

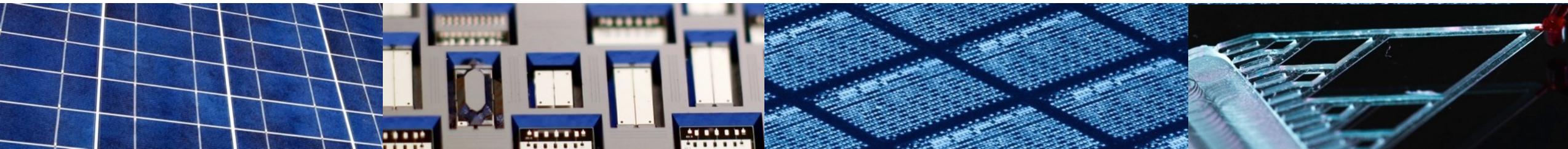


EPIC Online Technology Meeting on Emerging Trends in Laser Micromachining

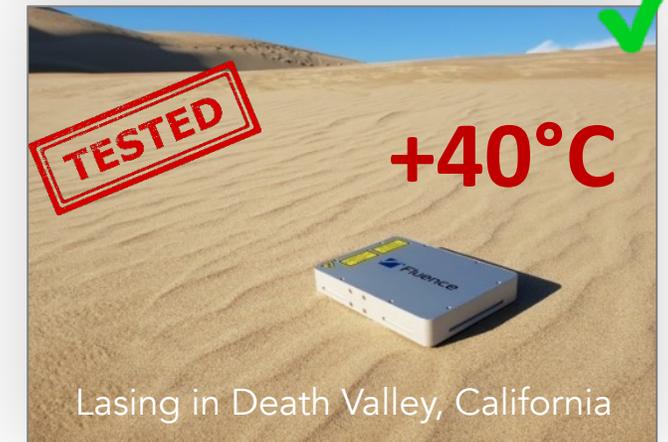
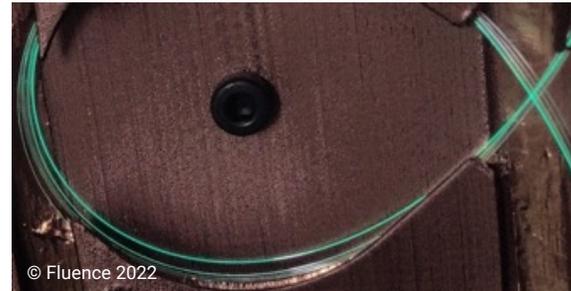
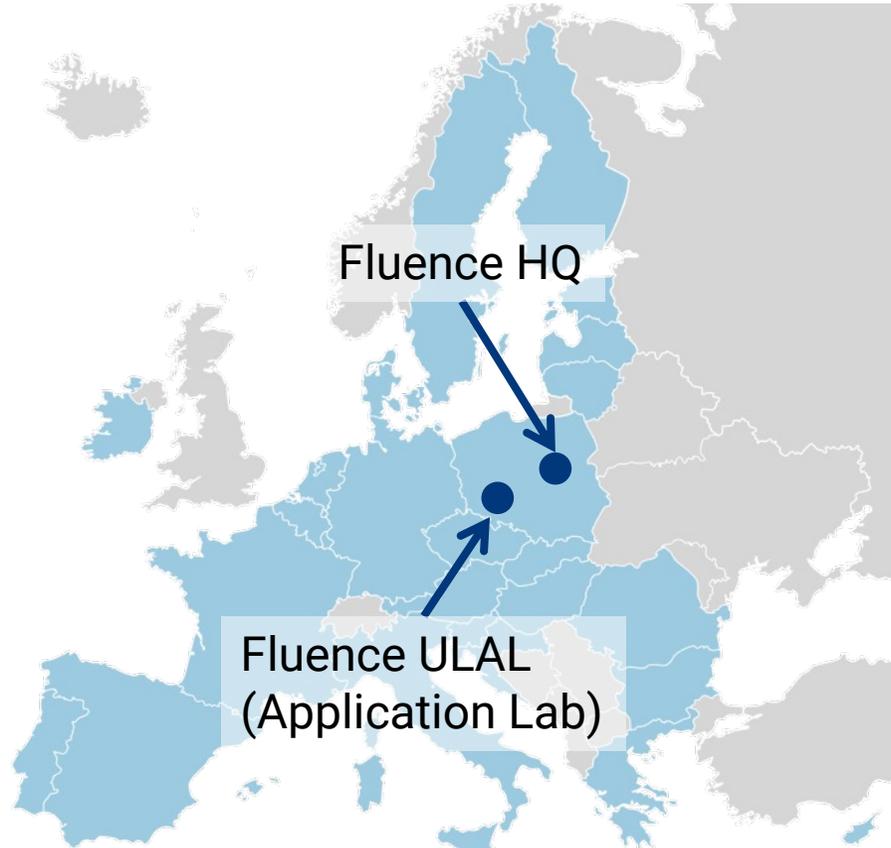
<https://Fluence.technology/>

