

Manufacturing capabilities of laser optical, crystal and electro-optical components

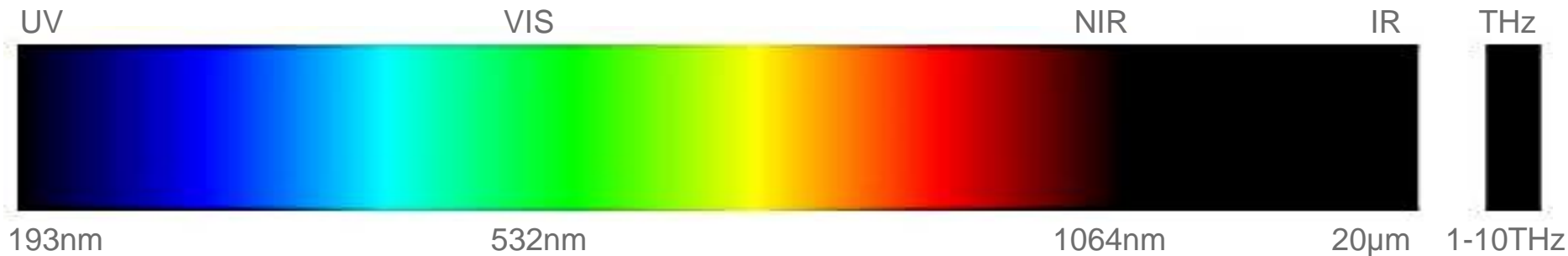
February 2020

EKSMA Optics mission

EKSMA Optics is a manufacturer and global supplier of **reliable laser components** for high-power **lasers, laser systems** and other **optical instruments** users and manufacturers.

We help our customers to solve their technical problems or complete their tasks by providing a wide range of **standard laser components**, as well as offering **custom solutions** and **customized components and systems** tailored to customer needs.

Our components are used for different photonic applications at the wavelength spectrum starting the UV through VIS up to the IR and at the Terahertz range.



About The Company

- ▶ **Facilities: ~2000 sq. meters** (21500 sq. feet):
- ▶ **Total employees: 70** (November 2019)
 - Sales & marketing – 10
 - Procurement - 8
 - R&D - 5
 - Quality Control – 7
 - Manufacturing – 34
 - Infrastructure – 6
- ▶ **Sales in 2019: 12.1 mln EUR**
- ▶ **Sales forecast 2020: ~13.8 mln EUR**
- ▶ **Sales geography in 2018: 59 country**
- ▶ **Export: ~80 % of total sales.**



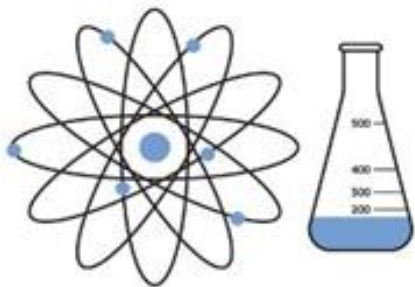
Main office - Mokslininku str. 11, Vilnius, Lithuania



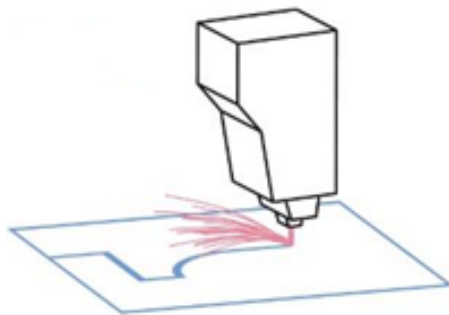
LITEK cluster and Optoelectronics Center buildings

