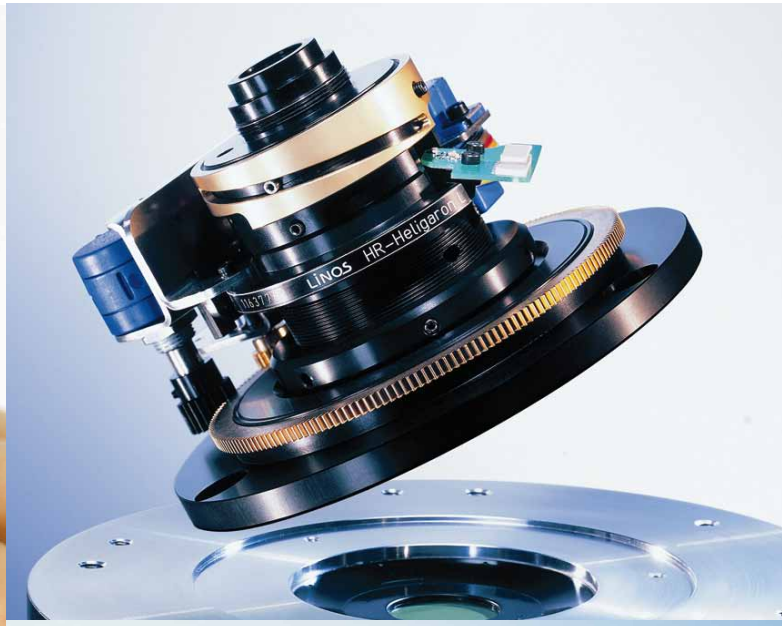
LINOS

A member of the Qioptiq Group

Health Care & Life Sciences



- **Medical Technology**
- **Dental Technology**
- **Biophotonics**

LINOS History

A company with a comprehensive past and a bright future
LINOS, a member of the Qioptiq Group, can look back on a company history of pioneering innovations in precision optics, optomechanics and optoelectronics. Based on the systematic and worldwide development of these competencies, with its 800 specialized employees LINOS is today a global leader in the supply of high-precision optical components and systems.

The requirements of our customers set the benchmark
Whatever your optical challenge, whatever your optical material, LINOS can provide the appropriate solution – anywhere in the world.

Customer liaison and support right from the start
LINOS offers you a comprehensive partnership. This means, your local LINOS engineer will guide you through the entire process of planning, designing, developing and manufacturing a sophisticated optical system.

Experts for each specific application
The LINOS profit centre structure enables us to act quickly and flexibly according to our broad range of customer-specific applications. The strong LINOS network consists of nine different LINOS business units as well as our external partners and top-level research institutions. These powerful teams stand for streamlined processes, exchange of know-how, flexibility and inspiration.

1877 — RODENSTOCK — Founding of Rodenstock in Würzburg

1898 — SPINDLER & HOYER — Founding of Spindler and Hoyer

1996 — STEEG & REUTER, Gsänger — Founding of LINOS and merging with Steeg & Reuter Präzisionsoptik, Franke Optik and Gsänger Optolektronik

2000 — RODENSTOCK — Acquisition of Rodenstock Präzisionsoptik

2001 — Lees — Integration of Lees Optical Instruments Products

2006 — QIOPTIQ — LINOS becomes a member of the Qioptiq Group

2007 — POINT SOURCE — Acquisition of Point Source

2009 — LINOS AG: Integration into Qioptiq group completed

LINOS Quality

No compromises. LINOS provides consistently outstanding design and production for all your optical requirements.

