OPTOMAN

YOUR SIDEKICK FOR
LASER OPTICS DEVELOPMENT

OPTOMAN

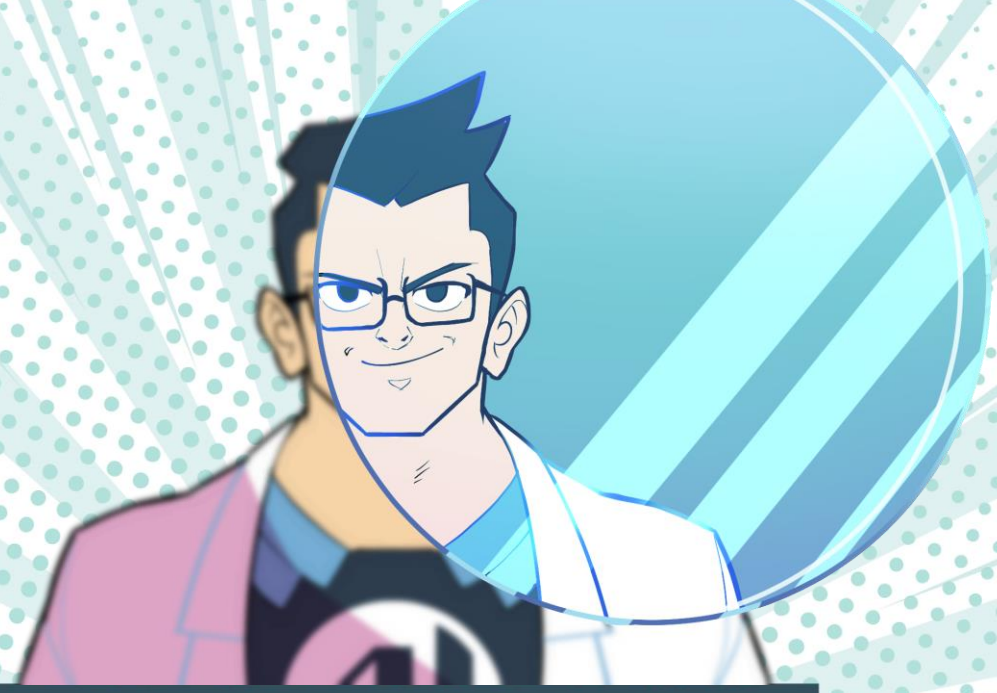
REMIGIJUS ŠLIUPAS, CO-FOUNDER & CEO

2022 - OPTOMAN TODAY

29 sidekicks do all the magic

Mission: OPTOMAN – your sidekick for laser optics development

Vision: OPTOMAN - number one choice manufacturer for laser optics worldwide



WHAT DOES OPTOMAN DO?

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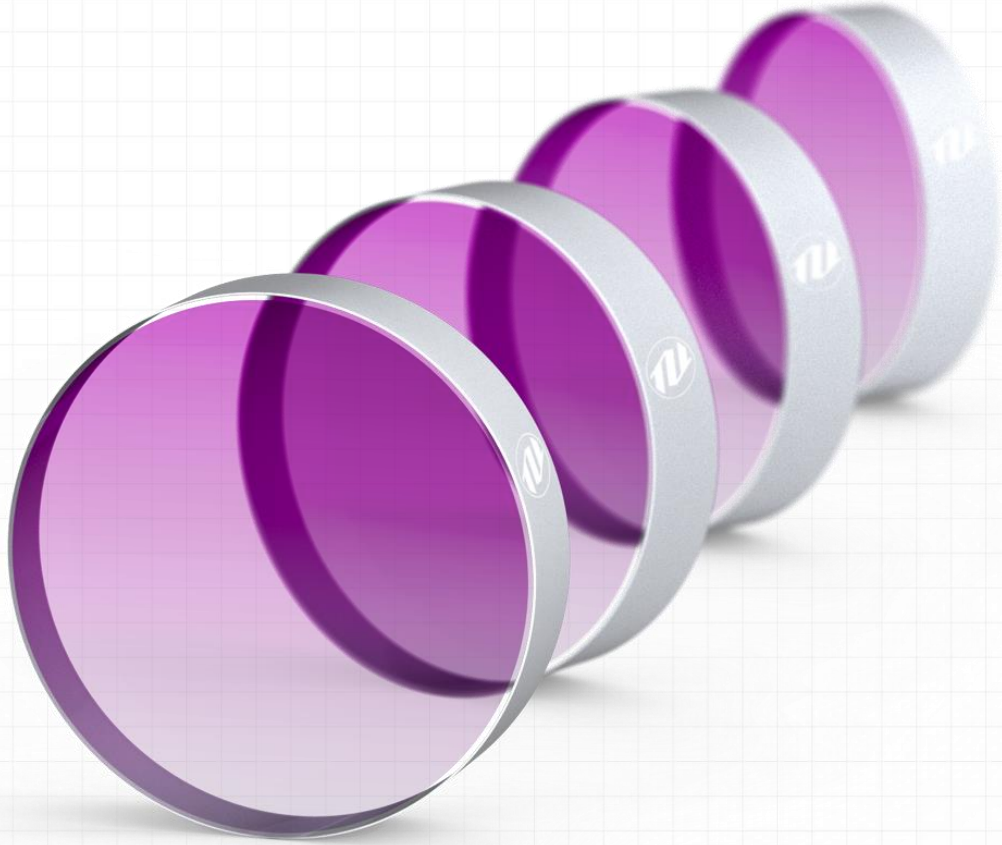
WHAT DOES OPTOMAN DO?

IBS COATINGS AND COATED OPTICS FOR HIGH-POWER LASER APPLICATIONS



WHAT DOES OPTOMAN DO?

