-band coatings
- Steep edges and high blocking notch, edge and band-pass filter coatings
- Polarizing and non-polarizing beam splitters
- High laser-induced damage thresholds
- Dielectric and metal mirror coatings

Manufacturing Capabilities

- 11 production sites in US, Western and Eastern Europe and Asia
- CNC, MRF and fluid jet polishing, diamond turning, aspheres and freeform capabilities
- Mechanics production including precision anodizing
- Precision injection molding of polymer optics
- Micro-optics fabrication down to Ø 1 mm
- Flexible production from fast prototype to high volume
- ISO certification: 9001, 14001, 13485

Materials

- All materials from UV to IR
- All types of glasses (Schott, Ohara, Desag, Pilkington and others)
- Crystalline optics such as fused silica, CaF_2, MgF_2, ZnS, ZnSe, Ge, Si, sapphire, $CaCO_3$, KRS5 and others
- Metal optics (aluminum, brass, copper, steel)
- TGG, BBO, RTP, KD*P and others
- A variety of polymer materials (PS, PC, PMMA, COP and others)

Quality Control and Metrology

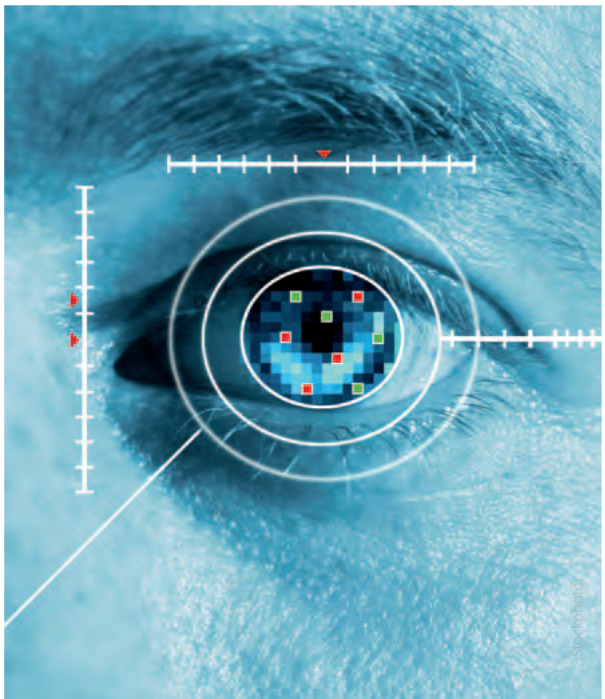
- Automated measurement equipment for optical parameters
- Wave-front measurement
- UV to IR interferometry
- MTF testing at various wavelengths
- Broadband spectrometers down to 130 nm
- White light interferometry
- Scattered light measurement
- Dedicated application and customer specific test equipment

contact

- www.qioptiq.com/opthalmology
- photonics@qioptiq.com

Ophthalmology

Qioptiq is the right choice for all of your high-precision optics solutions for ophthalmic instrumentation. We can manufacture your product "Built to Print" based on your design, or develop a customer specific design to your unique requirements and optimized for Qioptiq manufacturing.



The key to our success is a detailed understanding of our customers' applications. We work together to develop OEM solutions for the diverse ophthalmic disciplines from instrument conception and product development to serial production and after-sales service.

Our customized expert systems for refractive surgery provide high-numerical aperture, diffraction-limited focusing optics perfectly matched to the scanning system. The zoom optics permit addressing large working volumes in the tissue. Consistently small focal spot size throughout the scanning field guarantees the required high quality of the laser incision.

Whether you want to implement a high-precision ophthalmic measurement system or a retinal diagnostic instrument, we are familiar with various measurement principles including Placido projection,

LINOS cutting lens for focusing the femtosecond laser on tissue designed and manufactured by Qioptiq

Scheimpflug cross-sectional imaging and optical low-coherence reflectometry. We master any requirement for high-resolution retinal imaging and provide a highly reliable laser source combined with an ultimately stable fiber delivery system to bring a diffraction-limited beam to wherever you need it.