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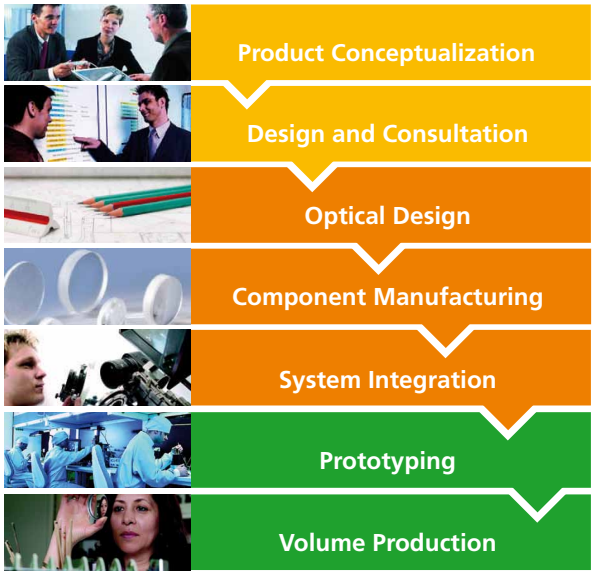
To keep up with the pace of development in the field of industrial image processing, the optics used must always be a step ahead. Flexibility, ruggedness and precision must meet the highest standards and yet not be the decisive cost factor. LINOS systems enable 100% quality control in manufacturing.
Our long-standing experience with opto-mechatronic systems and our extensive technology transfer across a wide variety of industries and research institutions, enable us to continuously optimize our systems.
On this basis, we are able to provide a wide range of high-quality standard components for any application, which allows highly sophisticated special solutions to be implemented at any time without the high cost involved in internal development. Beyond optics, we try to enforce the forward integration of our products into other fields like electronics where they play an important role.
Many years of successful research and development work have provided us with an even greater insight of the field: As a result, we can also make a valuable contribution to planning the application solution beyond systems integration.
When it comes to innovation, even the smallest element is ultimately indispensable. For this reason, every single component and production series is carefully registered and archived. This allows us to guarantee both long-term availability and fast global access.

LINOS in brief

- Vast in-house **expertise** in optical design supported by the proprietary optical design software
- Highest-accuracy manufacturing technology for **ultimate precision** optical elements of any desired shape
- Leading-edge mounting technology for **optical systems** with outstanding performance
- Long-term **customer support** from development to after-sales service and spare part supply
- **Flexible manufacturing** to serve customer's demands