OPTOMAN addresses optics and coatings related issues with **ultrafast turnaround.**

OPTOMAN aims to increase **longevity and reliability** of our partners' laser systems, eventually resulting in a **lower total cost of ownership.**

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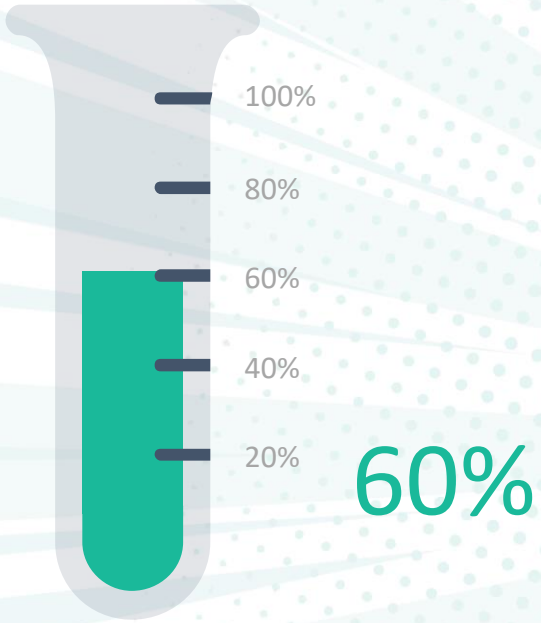
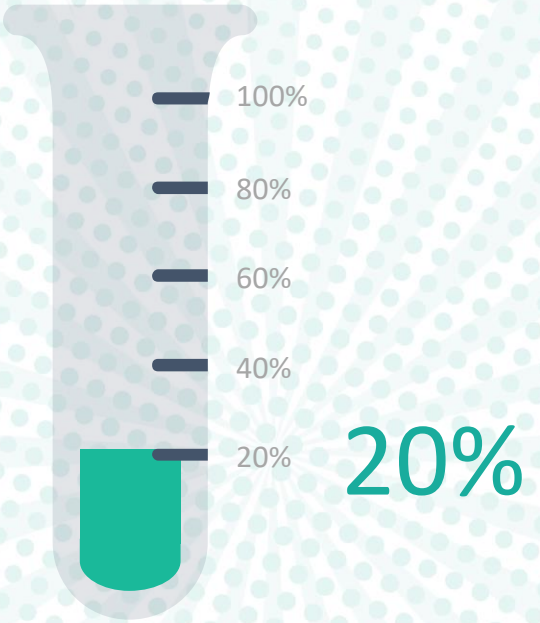
WHAT'S THE RIGHT FORMULA?



60%

1st priority

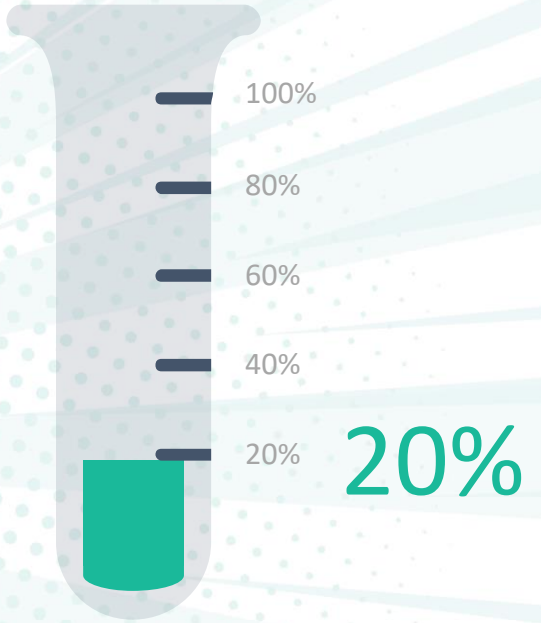
Laser Induced Damage Threshold



20%

2nd priority

Spectral performance



20%

3rd priority

Price

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Uncle Ben said once:

WITH A GREAT LASER POWER COMES

A GREAT RESPONSIBILITY FOR COATERS

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A laser is as strong as its weakest link

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APPLICATION ORIENTED METROLOGY

LIDT & lifetime
CW, ns, ps, fs

CRD
532 nm, 1064 nm

Environmental testing
To MIL-C-484197

GD, GDD, TOD
500 nm – 1400 nm

Absorption
355 nm, 532 nm, 1064 nm

Cosmetic surface quality
To MIL & ISO

Surface form errors
Down to $\lambda/20$

Roughness/scattering
355 nm, 532 nm, 1064 nm

Spectral measurements
Tsp, Rsp @ 200 nm – 5000 nm

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HOW DOES OPTOMAN DO THAT?