Your demands:

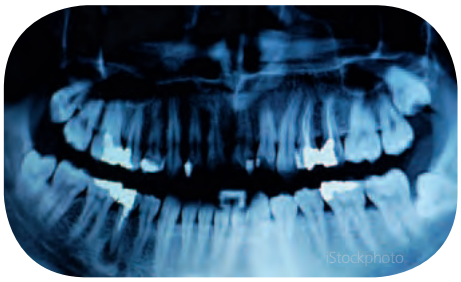
- **Sophisticated combination of optical functions**
- **Highest imaging quality**
- **Ultra-tight, diffraction-limited laser focusing**
- **Compact optical systems**
- **Quick innovation cycles**
- **Stray light critical systems**

Qioptiq can help you! Our solutions for ophthalmology are:

- **Fully aligned and tested optical systems**
- **Multiple beam paths integrated in compact assemblies**
- **Highly stable alignment of all beam paths**
- **High-resolution retinal photography**
- **Scanning-laser systems**
- **Customer-specific micro optics solutions**
- **Fiber-coupled diode and DPSS lasers**
- **Award-winning Flexible Laser Technology™ for stable fiber beam delivery**

contact

- www.qioptiq.com/dental-imaging
- photonics@qioptiq.com



Dental Imaging

For over 15 years, Qioptiq has applied its expertise in optical systems to building partnerships with many of the world's leading dental equipment manufacturers. Originally just a component supplier, we have, over the years, become a true value-added OEM supplier with highly integrated products and the full range of services.

We deliver leading-edge solutions for intra-oral cameras with a robust, waterproof and service-friendly housing in a modern and ergonomic design for integration with dentistry chair units.

An outstanding new feature is the proprietary fast liquid lens autofocus with an image analysis-based focusing algorithm.

Qioptiq's optical systems for 3D dental camera permit recording of 3D high-resolution digital impressions of a single tooth or the full dental arch. A sophisticated combination of projection and imaging optics provides the data for 3D reconstruction of the dental topography needed for restorative dentistry CAD and CAM processes.

For dental X-ray we offer customized camera systems for image amplifier-based systems.

Dental camera inspec.d AF designed and manufactured by Qioptiq

Your demands:

- Highly integrated optoelectronic systems
- Optimized form factor for hand-held intra-oral cameras
- Easy operation
- Plug & play functionality

Qioptiq can help you! Our solutions for dental imaging are:

- Fully aligned and tested optical systems
- Multiple beam paths integrated in compact assemblies
- Robust instruments for everyday use in the dental practice
- Reliable measurement precision
- USB connectivity

contact

- www.qioptiq.com/endoscopy
- photonics@qioptiq.com

Miniature lens element designed and manufactured by Qioptiq

Endoscopy

Our OEM product range comprises compact objectives with different angles, as well as appropriate doublets. We can realize viewing directions of 0°, 25°, 30°, 70° and a field-of-view ranging from 70° to 135°.

Custom components

Beyond our standard product portfolio we also provide customized rod lenses, negatives, prisms and T-windows for rigid endoscopy in a diameter range from 1.0 to 6.5 mm. Our assembly line teams routinely mount image transmitters and complex monocular and binocular eyepiece assemblies. We also manufacture customer-specific micro-objectives ("chip-on-the-tip") for flexible endoscopy with fields-of-view up to 150° and clear apertures down to 0.8 mm at an outer diameter of 1.0 mm.

Video couplers for endoscopes

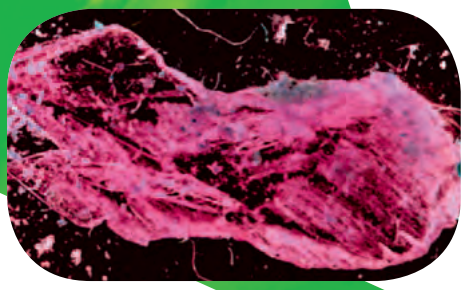
Beyond micro-optics for endoscopes, Qioptiq can also provide you with customized solutions for mounting your camera on the endoscope to achieve top-quality image transmission quality.

Design and manufacturing services

Whether it is Built to Print to your design, or our design and manufacturing to your requirements, Qioptiq is your partner of choice whenever you need high-precision optics solutions for endoscopy.