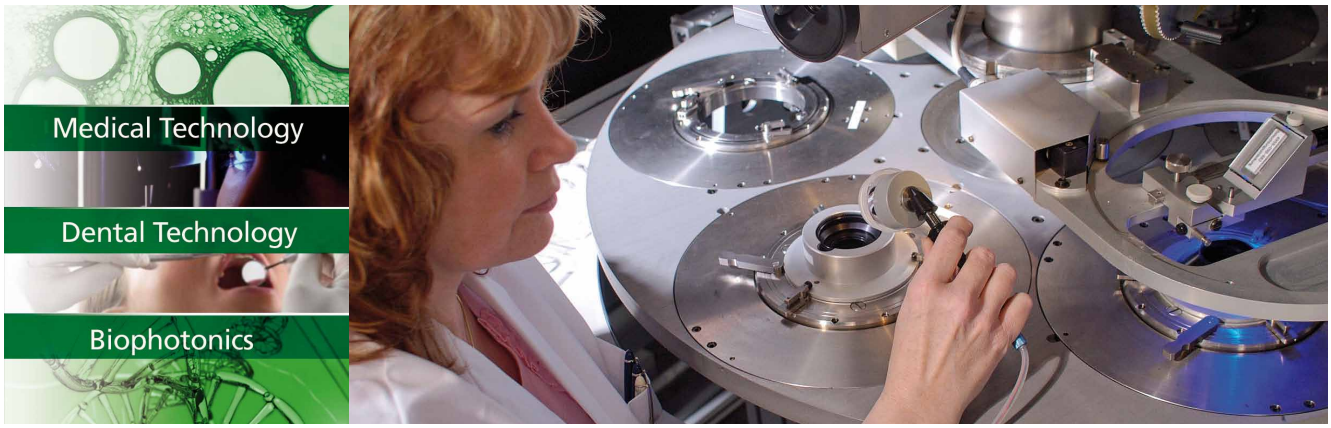
Complete chain of customer support



Complete range of products and technologies

Any treatment:	compression-molding, milling, grinding, polishing, varnishing, precision cooling
Any material:	all optical glasses, fused silica, sapphire, calcium fluoride
Any shape:	planar, spherical, cylindrical, aspherical, free-form surfaces, prisms
Any wavelength:	infrared, visible, ultraviolet
Any technology:	precision assembly, high precision cementing, ELSO-mounting, ALPHA-mounting
Any test and measurement:	MTF, interferometry, micro interferometry, refractive index, dispersion

Business Division Health Care & Life Sciences



The Health Care & Life Sciences business division offers OEM customers an innovative partnership when it comes to planning, designing, developing and producing groundbreaking optical systems.
Our employees have many years of experience in the fields of Optics, Mechanics, Electronics and Systems Engineering. They are keen to tackle new technical challenges and thus provide our customers with trend-setting solutions. Our employees' competence is the key to our customers' success.

The business division is divided into three business units: Biophotonics, Dental Technology and Medical Technology with the market segments Surgery Systems and X-Ray Imaging.
Besides a large number of major international companies our customer base includes renowned small specialist companies in Europe and overseas. They all value LINOS Photonics' high development and production competence.
LINOS Photonics is certified in accordance with ISO 9001:2000 and as a medical products manufacturer in accordance with ISO 13458:2003.

Markus Ehbrecht

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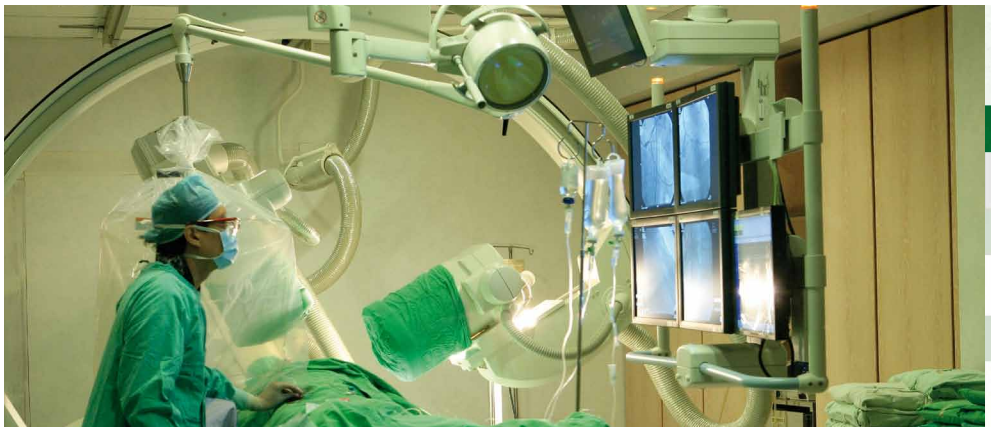
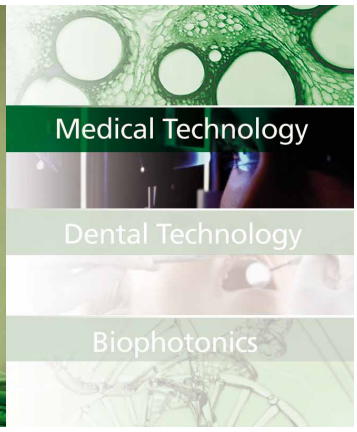
Business Unit Medical Technology