Dariusz Świerad, PhD
Sales and Marketing Director

12 September 2022



Femtosecond fiber lasers: superior lifetime and performance



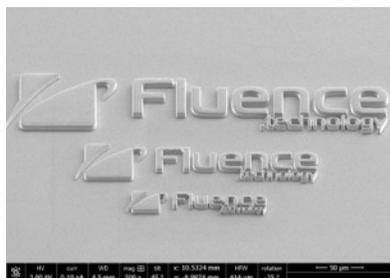
Femtosecond fiber lasers: superior lifetime and performance

Halite

All-Fiber Amplified Femtosecond Oscillator



2 W
100 nJ



2-Photon
Polymerization

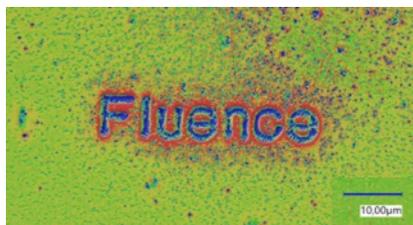
Dariusz Świerad

Jasper Flex

Compact High Power Femtosecond Fiber Laser



30 W
30 μ J



Marking,
Micromachining, etc.

Jasper XO

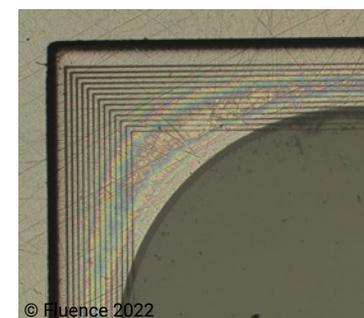
High Power Femtosecond Fiber Laser



Average power: **60 W**
 Max. Energy: **100 μ J** (200 μ J)
 Max. Peak Power: **0.5 GW**
 Pulse duration: **<250 fs – 8 ps**