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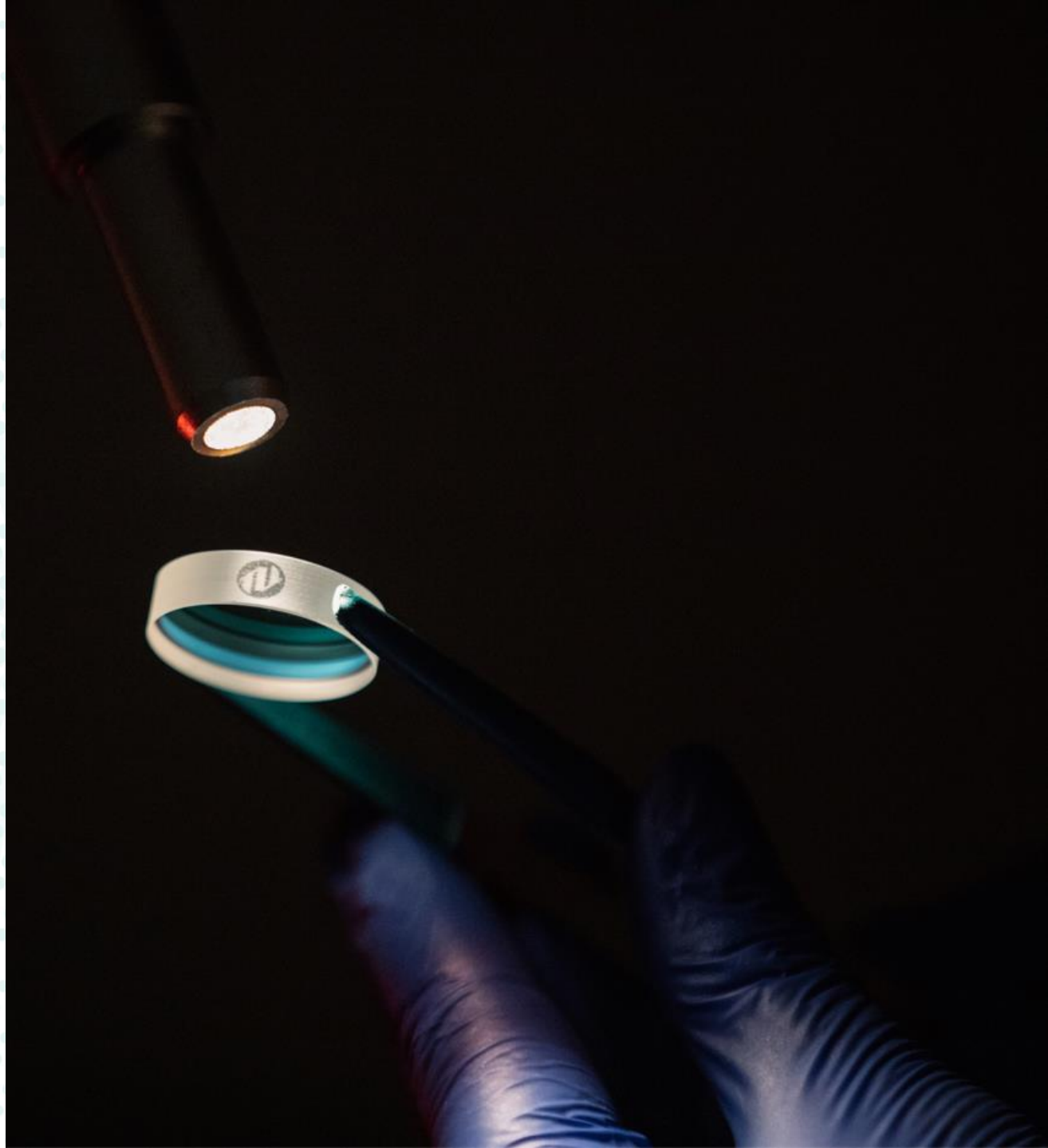
CONCENTRATION

Highly customized and application-optimized laser optics for **high power lasers** with **ultrafast turnaround.**

R&D-driven issues solving on the fast-track to serial production.



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CONCENTRATION

Single manufacturing technology

Ion-Beam Sputtering (IBS)

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IBS FAMILY

PETRA

Effective coating area:
ø270 mm x 2 pallets

Superpowers:

- *Universal*
- *Super efficient*
- *Extreme low loss coatings*

ALBERT – THE ATOM SMASHER

Effective coating area:
ø600 mm x 2 pallets

Superpowers:

- *Ability to coat big optics*
- *Volume production*

WANDA – SCARLET WITCH

Effective coating area:
ø270 mm x 1 pallet

Superpowers:

- *Mid-IR coatings*
- *Extreme low loss coatings*

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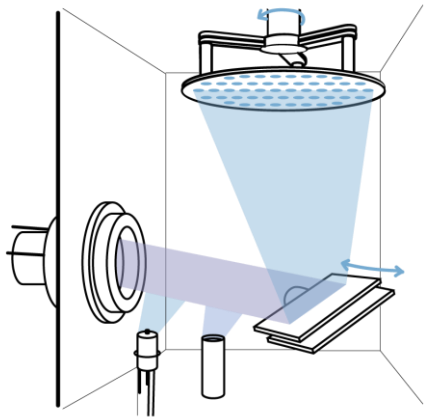
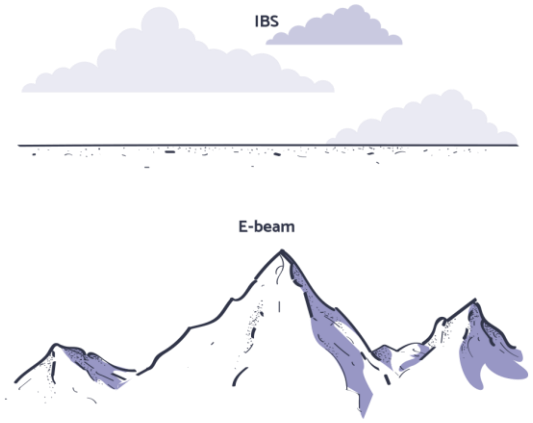
WHY IBS?