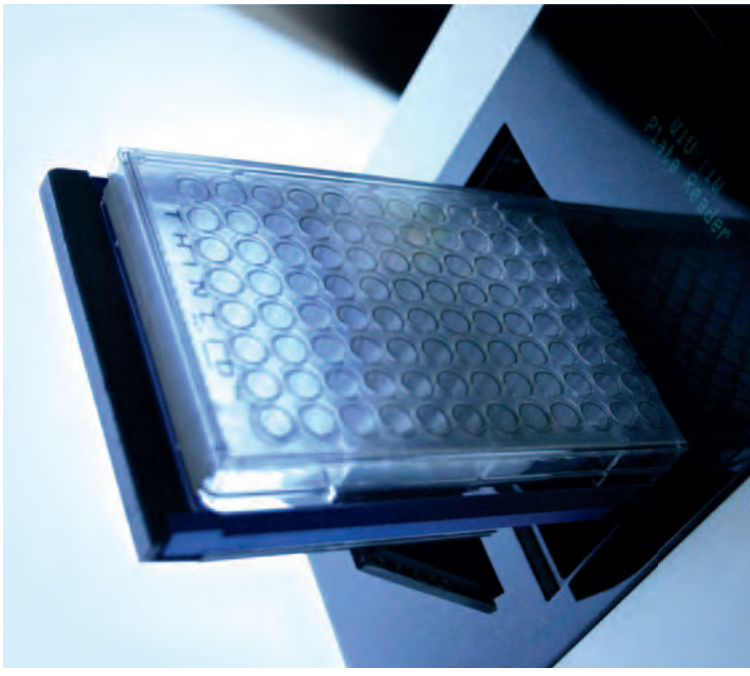
contact

- www.qioptiq.com/clinical-diagnostics
- photonics@qioptiq.com



Clinical Diagnostics

Our expertise in precision optomechanical integration, design for manufacture, high-resolution video microscopy and hight-contrast fluorescence imaging across multiple wavelengths has made Qioptiq a valuable partner in developing optical modules for bio-fluid and cell imaging for analytical instrumentation.



Your partner in developing the solution you need

Whether your system requires handheld compact designs, clinical bench-top performance and durability, or central imaging lab precision and versatility, Qioptiq will work with you from the concept and prototype stages with the foresight and experience to ensure your system is optimized for volume manufacturability and mission critical reliability.

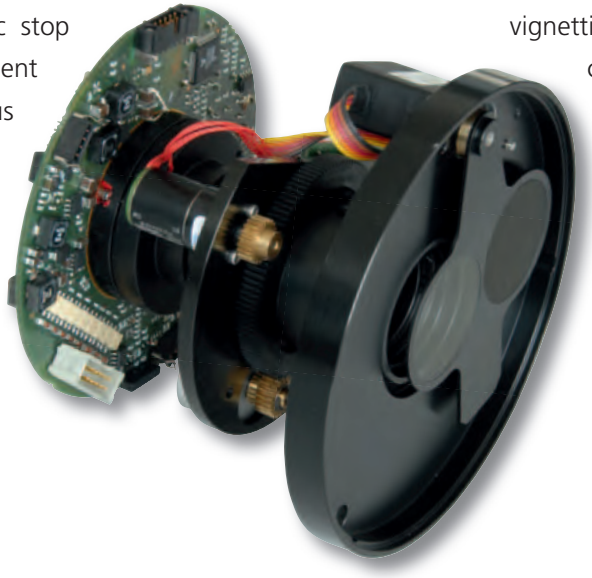
contact
www.qioptiq.com/x-ray
photonics@qioptiq.com