Most powerful and versatile

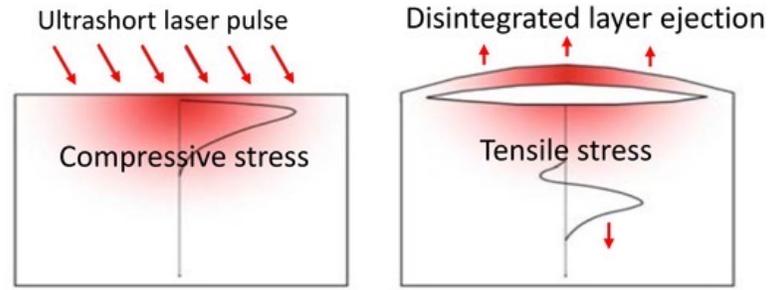
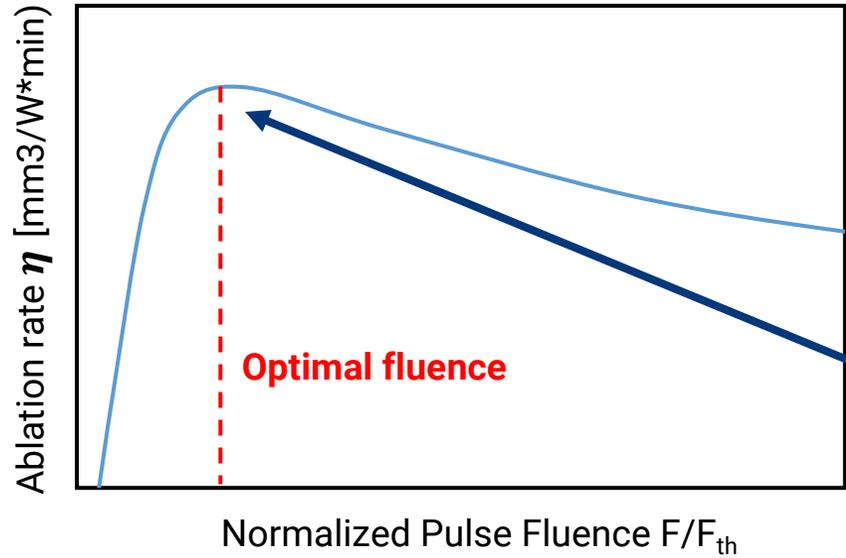
Micromachining



12 September 2022

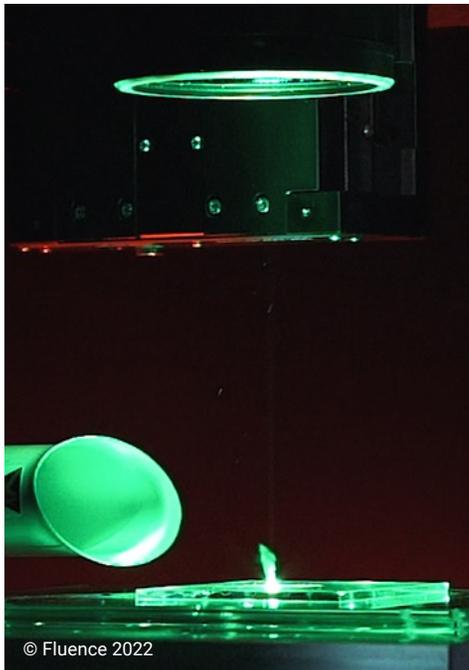
EPIC Online Technology Meeting on
Emerging Trends in Laser Micromachining

Optimal fluence for maximum ablation rate



Spallation mechanism

Förster, Daniel J., et al. "Review on experimental and theoretical investigations of ultra-short pulsed laser ablation of metals with burst pulses." *Materials* 14.12 (2021): 3331.