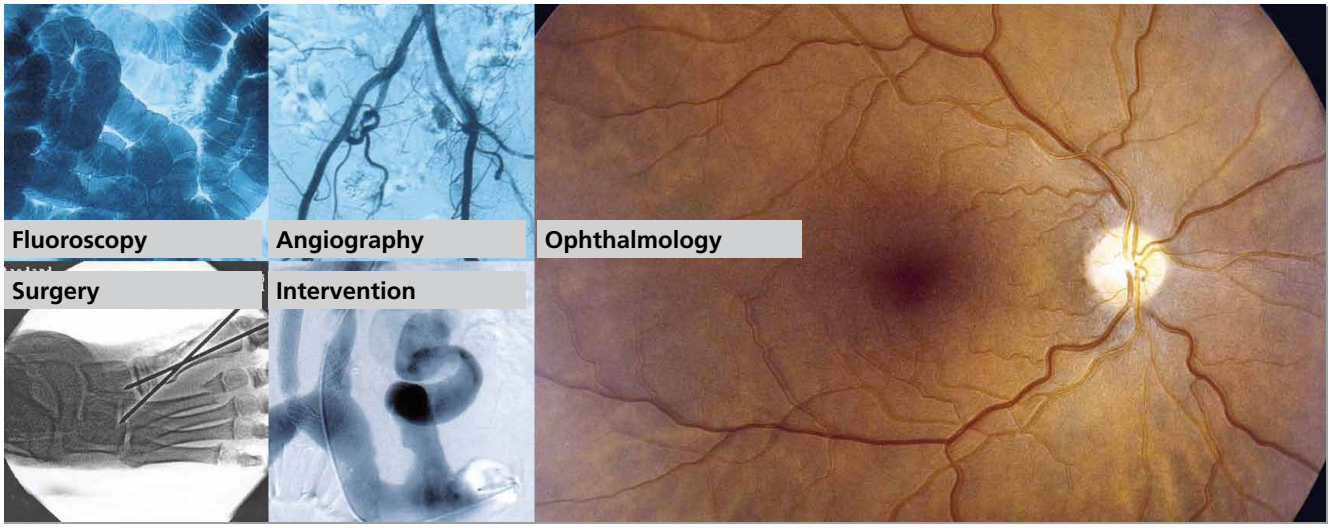




Experience and Innovation

The business unit Medical Technology develops and distributes optical systems for **X-Ray Imaging**. These range from numerous standard optics and customized lenses up to complete radiology cameras.

Angiographic, surgical or lithotripsy applications require the highest image quality and a high dynamic range. These demands are realized via high-aperture and fully motorized units. Swing-in filters, automatic stop adjustment, integrated incident light reading and modular focus have been design standards at LINOS for a long time.
Recently, LINOS also expanded its activities to **Ophthalmology and Surgical Applications**. LINOS develops and constructs beam control systems for refractive eye surgery as well as illumination, measuring and imaging units for diagnostic appliances. LINOS' high competence in the field of optics contributes significantly to the generation of improved retina and cornea images.



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Business Unit Medical Technology

Examples and know-how

The following are some examples from our product range. We have played a decisive role in the development of all these products, from the start through to series production.

This is of course only a selection of the entire product range we offer. Our specialists will be pleased to provide you with more details.

Surgery Systems > **Ophthalmic Surgery**

Application:	Anterior Segment Ophthalmic Surgery
Key Features:	High precision "Laser blade" for arbitrary cuts and incisions in cornea, sclera, and lens using an ultra-tightly focused laser beam scanning through the tissue volume.

LINOS provides a complete optics solution including multiple beam paths and sub-assemblies:

- Beam shaping and propagation
- 3D-Scanning
- Diffraction-limited final focusing
- Online video monitoring

Do you want more information?