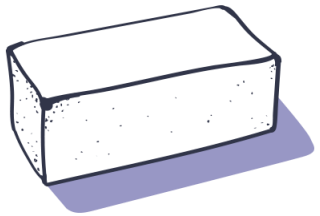
Inherently stable sputtering process



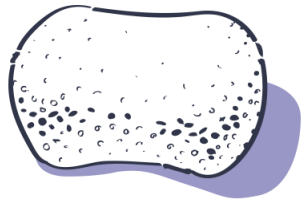
Low roughness - Scatter-free coatings



Bulk-like packing density



IBS
Near bulk density



E-beam
porous structure

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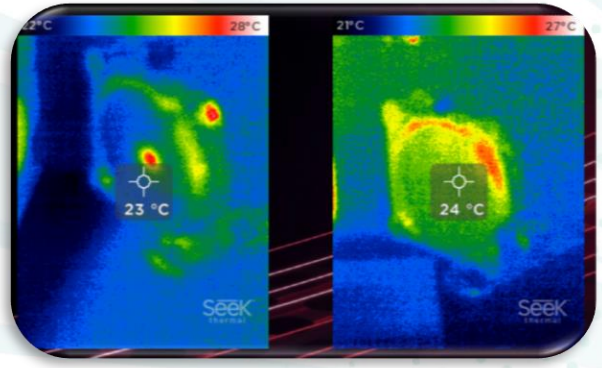
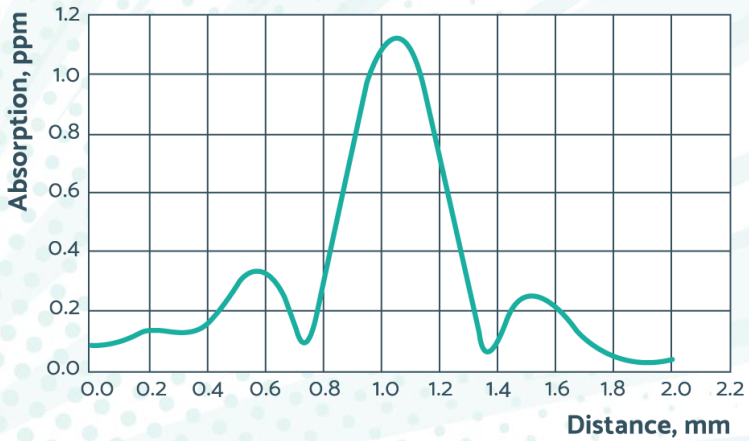
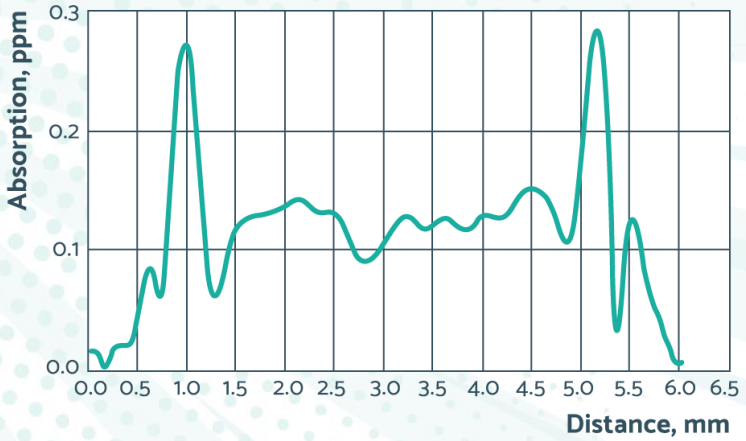
LOW ABSORPTION COATINGS



HR @ 1064 nm



AR/AR @ 1064 nm



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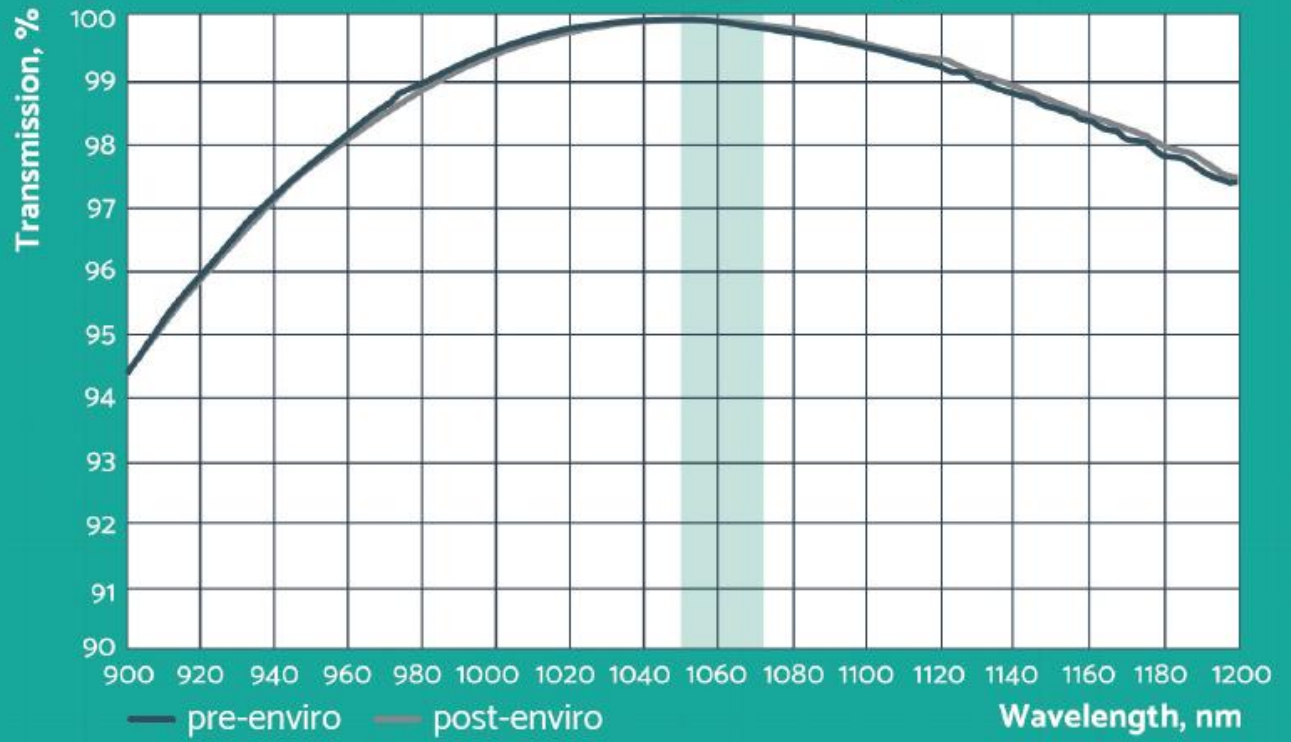
STABILITY OF IBS COATINGS

IBS AR coatings are extremely durable and environmentally stable due to the density of layers. Incredible resistance makes them perfect for on-field applications.

