

# 3 photon

**CRYSTALS  
COATINGS  
OPTICS**



LASERS



OPHTHAL-  
MOLOGY



MEDICAL



BIO &  
CHEMICAL



R&D



DEFENSE

**MARIUS ŠEMETA, 2022 VILNIUS**



3photon



Founded in 2017



>20 years in different  
photonics products  
development



Technical knowledge in  
crystals, optics, lasers

# CUSTOM LASER OPTICS

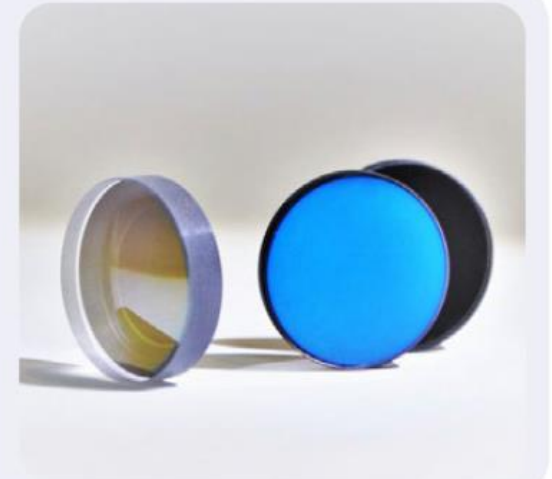


**Dichroic mirrors  
(Wavelength  
separators)**

190 - 12 500 nm

**Output (cavity)  
mirrors**

190 - 8000 nm



**Laser line  
mirrors**

**213, 266, 355, 532,  
632, 1053, 1064 nm,  
...**

Within  
190 - 7000 nm region

**Broadband  
mirrors**

**400-700 nm,  
900-1100 nm,  
...**

Within  
190 - 12 000 nm region





## POLARIZERS

### Thin film plates & Beamsplitter cubes

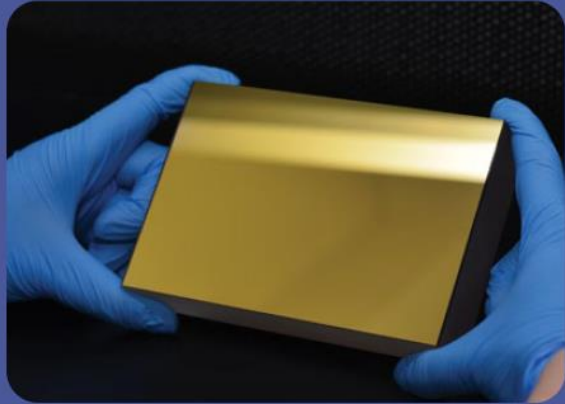
Extinction Ratio 1:2000 | Up to  $\varnothing$ 230 mm | High LIDT

## WAVEPLATES

### Low order, zero order, true zero order, achromatic

Up to  $\varnothing$ 30mm | High LIDT

## METALLIC COATINGS



**High durability & lifetime > 10 years**

- UV Enhanced Aluminum mirrors down to 193 nm
- High LIDT Ag + Protective Coating > 2 J/cm<sup>2</sup> @ 1064 nm
- Low absorption Au coatings

## COATING ON CRYSTALS



**Precisely controlled process allows:**

- Coatings on hygroscopic, light sensitive, soft crystals (e.g. BBO, BiBO, LBO, DKDP, AgGaS<sub>2</sub>, Cr: CdSe...)
- Coatings on high value crystals e.g. Ti:Sapphire, Cr:ZnSe, Yb:KGW, Co:MALO, LiNbO<sub>3</sub>, AgGaSe<sub>2</sub>, ZGP...)