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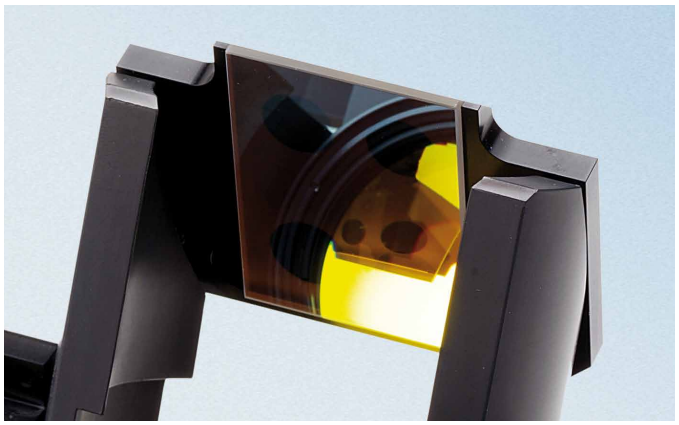
Surgery Systems > **Ophthalmic Measurement**



Application: High Accuracy Eye Geometry Measurement

Key Features:	Multiple measurement principles combined for ultimate precision measurements of all anterior chamber geometry parameters.

LINOS provides the entire optomechatronic assembly including:

- Slit projection
- Eye fixation target projection
- Pupillometry and placido imaging
- Cornea and lens cross-sectional imaging

Do you want more information?

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Surgery Systems > **Retinal Diagnosis**

Application: High Resolution Fundus Imaging

Key Features:	Retinal imaging platform solution for color and IR fundus photography, fluorescence analysis, and optical coherence tomography (OCT).

LINOS provides the optical system with all required beam paths:

- Fundus illumination
- High resolution retinal imaging
- NIR retinal preview
- OCT retinal scanner
- Eye fixation target projection
- Pupil alignment aid

Do you want more information?

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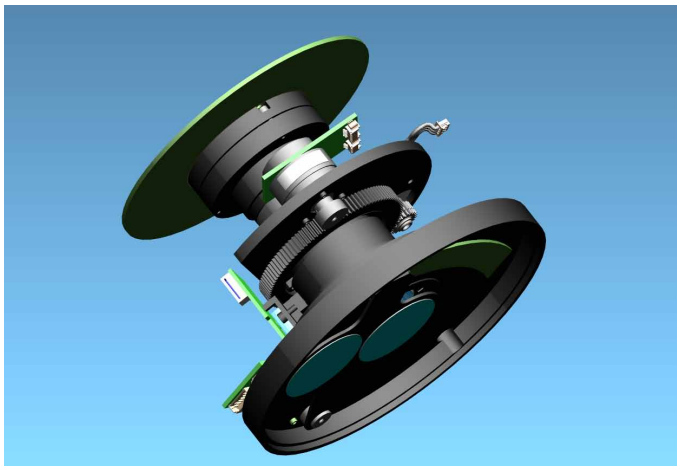
Business Unit Medical Technology

X-Ray Technology > **New 1k Camera Luma X-System**



Application:	The new Luma X-System is a 1k camera for human fluoroscopy.
Key Features:	Camera system with a very flat design to allow a short image chain offering comprehensive data processing options.

LINOS offers an integrated camera solution with:

- 14 bit digital signal processing and bad pixel compensation
- GigE Vision data transfer – no frame grabber required
- Unlimited cable length

The system offers various image processing functions like:

- Circular blanking
- Shading correction
- Edge enhancement
- Different recursive filter factors

Do you want more information?

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X-Ray Technology > **Customer-specific Solutions**

Application:	The HR Heliflex is an example of a lens made for high resolution CCD Cameras in X-Ray diagnostics, mainly used for angiography, the supreme discipline in X-ray diagnostics.
Key Features:	Lenses with highest performance which is required for card angiography, general angiography and cerebral angiography. High light efficiency for minimum X-ray dose.

LINOS provides the complete optomechatronic system including:

- High light transfer
- Free of vignetting
- Temperature compensation
- Folded lens setup for reaching small external dimensions
- Features like motorized iris, light measurement, rotation and ND filter available upon customer's request

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Do you want more information?

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X-Ray Technology > **Digital Radiography**

Application:	The XV Heligon 4k-S is the latest member of a family of various lenses designed for digital radiography with sensors in the range from 2k² up to 4k².
Key Features:	High end optical solution for human direct radiography in combination with a scintillator foil.