IBS
Near Bulk Density

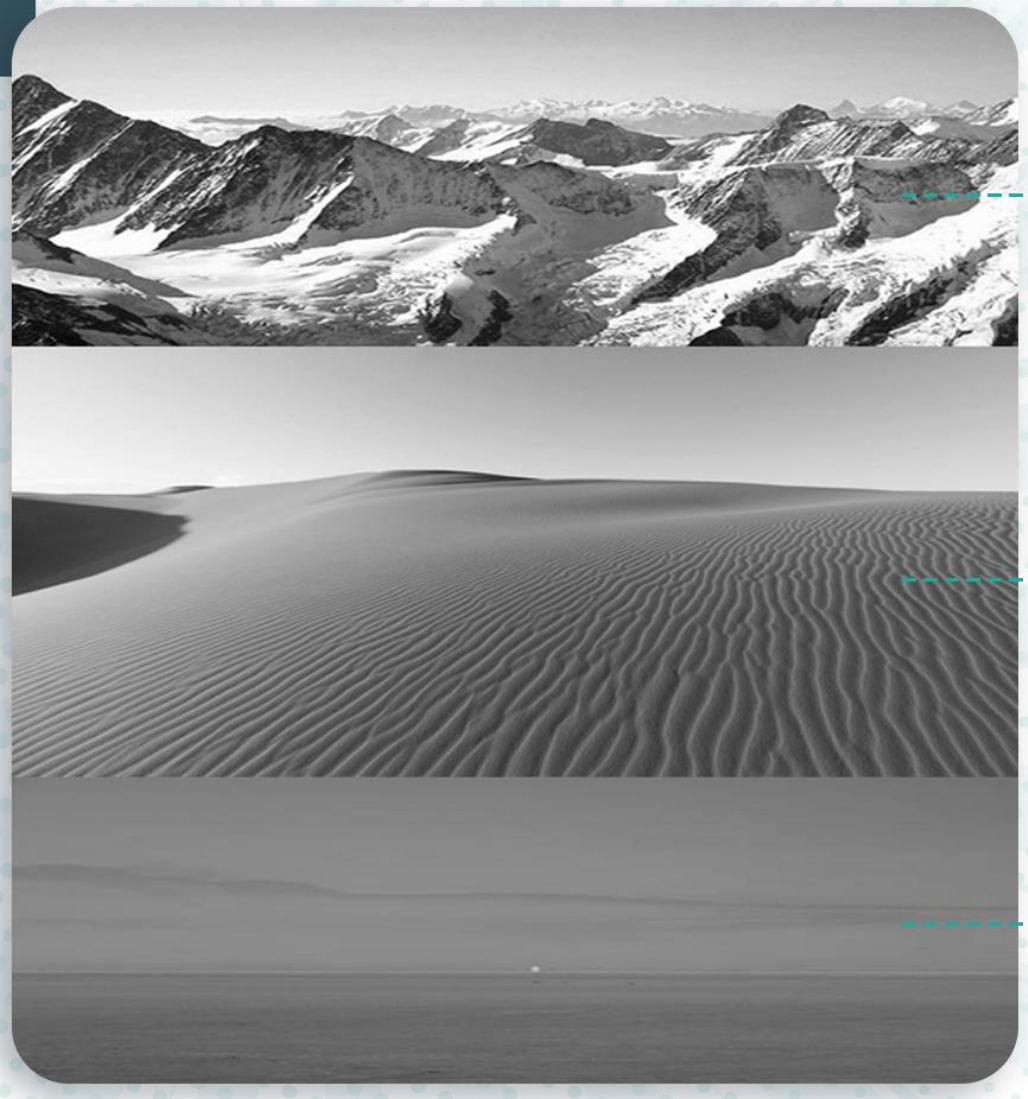
E-beam
Porous Structure

AR@1064 nm coated sample performance before and after environment treatment cycles.



NEGLIGIBLE INFLUENCE ON ROUGHNESS

Influence on roughness, which is reposonsible for scatter loss.



E-BEAM

MAGNETRON SPUTTERING

ION-BEAM SPUTTERING

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RESEARCH AND DEVELOPMENT

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PUSH LIDT TO NEW LIMITS

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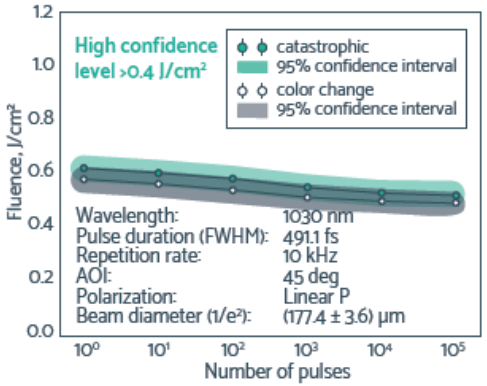
PUSH LIDT TO NEW LIMITS – NIR MIRRORS

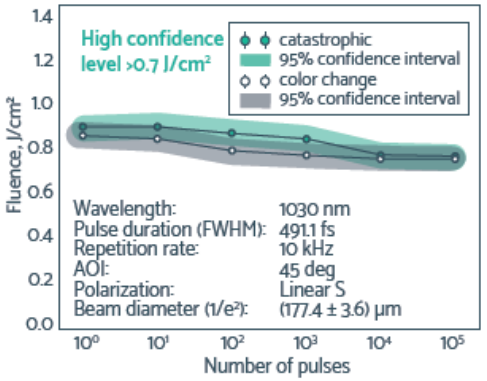
For stable NIR laser system performance over long period of time