## UNCOATED OPTICAL ELEMENTS



**Various shapes and sizes of:**

- Windows, lenses, prisms, axicons
- Custom optical components

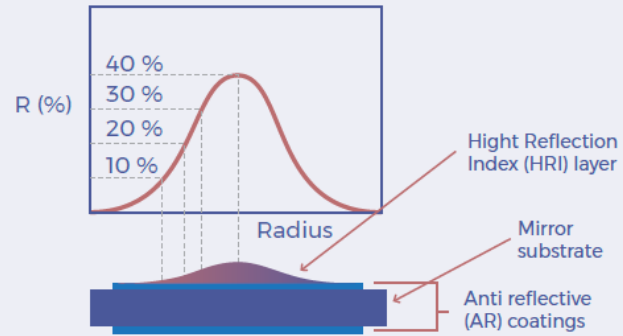
## COMPLEX OPTICAL COATINGS



### Coating technologies

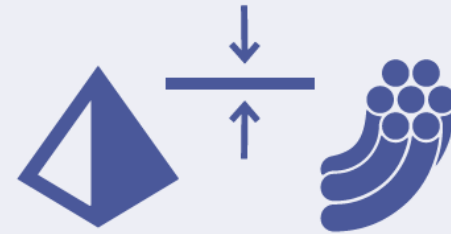
- TE - thermal evaporation
- EBE - electron beam evaporation
- IAD - ion assisted deposition
- IBS - ion beam sputtering
- MS - magnetron sputtering

## VARIABLE REFLECTIVITY MIRRORS



- Reflection at the center up to 40%
- Custom dimensions
- Reflectivity profile according to your specifications
- Used in resonators

## COATINGS ON NON-STANDARD PARTS



- Prisms
- Fiber ends
- Thin wafers
- Custom components

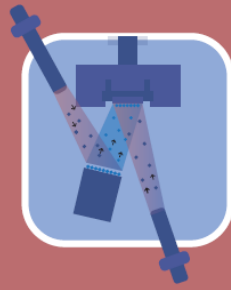
From Idea to R&D to commercial production, custom optics, beam delivery systems...

## IBS (Ion Beam Sputtering) coatings

- Fully automatic PVD coating plant with load-lock
- Fast coating process
- Lower maintenance costs
- 24/7 non stop production
- Highly precision coatings
- High LIDT, Durable & Environment stable coatings



# IBS (Ion Beam Sputtering) coatings



Dedicated ion source for substrate pre-cleaning/etching

$$n\lambda \rightarrow \frac{\lambda}{10}$$

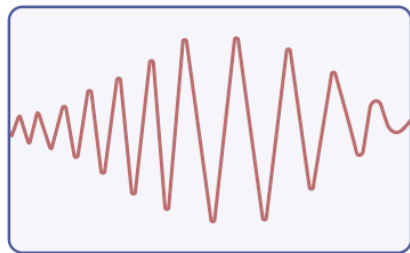


Special coating stress reducing techniques

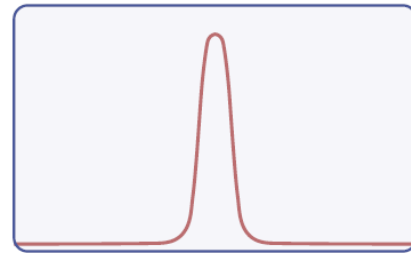


Low coating defect density

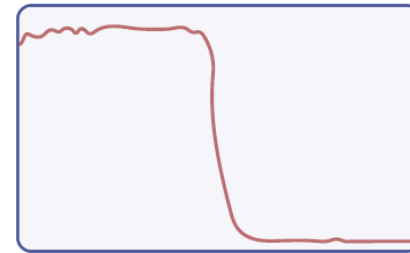
**Reliable and repeatable batch-to-batch deposition of complex multilayer coatings with precisely controlled spectral, dispersion properties:**