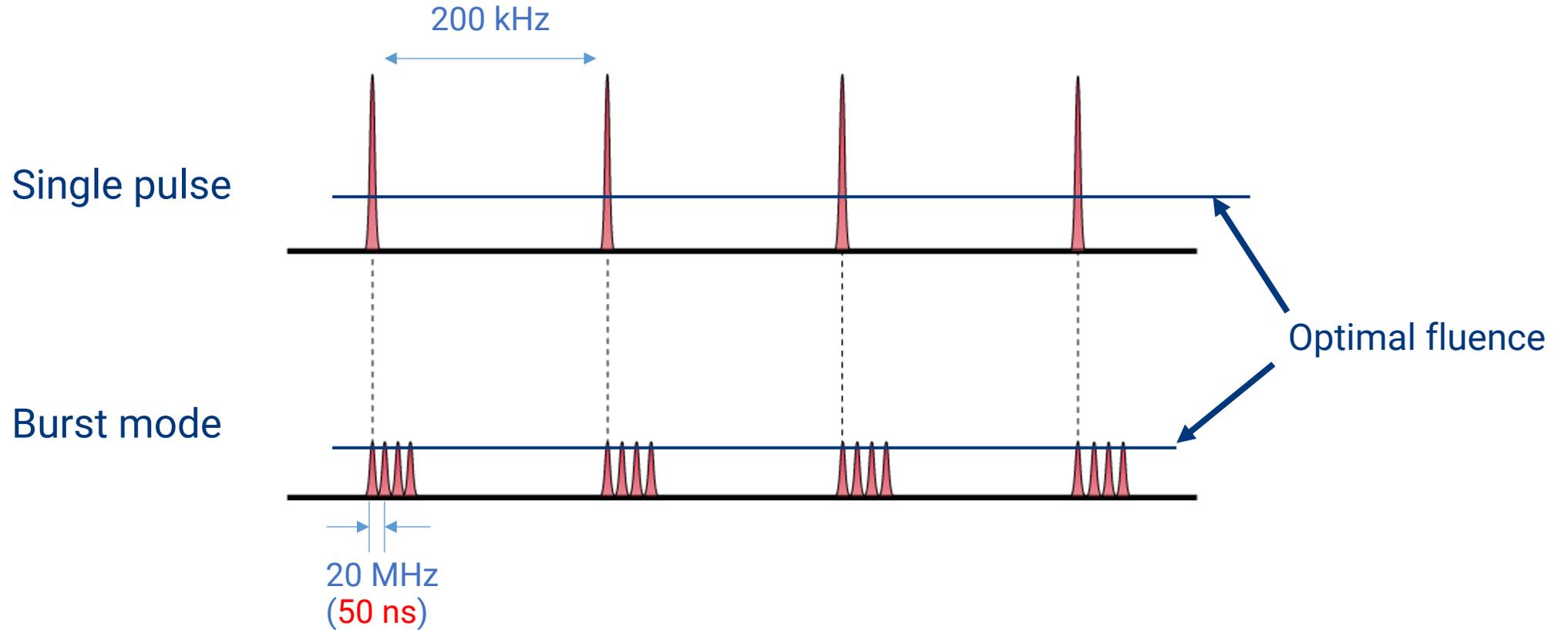
The optimal fluence is low:

- For metals **0.2 – 1.0 J/cm²**
- For dielectrics*: **2 – 5 J/cm²**

Single pulse of 100 μ J and 30 μ m spot size gives average fluence of **14.0 J/cm²**