X-Ray Imaging

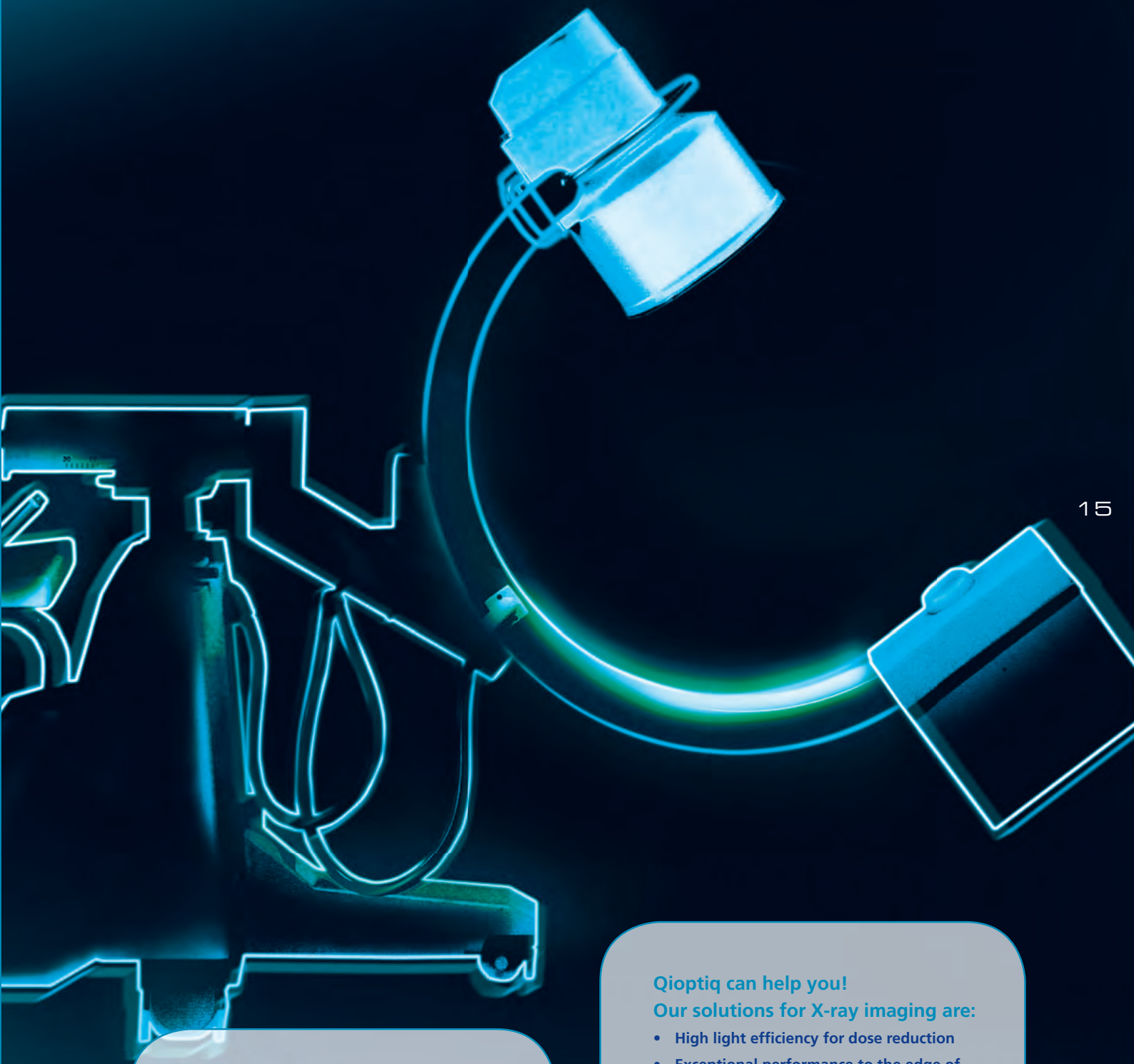
Qioptiq develops and distributes a variety of X-ray imaging systems. These range from standard optics and customized lenses to complete radiology cameras.

Angiographic, surgical or lithotripsy applications require the highest image quality and a high dynamic range. Qioptiq camera systems meet your demands with high-aperture and fully motorized units. Swing-in filters, automatic stop adjustment, integrated incident light reading and modular focus have been our design standards for many years. Our new Luma X-system even provides you with a GigE-interface for image transmission and camera control as well as on-board signal processing. Customized solutions with folded lens setup for compact external dimensions are also available.

The XV Heligon family of direct digital radiography lenses is designed for 2k² to 4k² sensors and object sizes up to 430 x 430 mm². These lenses provide high resolution to the edge without distortion or vignetting. Passive temperature compensation per design permits working in a wide range of ambient conditions.