Chirped mirrors



Interference filters



Cut-off filters

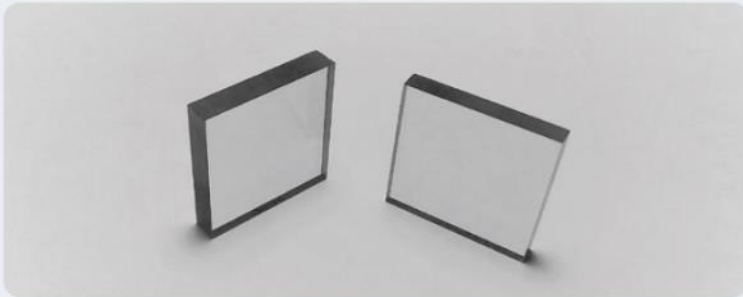




# OPTICAL COATINGS FACILITY

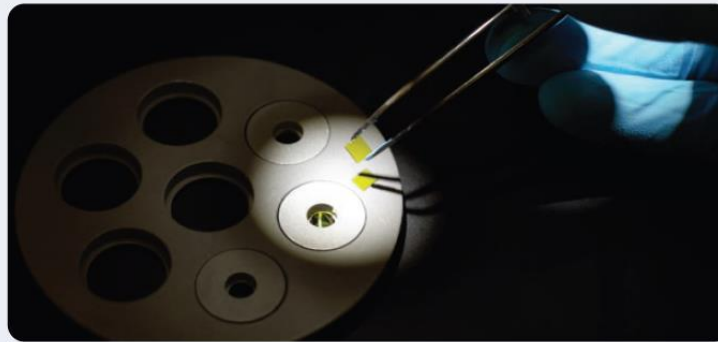
## Coatings on Crystals

### COMPLEX OPTICAL COATINGS



Hygroscopic, Soft (<3 MOHS), sensitive (BBO, LBO, DKDP, AgGaS<sub>2</sub>, Calomel...)

### NON-STANDARD COATING SOLUTIONS ON CRYSTALS



Full apertures, multiple surfaces, small crystals

### COATING SERVICE ON HIGH VALUE CRYSTALS



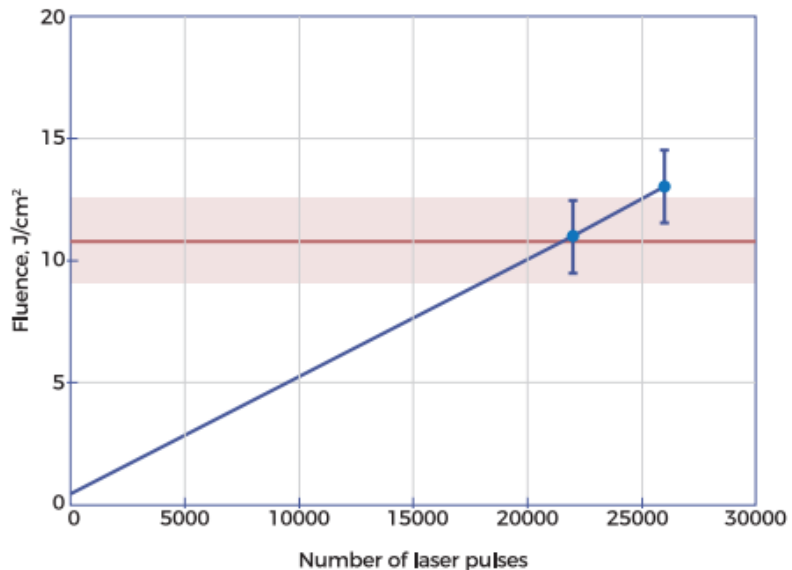
Large, custom shapes  
Ti:sapphire, Cr:ZnSe, Yb:KGW, Co:MALO, LiNbO<sub>3</sub>, AgGaSe<sub>2</sub>, ZGP, ...

## SINGLE-PASS CONFIGURATION

LBO for THG

S1: AR @ 1064 +532 nm; S2: AR @ 355 nm;