STANDARD MIRRORS (ULLM5)

- Perfect price-to-performance ratio
- Industry standard specifications
- Fully characterized

LIDT	Lifetime	Price
●●●○○	●●●○○	●○○○○

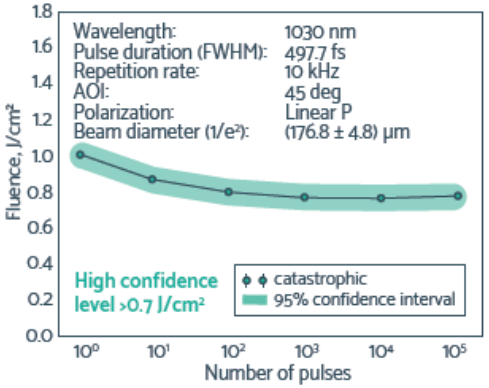


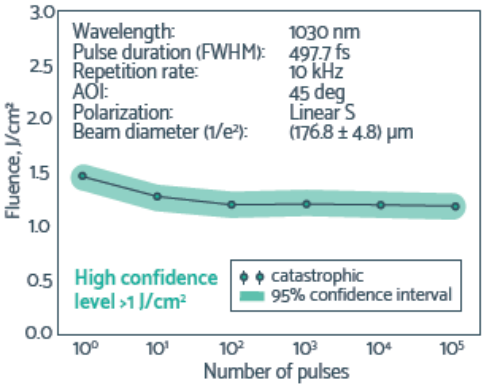


SUPERHERO LEAGUE MIRRORS (ULLM5SHL)

- Very high LIDT
- No color-change damage
- Fully characterized

LIDT	Lifetime	Price
●●●●○	●●●●○	●●●○○





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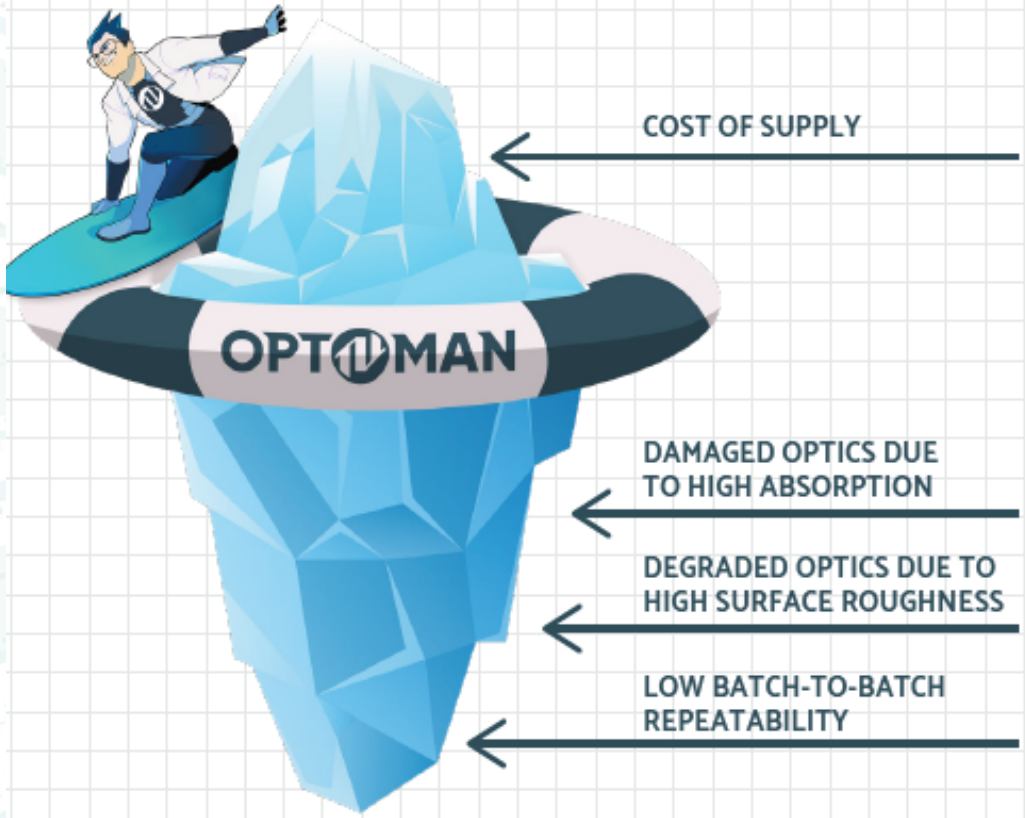
PUSH LIDT TO NEW LIMITS – UV OPTICS

OPTOMAN addresses these challenges and provides optics that lower your total cost of ownership:



WHY NOT METAL OR FLUORIDE COATINGS?

Fluoride coatings:

Soft coatings

↓

High surface roughness

↓

Scattering and rapid coating degradation

Metal coatings:

High absorption

↓

Heating

↓

Laser damage

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PUSH LIDT TO NEW LIMITS – UV OPTICS

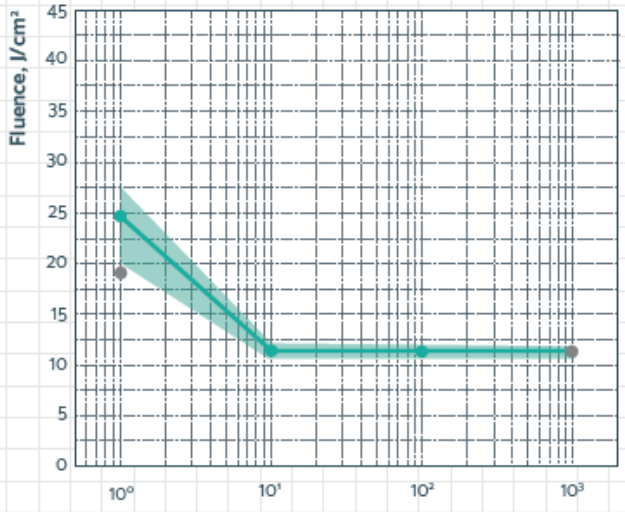
SUPERHERO POWER HIGH REFLECTIVE COATINGS FOR ULTRA VIOLE[N]T LASERS

Laser damage is the arch-enemy of UV optics.