Designed and built by Qioptiq:
Luma X-system
for X-Ray Diagnostics



Your demands:

- Highest imaging quality to the edge at high aperture
- Perfect reliability for the clinical environment
- System integration capabilities
- Compact optical modules
- Long-term service & support guarantee

Qioptiq can help you!
Our solutions for X-ray imaging are:

- High light efficiency for dose reduction
- Exceptional performance to the edge of the field
- Light measurement for online X-ray dose control
- Remote control for motorized aperture and swing-in ND filters
- GigE vision data transfer with almost unlimited cable length
- Full modularity for your system

contact

- www.qioptiq.com/microscopy
- photonics@qioptiq.com

Microscopy

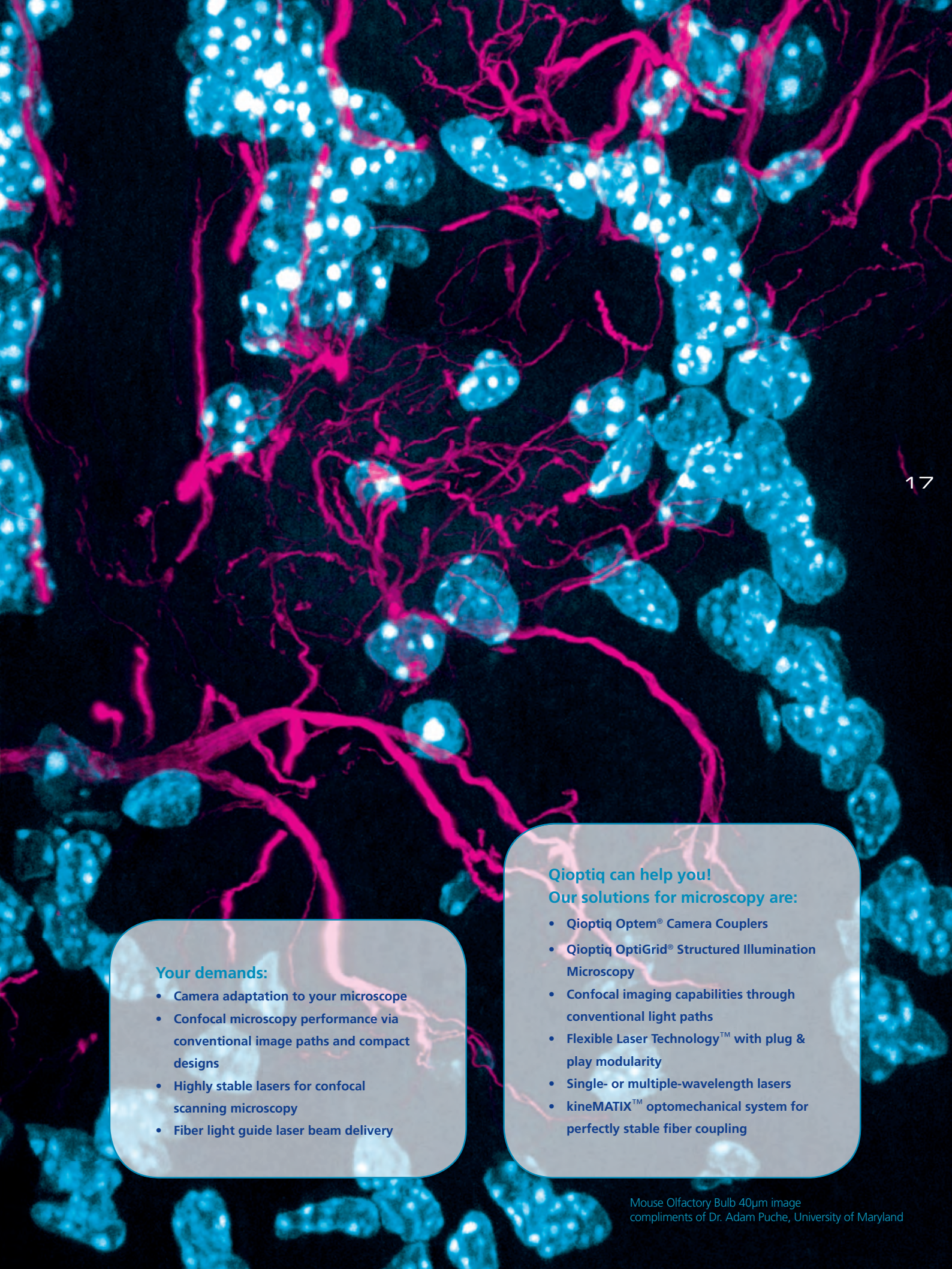
In addition to our vast array of standard microscopy products for life sciences, materials sciences and manufacturing inspection, Qioptiq has over 100 years of expertise in customized solutions for expedient and efficient microscopy and fluorescence imaging applications.

