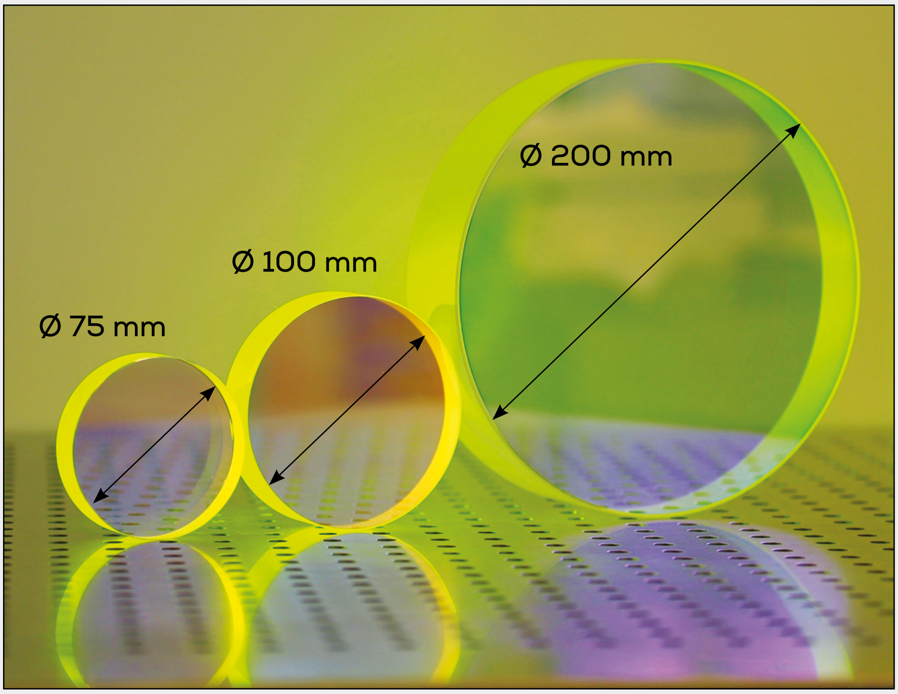
UltraFast Innovations

YOUR KEY to innovation and success

High LIDT large aperture dispersive optics

Ultrafast Innovations GmbH is newly equipped with the HELIOS 800 Gen II magnetron sputtering coating plant of Bühler Leybold Optics. This newest addition has allowed to expand our portfolio since it enables production of large aperture optics. We are currently able to produce up to 200 mm diameter optical components including beam splitters, filters, ultra-highly reflective mirrors and dispersive mirrors.
In addition to the availability of the large aperture optics, we are providing optical coatings with high damage thresholds. Our current damage threshold record for a high reflecting mirror at 1064 nm, 100 Hz stands at 90 J/cm^2 as tested by our partner - Laser Zentrum Hannover (LZH).



Our optics are available in a variety of sizes, up to 200 mm diameter x 50 mm thickness.

Key Product Features:

- Aperture: up to 200 mm diameter
- Reflectance: > 99.99% per bounce
- Laser Induced Damage Threshold (LIDT): up to 90 J/cm^2 at 1064 nm, 100 Hz, 10 ns pulses
- Types of optics: mirrors, beam splitters, thin film polarizers, filters, etc.
- Custom substrate shapes and sizes on request

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UltraFast Innovations is a spin-off from the LMU Munich and the Max Planck Society.

Laser Induced Damage Threshold (LIDT) S-on-1 measurement according to ISO 21254-2:

A typical application of large aperture optics is high-power/high-energy hertz (Hz) repetition rates systems for electron acceleration and high-field science. The ability of the optics to withstand high average powers/energies is a pivotal requirement. Our optics have been tested to withstand up to 90 J/cm² energy density.

Test conditions:

System: Nd:YAG – diode-pumped solid state laser SpitLight DPSS, InnoLas Laser GmbH.
1064 nm @ 100 Hz, 10 ns pulses (FWHM) [1].

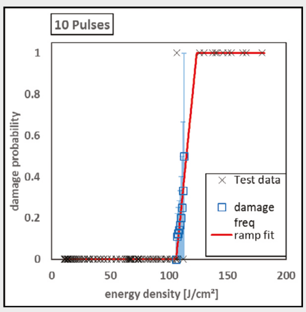
Sample:

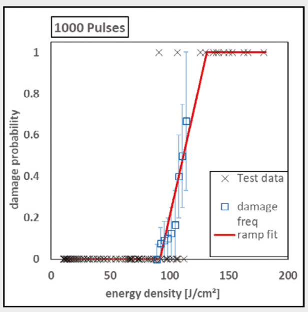
HR@1064 nm, 0° AOI on Corning 7980, 1” diameter x 0.25” thickness;
Surface quality: 10-5 laser grade polishing; Surface flatness: λ/10.

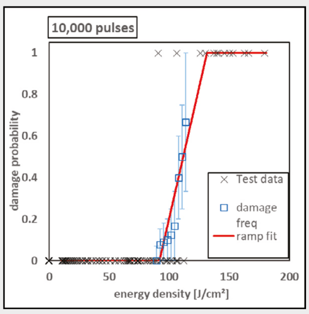
LIDT values for several classes of pulse numbers:

Number of pulses	50%-LIDT [J/cm²]	0%-LIDT [J/cm²]	First observed damage [J/cm²]
10	114.86	106.09	106.51
22	114.86	106.09	106.51
46	114.86	106.09	106.51
100	114.86	106.09	106.51
220	114.86	106.09	106.51
460	111.71	91.92	90.94
1 000	111.71	91.92	90.94
2 200	111.71	91.92	90.94
4 600	111.71	91.92	90.94
10 000	111.71	91.92	90.94

Damage probability plots:







References:

[1] V. Pervak et al., “High damage threshold coating with RF magnetron sputtering,” Laser Damage Symposium 2020 (submitted).