To fight it, one must measure it. So OPTOMAN does, for femtosecond and nanosecond scale.

HR @ 355 nm:

LIDT: >11.20 J/cm² @ 355 nm, 6 ns, 100 Hz, s-pol, 10^3 – on – 1

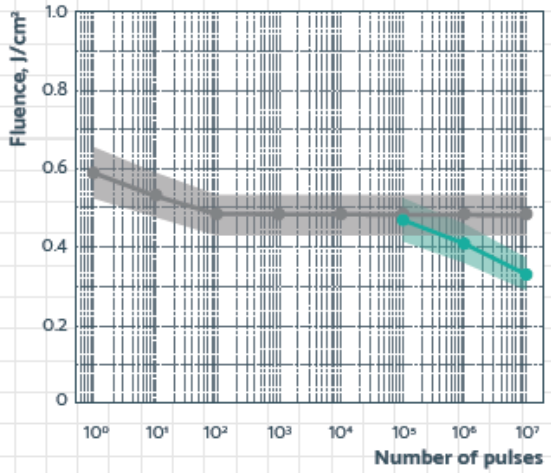


- Offline detection
- Online detection
- 95% confidence interval

Wavelength: 355 nm
Pulse duration (FWHM): (5.7 ± 0.3) ns
Repetition rate: 100 Hz
AOI: 45°
Polarization: Linear S
Beam diameter (1/e²): (218.4 ± 3.3) µm

HR @ 343 nm for ultrafast laser applications:

LIDT (catastrophic): >0.484 J/cm² @ 343 nm, 300 fs, 10^7–on–1
LIDT (color change): >0.332 J/cm² @ 343 nm, 300 fs, 10^7–on–1



- Offline detection
- 95% confidence interval
- Color change
- 95% confidence interval

Wavelength: 343 nm
Pulse duration (FWHM): 300 fs
Repetition rate: 200 kHz
AOI: 45°
Polarization: Linear S
Beam diameter (1/e²): (19.5 ± 0.5) µm

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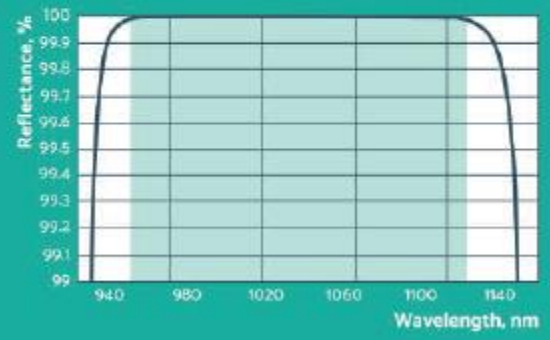
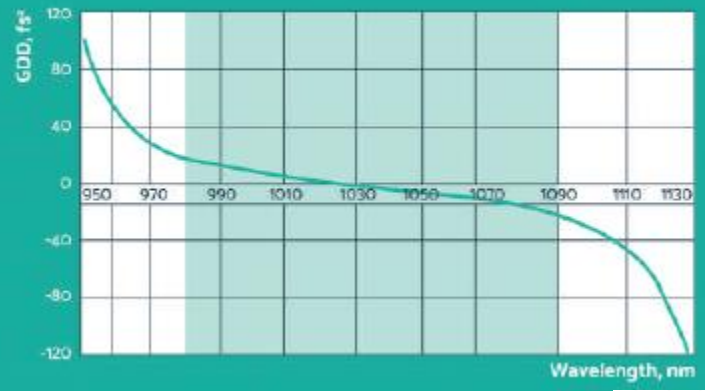
MIRRORS FOR MULTI-PASS CELLS

HR>99.95% @ 950-1130 nm, AOI=0° (IGDDrI < 20 fs² @ 980-1090 nm)

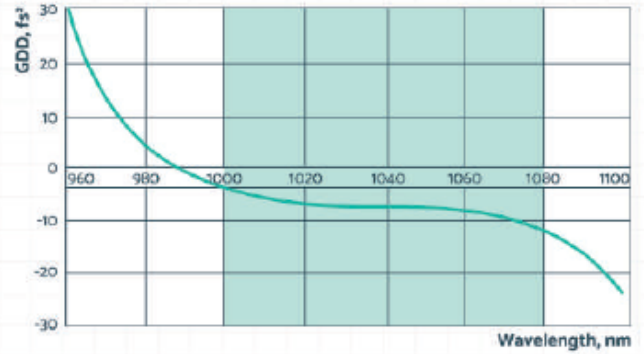




Features:

- Mirrors available in spectral range of 400-2000 nm,
- HR (in gas) > 99.99%,
- Absorption: <1 ppm @ 1030 nm.
- LIDT: > 1 J/cm², 1030 nm, 500 fs, 10 kHz.