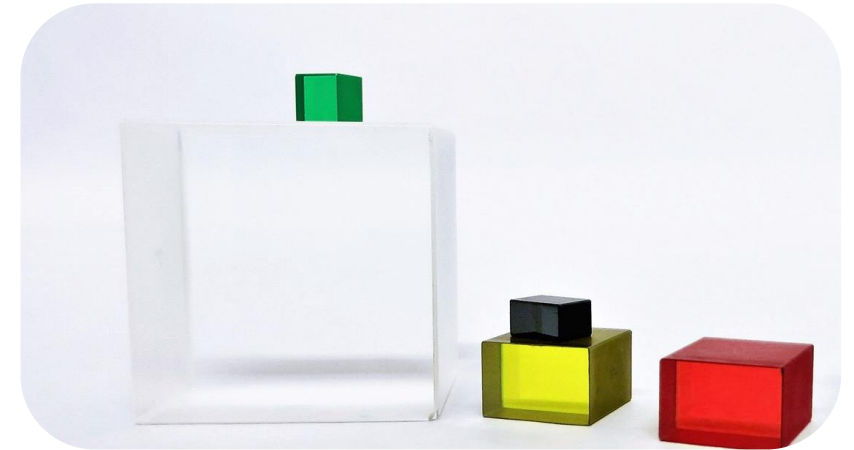
LIDT > 10 J/cm<sup>2</sup> @ 355 nm



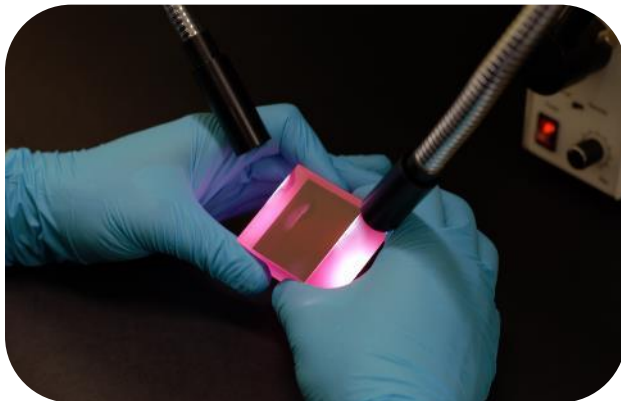
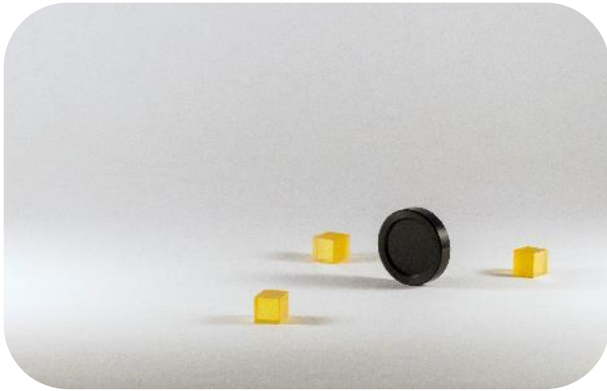
**Non-Linear Crystals:**  
BBO, LBO, KTP, DKDP,  
AgGaS<sub>2</sub>, ZnGeP<sub>2</sub>, GaSe, ...

**Laser Crystals:**  
Nd:YAG, Nd:YVO<sub>4</sub>,  
Yb:YAG, Cr:ZnSe, Cr:CdSe,  
Nd:YLF, ...

**Passive Q-switch crystals**



# CRYSTALS



Support and simulations  
for your applications

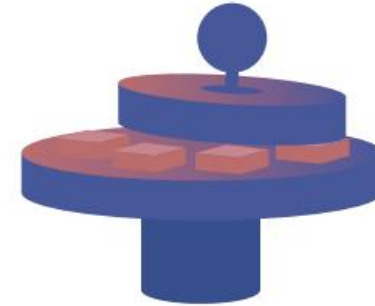
Polishing and coating

Custom dimensions

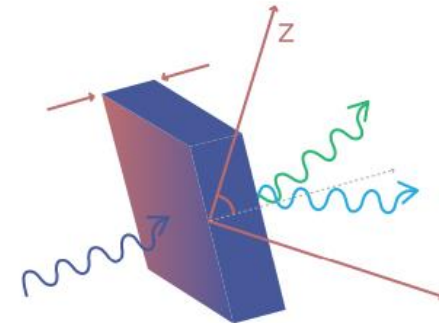
Mounting

Crystals Repair

HUMIDITY SENSITIVE, LOW  
MOHS CRYSTALS POLISHING



DEVELOPMENT, SIMULATIONS AND  
TECHNICAL CONSULTATIONS FOR CRYSTALS





**New Facility 2022**

**3photon**

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