Markets

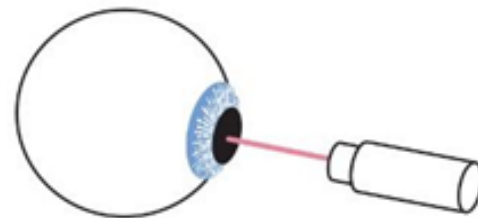
Scientific ~40%



Industry ~50%



Medical and aesthetic ~10%



Products portfolio

Laser optics

Nonlinear and laser crystals

Optical systems

Opto-mechanical components

BBO, DKDP, KTP Pockels cells

HV drivers and power supplies for Pockels cells

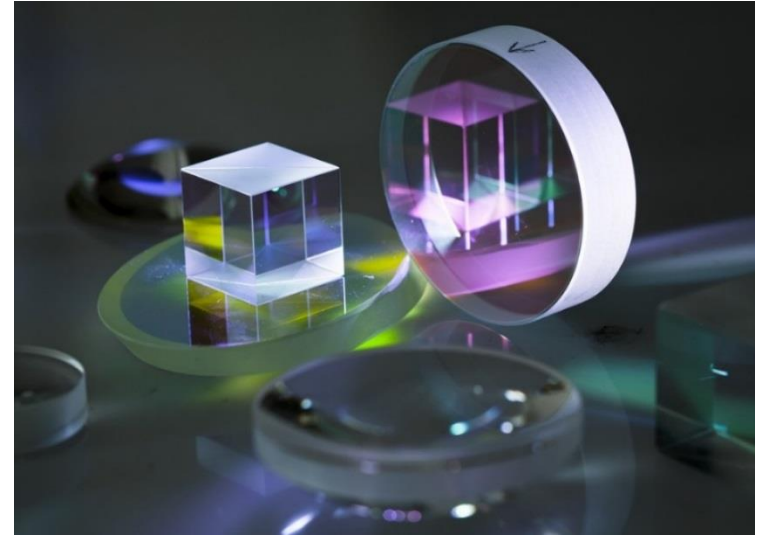
Ultrafast pulse picking systems

Laser diode drivers

Laser synchronization modules

Products: Optical components

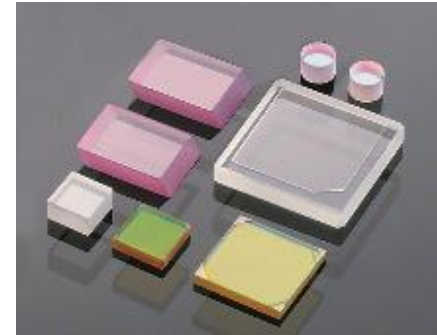
- ▶ Laser coatings (IBS, E-beam, IAD, MS)
- ▶ Laser mirrors (HR, PR, BB, Low GDD)
- ▶ Lenses (spherical, aspherical, cylinder, axicon)
- ▶ Filters (Notch, UV, color glass, neutral density)
- ▶ Windows (curved, flat, elliptical, precision, flats)
- ▶ Polarizing optics (TFPs, waveplates, prisms)
- ▶ UV & IR optics



Materials: Schott, Heraeus, Corning, Ohara glasses and Fused Silica, Natural Quartz, Calcite, LiF, MgF_2 , CaF_2 , BaF_2 , ZnSe, Sapphire, Si, Ge.

Products: *FemtoLine* optics and crystals

- ▶ Ultrafast low GDD mirrors
- ▶ Ultrafast polarizing optics
- ▶ Thin lenses
- ▶ Broadband low GDD coatings
- ▶ Variable attenuators for femtosecond pulses
- ▶ GVD compensation plates
- ▶ Frequency conversion crystals for fsec Ti:Sapphire and Yb:KGW lasers
- ▶ Femtokits for THG of fsec Ti:Sapphire lasers



Products: ***Nd:YAG LaserLine*** optics and crystals

- ▶ Nd:YAG rods and slabs
- ▶ Frequency conversion crystals – LBO, BBO, KTP, DKDP, KDP
- ▶ Nd:YAG Laser mirrors
- ▶ Output couplers
- ▶ Rear mirrors
- ▶ Harmonic separators
- ▶ Lenses
- ▶ Polarizing optics
- ▶ Variable attenuators



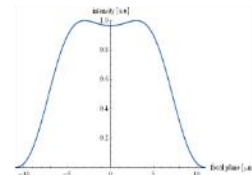
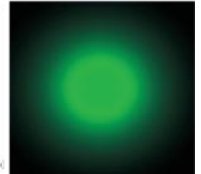
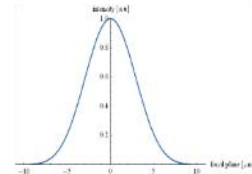
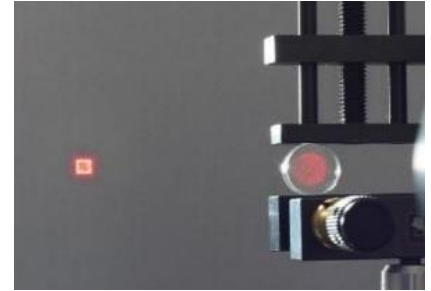
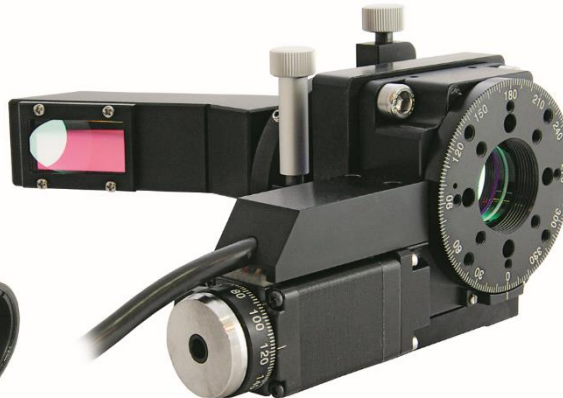
Products: Nonlinear and Laser crystals