Qioptiq Optem® Camera Couplers are optimized for field uniformity and camera performance. They interface almost any camera to almost any microscope with the required magnification to maximize camera chip coverage and optimize image transmission.

The revolutionary OptiGrid® Structured Illumination Microscopy System integrates with conventional microscopes to afford bench-top access to research-grade confocal imaging. OptiGrid technology utilizes conventional light, reducing cost, minimizing space requirement and eliminating specimen-scorching lasers. OptiGrid easily integrates into the vertical illuminator of research-grade microscopes offering 2D optical sectioning and enhanced-contrast fluorescence microscopy. Its innovative simplicity and compact design make OptiGrid an ideal advanced imaging technology for OEM integration.

For laser scanning confocal microscopy, Qioptiq offers Flexible Laser Technology™. Our unique fiber guide technology can deliver single- or multi-wavelength lasers that are perfectly matched for fluorescence excitation to your sample with reliability and stability.

Developed and made by Qioptiq, OptiGrid integrates with a conventional microscope to afford bench-top access to research-grade, confocal fluorescence imaging



Your demands:

- Camera adaptation to your microscope
- Confocal microscopy performance via conventional image paths and compact designs
- Highly stable lasers for confocal scanning microscopy
- Fiber light guide laser beam delivery

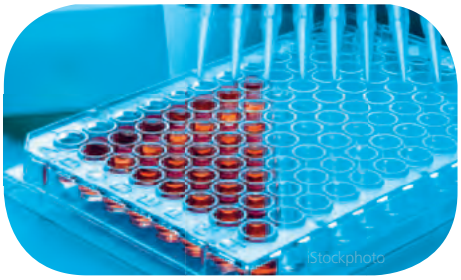
Qioptiq can help you!
Our solutions for microscopy are:

- Qioptiq Optem® Camera Couplers
- Qioptiq OptiGrid® Structured Illumination Microscopy
- Confocal imaging capabilities through conventional light paths
- Flexible Laser Technology™ with plug & play modularity
- Single- or multiple-wavelength lasers
- kineMATIX™ optomechanical system for perfectly stable fiber coupling

Mouse Olfactory Bulb 40µm image
compliments of Dr. Adam Puche, University of Maryland

contact

- www.qioptiq.com/dna-sequencing
- photonics@qioptiq.com



DNA Sequencing

The insight gained from research on genes and proteins is having a revolutionary impact on medical diagnostics, pharmacology and food safety and control. Luminescence and fluorescence are the preferred methods of capturing the results of bio-chemical assays, whether the sample format is a biochip, microtiter plate, capillary or gel. With Photonics Engines for fluorescence detection, Qioptiq accesses new solution paths in the diagnosis of hereditary diseases, virus and parasite detection, stem cell sorting and development of pharmacological substances.

In recent years the company has become a first-class development and production partner of renowned appliance manufacturers in research and clinical diagnostics. Qioptiq has co-developed a series of very successful measuring systems for fluorescence detection which make an important contribution to basic molecular biology research.

Each system component is optimized to achieve the high efficiency required to detect the weak signals of the fluorophores. Our optical systems are designed for maximum light-capturing ability, thus increasing sensitivity and throughput of your instrument. They provide a higher dynamic range, accommodating the vast differences in fluorophore concentration across the sample array and reducing cross-talk between sample spots via optimum optical resolution.