*depends on wavelength and pulse duration

More pulses with the optimal fluence for higher speeds



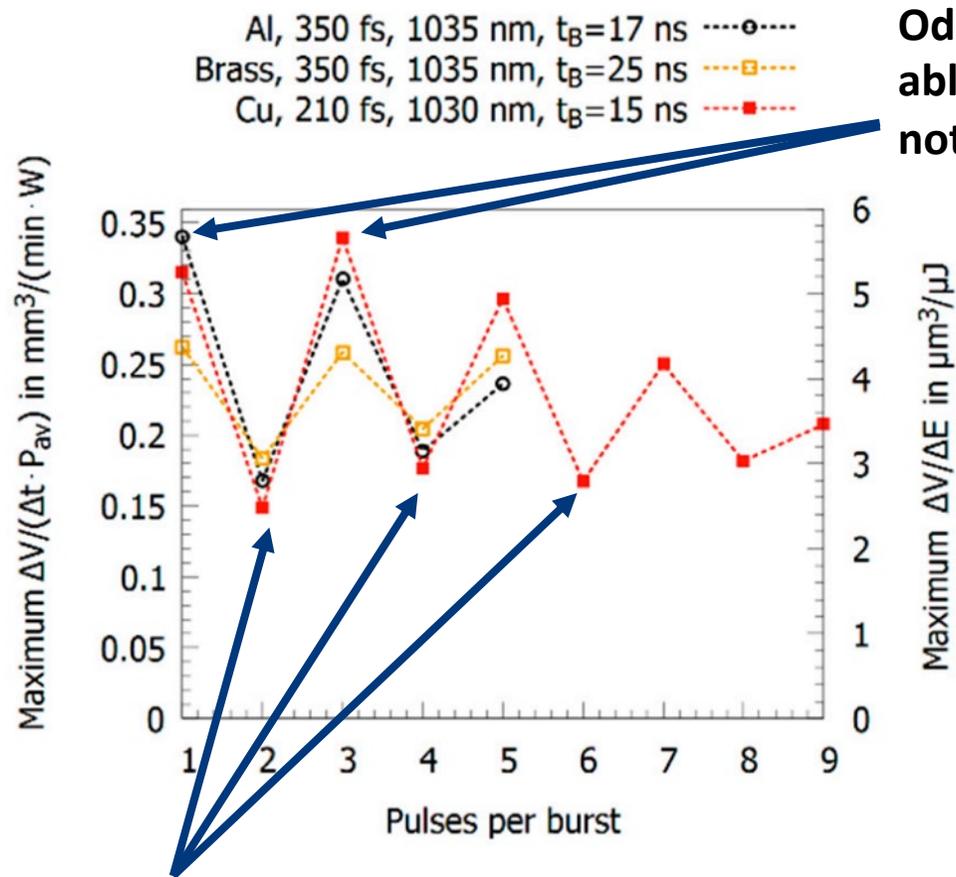
Problem:

- Thermal interaction between bursts
- Shielding effects