LINOS offers an optical system with outstanding characteristics:

- High aperture of 1:1.0
- Object size of 430*430 mm
- Object distance less than 500 mm
- Temperature compensation
- Focus adjustment
- Modular assembly

www.linos.com/x-ray

Do you want more information?

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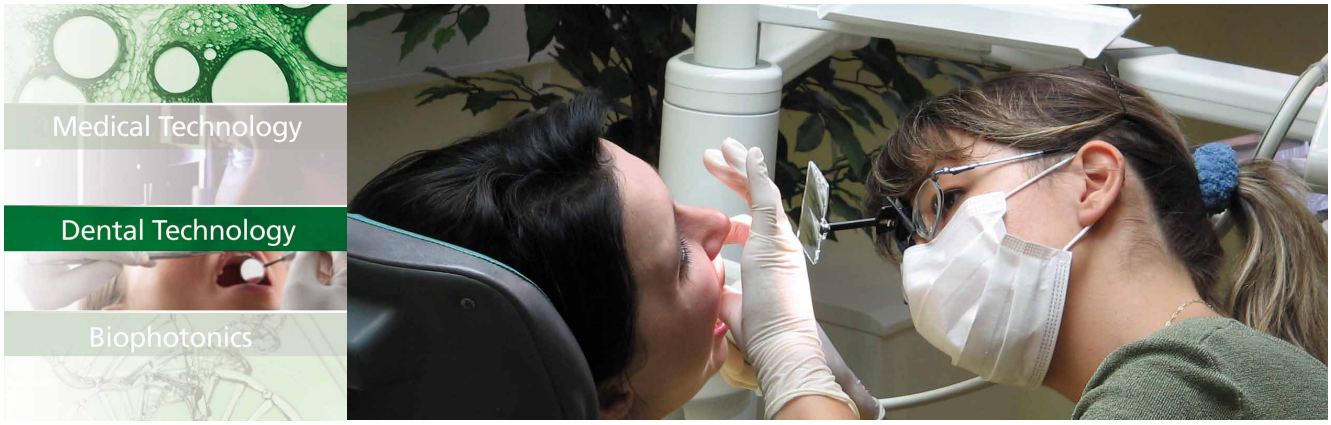
Business Unit Dental Technology



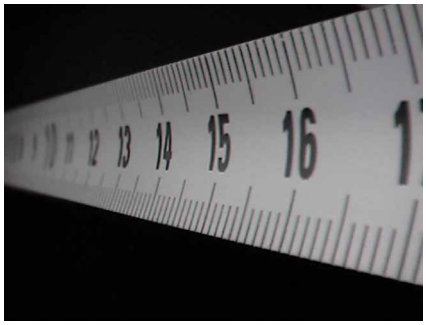
With its optical systems, LINOS has been an important partner of internationally leading dental equipment manufacturers for over fifteen years now. During this time, we consequently increased the integration density of our products.

The spectrum ranges from optical modules via intraoral cameras up to optical measuring systems (intraoral and extraoral) for restorative dentistry CAD/CAM processes.

Intraoral cameras are an important part of dentistry chair units and serve to visualize necessary surgical procedures or achieved improvements for the patient during treatment or consultations.

3D dental cameras are an indispensable component for the increasingly popular mechanical production of dental prostheses. Their images are the basis for perfect shaping processes and the fit of ceramic prostheses.

LINOS dental cameras today



- Focus range from Full Face to Macro (∞ to 3mm object distance)
- Sophisticated LINOS lens design
- Optimal universality by patented iris control

- Intraoral: maximum depth of field
- Extraoral: maximum brightness
- No visible image distortion
- Homogenous illumination

- Very small camera heads for perfect ergonomics
- Waterproofed camera heads
- State-of-the-art cameraelectronic (USB 2.0; CCD or CMOS sensor)

Do you want more information?