Your demands:

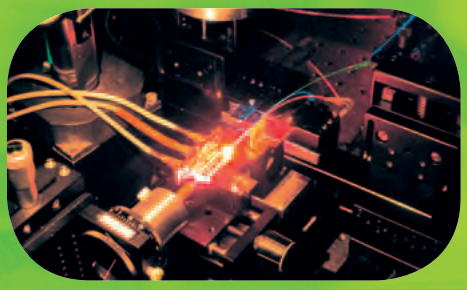
- Fast image capture and efficient fluorescence detection
- Availability of real images of the biological sample
- Background noise reduction and false signal prevention
- Single- or multiple-wavelength laser sources
- Highly stable laser beam delivery

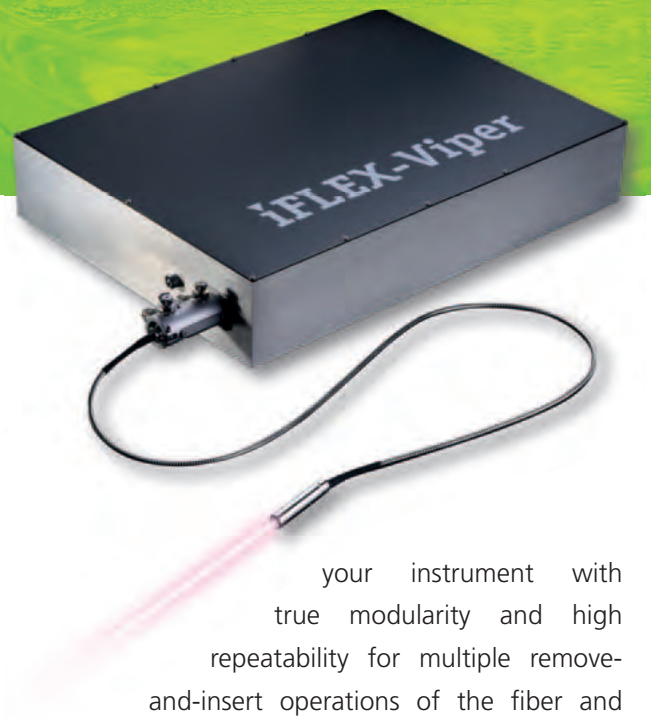
Qioptiq can help you! Our solutions for DNA sequencing are:

- Powerful light sources to excite the entire sample
- High-quality illumination optics for uniform distribution of the excitation light
- Minimized stray light, ghost images and auto-fluorescence
- Dichroic mirrors and optical blocking filters to keep excitation light away from the detector
- Large-aperture, zero- vignetting, high-resolution detection lens to increase light collecting efficiency
- Carefully selected sensors to transfer the image into digitized signals
- Integrated detector solutions with high-dynamic range analogue-to-digital conversion
- Flexible Laser Technology™ with plug & play modularity
- kineMATIX™ optomechanical system for perfectly stable fiber coupling
- Beam homogenizing capabilities

contact

- www.qioptiq.com/flow-cytometry
- photonics@qioptiq.com





Flow Cytometry

Qioptiq's single-mode fiber delivery systems deliver laser light with absolute accuracy – and are ideal for the most challenging precision measurement applications.

Our award-winning Flexible Laser Technology™ delivers the laser beam to your sample volume: single or multiple wavelengths from UV to IR come in a TEM_{00} true Gaussian beam with low dynamic pointing error. Our products offer maximum flexibility for your specific application.

The kineFLEX™-HPV kinematic laser-to-fiber coupler enables true plug-and-play benefits. Sub-micron repeatability and sub-micro radian stability mean systems need to be aligned only once. They provide your instrument with true modularity and high repeatability for multiple remove-and-insert operations of the fiber and high stability to opto-mechanical thermal effects without hysteresis.

Qioptiq can master your full photometric beam path. From the single- or multiple-wavelength laser or conventional light source with spectral filtering, collimation and focusing optics, sample volume to the detection side with recollimation optics, spectral separation and filtering to detection, signal processing and digital output. All these functions can all be combined in one compact, fully aligned and tested assembly we call a "Photonics Engine".

contact

- www.qioptiq.com/other-biomed
- photonics@qioptiq.com

Other Biomedical Applications

In addition to the wide array of applications presented in this brochure, Qioptiq also offers services and products for nearly every other biomedical application requiring or using optics or lasers.

Polymer optics

Over 20 years of experience with injection molding polymer optics have resulted in creative solutions that require multiple optical elements. Integrated mounting hardware simplifies product assembly, improves alignment and reduces costs. Qioptiq polymer optics is widely used in the medical sector, including disposables, dental and molecular imaging, diagnostics and medical projection and display.