Solution:

- Optimal intraburst separation: **50 ns**

Burst mode experimental data

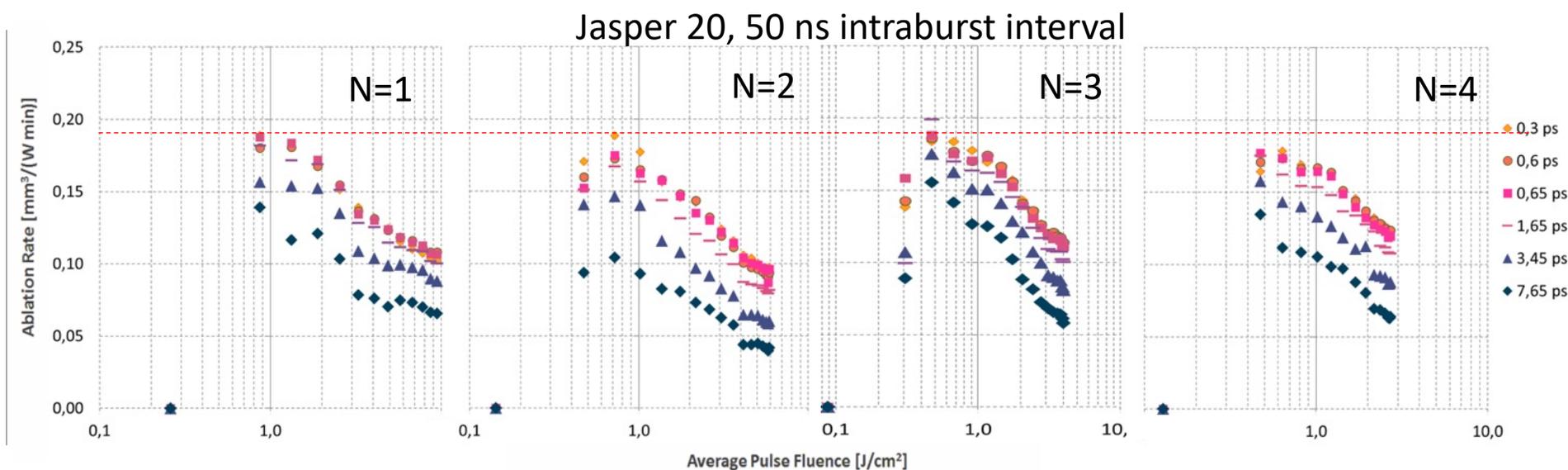
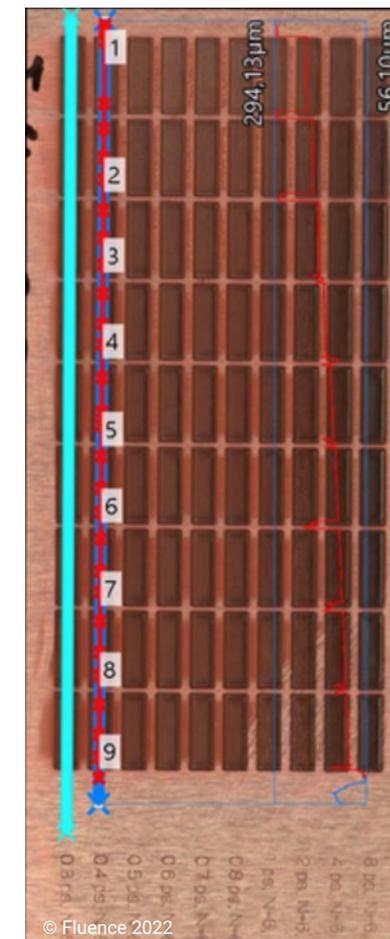
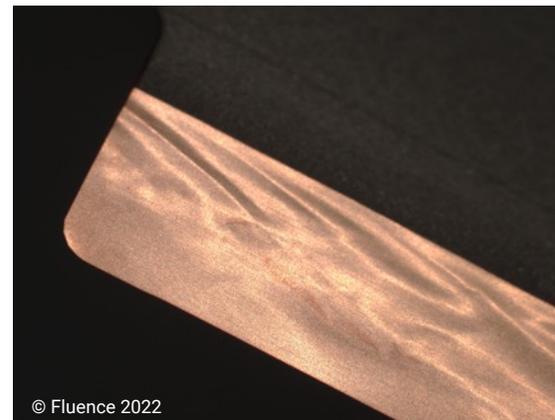