- ▶ Frequency conversion crystals for applications in UV, VIS, NIR applications – LBO, BBO, KTP, KTA, KD*P, KDP, LiNbO₃, LiIO₃
- ▶ NIR, MIR and IR frequency conversion crystals – AgGaSe₂, AgGaS₂, GaSe, ZnGeP₂, etc. ...
- ▶ THz generation crystals – GaSe, ZnTe
- ▶ Raman shift crystals – KGW, Ba(NO₃)₂, BaWO₄, SrWO₄, SrMoO₄
- ▶ Laser crystals – Yb:KYW, Yb:KGW, Yb:YAG, Nd:YAG, Nd:YVO₄, Nd:YLF, Nd:KGW, Ti:Sapphire
- ▶ Passive Q-switching crystals – Cr:YAG, Co:Spinel



Products: Optical systems

- ▶ Beam Expanders
- ▶ F-Theta Lenses
- ▶ Beam shaping lenses for micromachining
- ▶ Variable Attenuators for Linearly Polarized Laser Pulses
- ▶ Motorized attenuators



Products: Opto-mechanical components

- ▶ Optical Tables and vibration isolation systems
- ▶ Brackets & Rails
- ▶ Base mounts & Accessories
- ▶ Optical Mounts
- ▶ Optical Positioners
- ▶ Translation & Rotation Stages
- ▶ Adjustment Screws
- ▶ Motorized Positioners



Products: Electro-optics and electronics

- ▶ Pockels cells: BBO, DKDP, KTP and RTP based;
- ▶ Drivers and power supplies for Pockels cells;
- ▶ Synchronization modules for lasers – SY4000;
- ▶ Ultrafast pulse picking systems based on electro-optics;
- ▶ Laser diode drivers – uniLDD;
- ▶ Heaters and ovens with thermo-controllers for nonlinear crystals;



EKSMA Optics IBS coatings facility

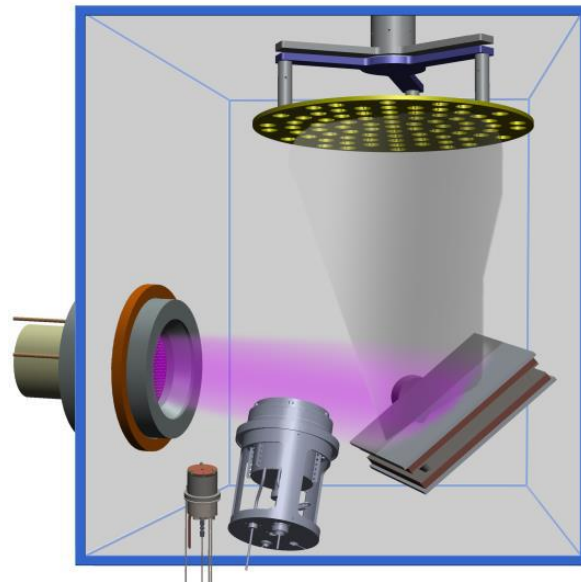
Ion Beam Sputtering (IBS) is the most advanced deposition technology for the most critical demands on laser optics.

IBS technology allows to deposit dielectric thin film coatings with precisely controlled spectral parameters. Processes are highly reproducible with broadband optical spectral monitoring and layers thickness control during coating process.

Optics and crystals coated with IBS technology feature highest LIDT in comparison with other commercially available coating deposition technologies.

IBS coatings feature stable spectral performance in changing ambient conditions. There is no spectral shift in vacuum. Coatings are dense, non-porous and have perfect adhesion.

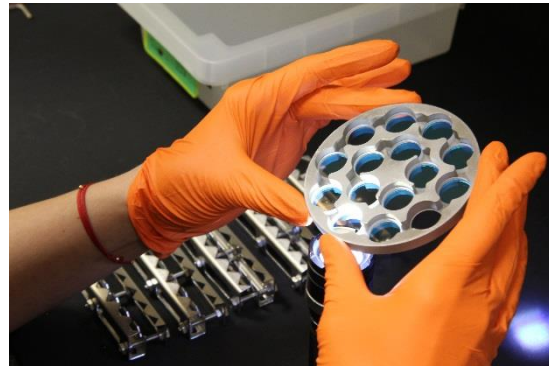
Our IBS machines feature up to 30 cm diameter coating area with coating uniformity better than 1%.