Micro-optics

You will find Qioptiq micro-optics in medical applications such as endoscopy, ocular implants and other tasks requiring small size and exacting optical performance.

Optical components

Qioptiq offers all known optical component types in any material imaginable. We can deliver standard and custom fabricated elements including plano optics, windows, filters, mirrors, prisms, beam splitters, spherical optics, aspheres, polarizing optics, achromats, hyperachromats, molded glass optics, and custom fiber optics.

Polymer Optics Components for Clinical Diagnostics manufactured by Qioptiq

contact

www.qioptiq.com/built-to-print

photonics@qioptiq.com

Built to Print

In addition to our global expertise in developing OEM products for our customers, Qioptiq also possesses broad capabilities in the design and manufacture of Built to Print products that are perfectly suited to your specific needs in the medical, life sciences or industrial manufacturing sectors.

Built to Print components

In today's highly competitive markets, Qioptiq offers you something different: We have cutting-edge design, the latest technology, and top-end manufacturing in Western Europe and North America, using also low-cost yet high-quality manufacturing in Eastern Europe and Asia according to your needs.

All known component types

Our teams of experts have managed Built to Print projects for clients in the semiconductor industry, biotechnology and industrial inspection sectors - just to name a few! Besides spherical and plano optics, we are particularly skilled in manufacturing:

- Aspheres
- Free form optics
- Diamond-turned polymer and metal optics

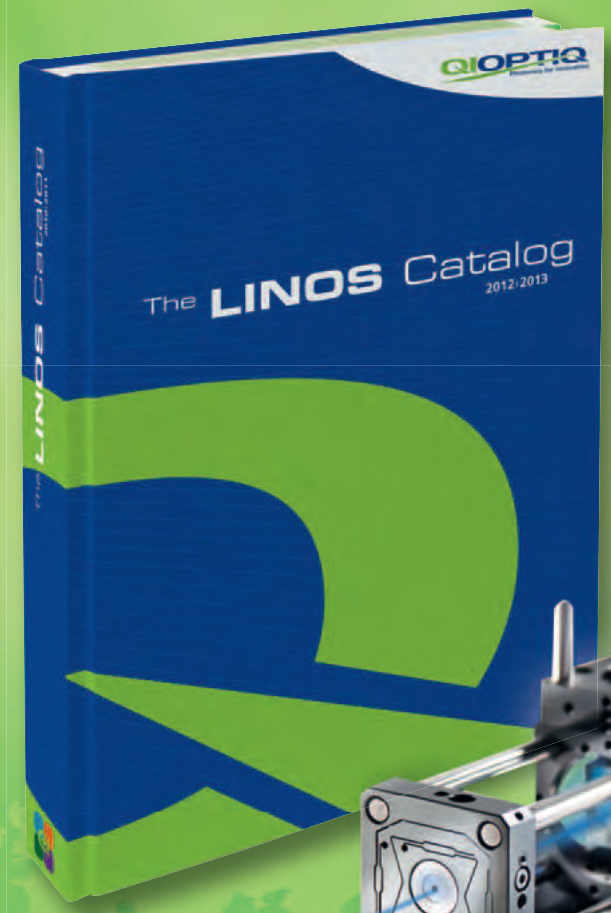
Built to Print modules

Our capabilities also include assembling sophisticated modules that match your unique drawings. We are particularly skilled at assembling modules for:

- Medical technology
- Ophthalmology
- Dental imaging
- Analytical instrumentation
- Semiconductor industry

Discover the capabilities, knowledge, equipment and technology of Qioptiq!

The LINOS Catalog



High quality:
Off-the-shelf products

Qioptiq's world-renowned LINOS catalog and online Q-Shop offer a wide selection of high quality lab equipment and accessories for customers operating in scientific research and industry laboratories. More than 4,800 items are available for immediate purchase

www.qioptiq-shop.de

Discover the Q!

Qioptiq supplies cutting-edge technology for all optical requirements of the medical and life science industry. Worldwide production capacities and state-of-the-art manufacturing facilities guarantee an impressive portfolio of photonic products and solutions. Join us on a journey of discovery in our Medical and Life Sciences brochure!

Photonics for Innovation

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