Negative GDD optimization
GDD = -10 fs² ± 5 fs² @ 1000 - 1080 nm

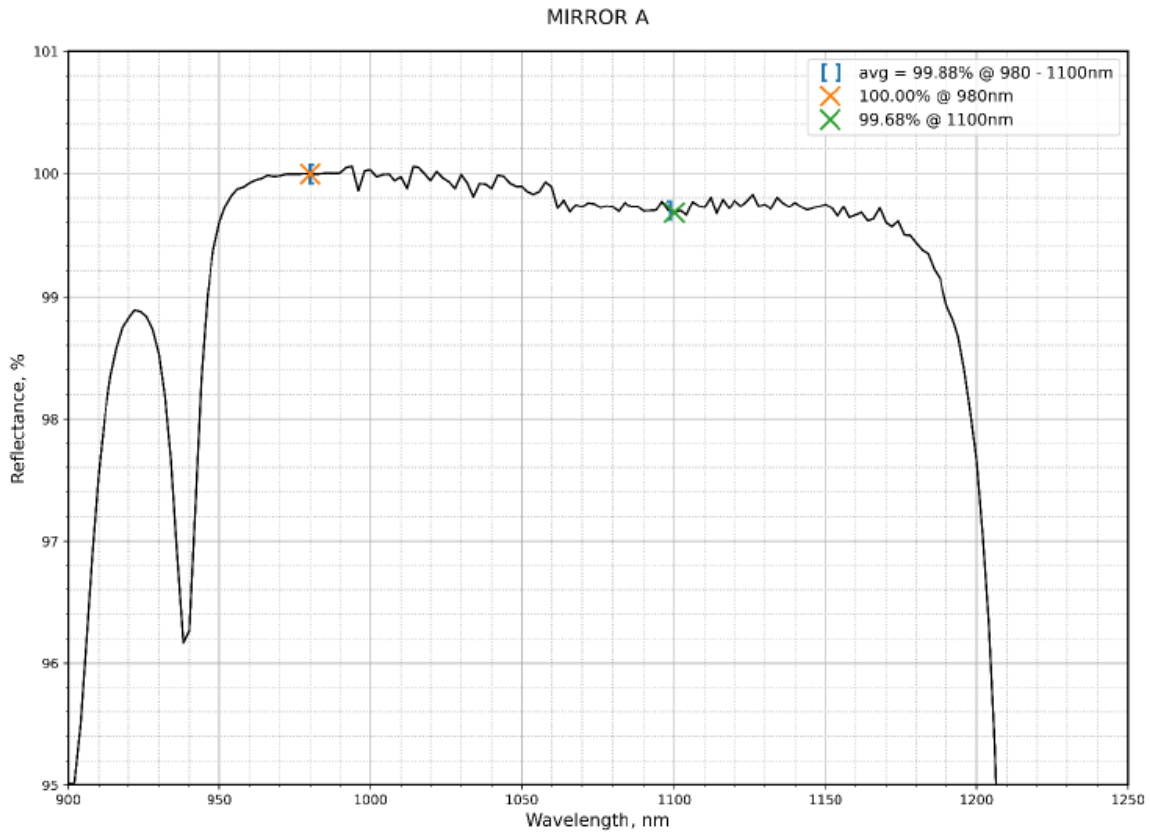


CONTINUOS R&D

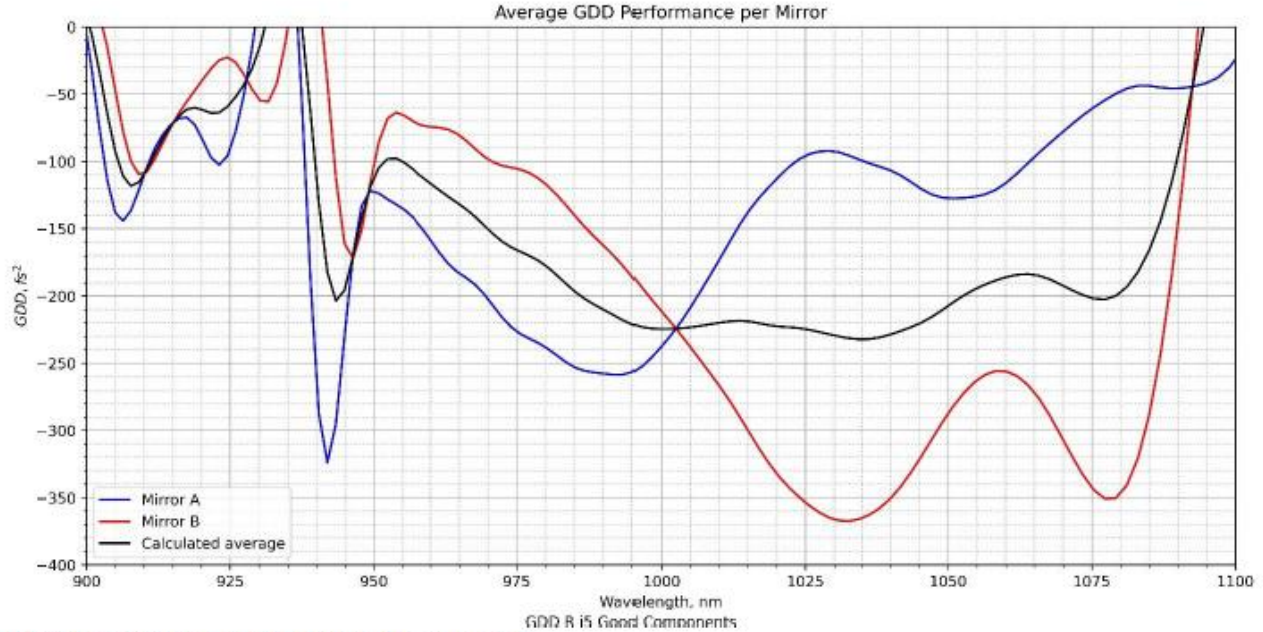
As Lady Dispersion is a tough opponent, OPTOMAN can't stop here. Spectral bandwidth of 300 nm is coming soon...

PAIRS OF CHIRPED MIRRORS

Reflectance of Mirror A



MIRROR A Ra i8 Good Component



Margin of GDD measurement error: +/-20fs^2

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OPTICAL ASSEMBLIES

- Low-outgassing glues
- Possibility of cementing
- Custom assemblies with custom IBS coatings
- Adaptation to specific optical design
- Assembly development
- Possibility for low quantities

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