IBS coatings for laser optics and crystals

EKSMA Optics deposits HR, PR, AR, filter and polarizing coatings in 3 IBS coating machines on different optical glasses and fused silica and AR coatings for nonlinear LBO, BBO and KTP crystals.

Infrastructure of coating facility has three automatic ultrasonic cleaning machines with multi baths, special work places in clean rooms in laminars for opticians and thermal annealing equipment for further treatment of coated optics. Work places are equipped with tools and microscopes for preparation and inspection of surfaces of optical elements.



20 and 30 cm diameter IBS coating chambers

Crystals polishing facility

Polishing of nonlinear, laser and electro-optical crystals:

- ▶ DKDP, KDP, *flatness $\lambda/8$, polishing quality better than 10/5 scr/dig*
- ▶ LBO, BBO, KTP, *flatness $\lambda/10$, polishing quality better than 10/5 scr/dig*
- ▶ ZnGeP_2 , AgGaSe_2 , *flatness $\lambda/8$, polishing quality better than 10/5 scr/dig*



Flat optics production facility

Production of flat optics substrates with 0.5 - 2 inch diameter:

- ▶ BK7 glass, *flatness $\lambda/10$, polishing quality 20/10 scr/dig*
- ▶ Fused Silica, *flatness $\lambda/10$, polishing quality 20/10 scr/dig*

We provide specifications and polishing quality required by high power and high energy laser applications!



CNC lens polishing facility

Design, grinding and polishing of 6 to 150 mm diameter:

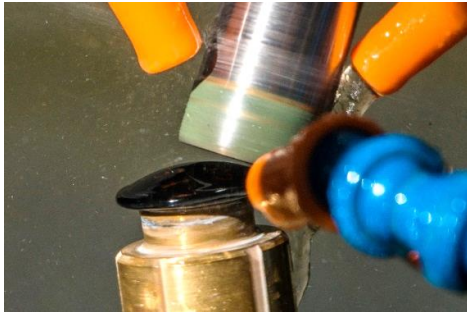
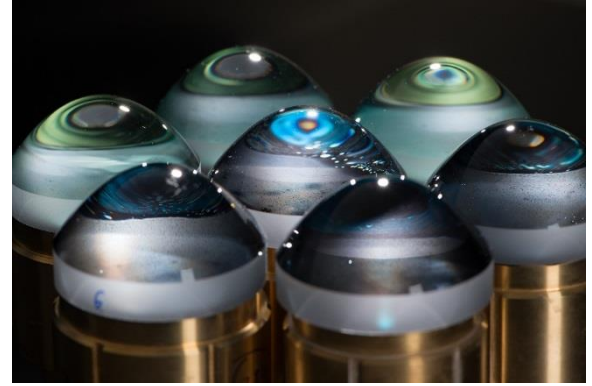
- ▶ Spherical lenses
- ▶ Aspherical lenses

Standard production from: N-BK7, Fused Silica, S-LAH64.

Other glasses and types of synthetic quartz on request.

- ▶ Precision grade UVFS axicons (conical lenses)

Apex up to $179.5^\circ \pm 3'$, tip rounding dia < 0.4mm, surface irregularity $< \lambda/4$ @ 633nm.



Electro-optics & electronics assembling division

Pulse pickers:



Pockels cells:



Drivers and HV supplies:



Clean room assembling facilities

The clean room facilities dedicated for assembling of Pockels cells and optical systems are equipped with filtered air laminars, temperature and humidity control and special workstations for final tests of assembled BBO, DKDP, KTP Pockels cells and optical systems. Clean room facilities corresponds to ISO class 7 standard requirements.



Quality control

All components provided by the Company are subject to quality testing and certifications in quality control laboratories.

Our quality control laboratories are equipped with high-precision optical and laser instruments to perform a variety of measurements and tests of optical laser components.



Quality management

EKSMA OPTICS is ISO 9001:2015 certified company

Certification cycle start date: 19 September 2018

Certificate expiration date: 18 September 2021

Original certification date: 19 September 2012

Certification body: Bureau Veritas

Certificate No: LT2225Q



EKSMA Optics delivers to customers reliable and high quality laser-optical, crystal, electro-optical components and electronics for high power laser applications.

www.EksmaOptics.com

EKSMA Optics
Mokslininku str. 11
LT-08412 Vilnius
LITHUANIA