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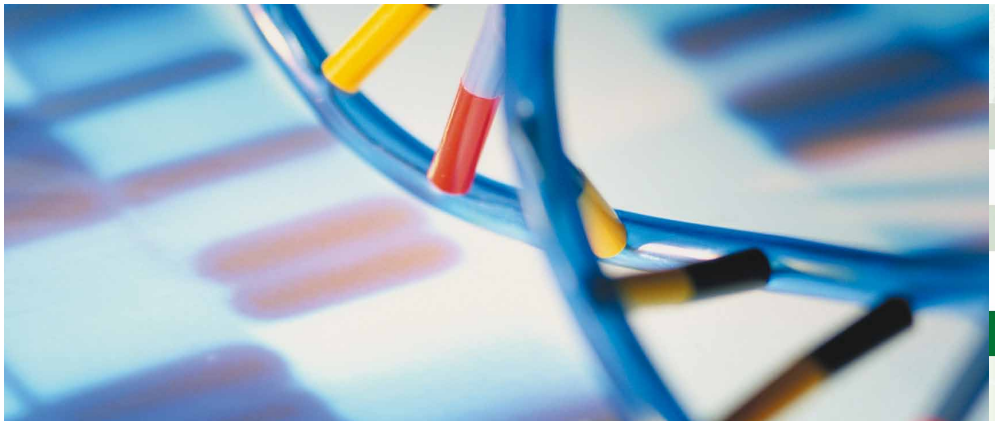
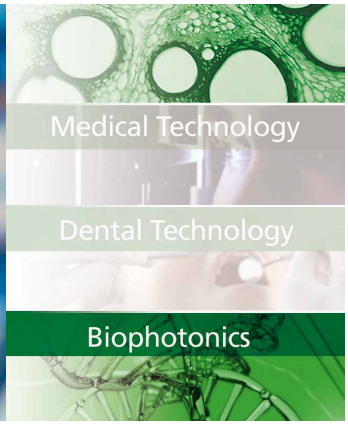
Business Unit Biophotonics





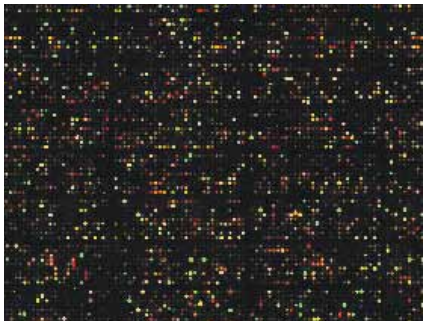
With its business unit Biophotonics, LINOS accesses new solution paths in the diagnosis of hereditary diseases and the development of pharmacological substances.

Meanwhile, the company has become a first-class development and production partner of renowned appliance manufacturers in the fields of research and clinical diagnostics.

At the same time, LINOS co-developed a series of very successful measuring systems for fluorescence detection in the past years, which are an important contribution to basic molecular biology research.
Thanks to LINOS' systems, hundreds of biochemical assays, regardless of whether on biochips, microtiter plates or in glass capillaries, can be analyzed simultaneously within the shortest time these days.

LINOS' biophotonics systems provide their customers with the right equipment to meet the future challenges in the diagnostics, pharmaceutical and food engineering industry.

The product range comprises both individual lenses and optical components as well as entire optoelectronic systems ranging from illumination sources, imaging lenses and interference filters up to sensor technology.



Solution by imaging system
One approach to detect the fluorescence emmited from a biological sample is to image the sample onto a CCD camera. The advantages of an imaging solution are:

- Fast image capture
- Highly stable system
- Real images of the biological sample
- Very low probability of false signals

Solution by scanning system
The dynamic range of imaging systems is often limited by electronic background noise. In these cases a more sensitive detector such as a photomultiplier tube can be used. The assays are analyzed by scanning the sample and digitized images are generated by sequentially reading the detector output.
For both solutions LINOS delivers R&D and production know-how for complete optical systems in low or serial quantities.

Do you want more information?

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