**Odd number:
ablation rate
not affected**

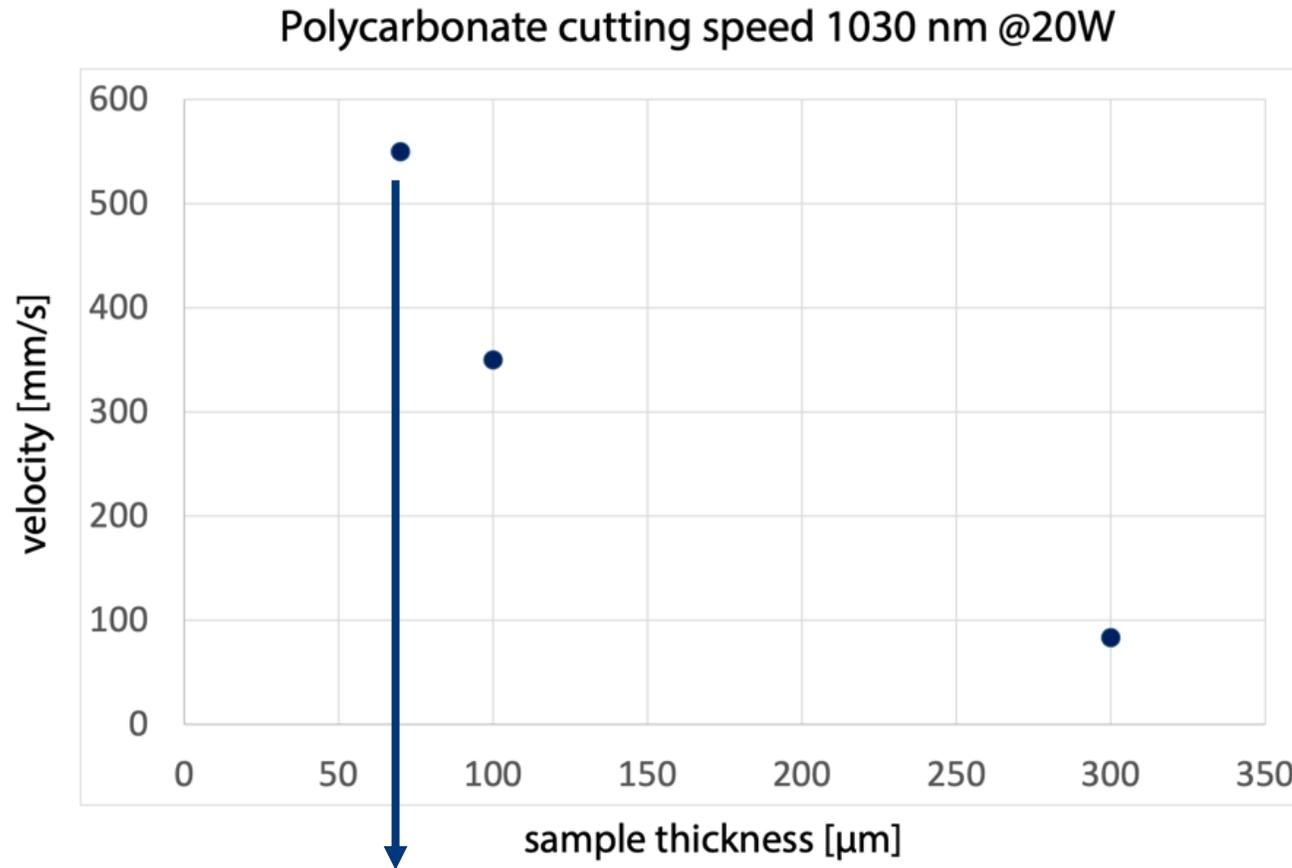
**Even number: too short intraburst
interval - plasma shielding**

Förster, Daniel J., et al. "Review on experimental and theoretical investigations of ultra-short pulsed laser ablation of metals with burst pulses." *Materials* 14.12 (2021): 3331.

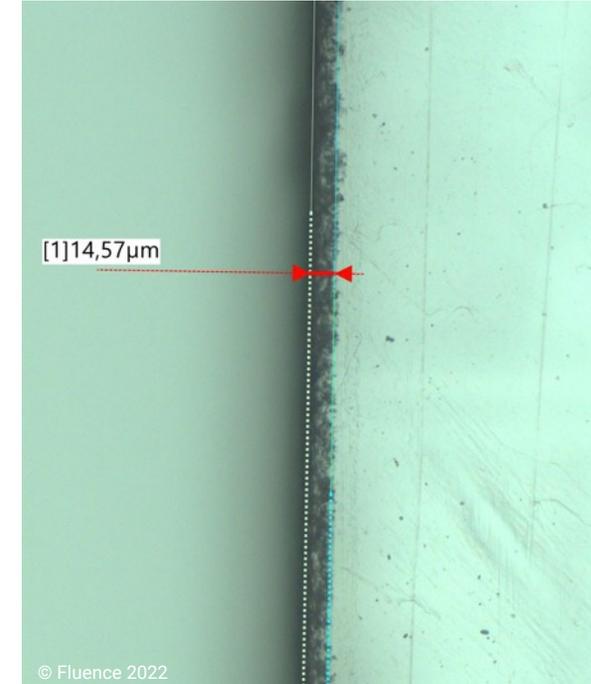
High ablation rates for metal with optimal parameters



Polycarbonate cutting



Cutting speed: >0.5 m/s
Galvoscaner only





Do you need superior lifetime and performance?
Get in touch!

<https://Fluence.technology/>



Dariusz Świerad, PhD
Sales and Marketing Director
d.swierad@fluence.pl
+48 797 890 595

