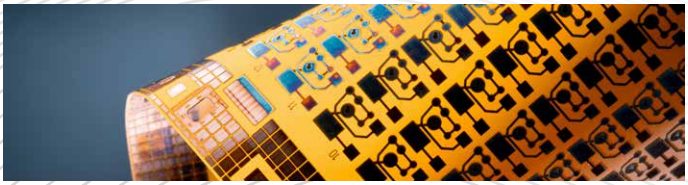
The Innovative Company

Founded in 2001, EdgeWave is a leading provider of cutting-edge laser beam sources. Renowned for spearheading the InnoSlab technology, EdgeWave has established itself as the industry leader. Setting new standards in performance, InnoSlab lasers offer not only superior features but also deliver value added differentiators. They enable customers to enhance existing manufacturing processes, develop novel applications and tap into new markets.
EdgeWave specializes in the development and manufacturing of short and ultrashort pulse InnoSlab lasers as well as peripheral components. Additionally, the company's dedicated application center offers comprehensive consultation services regarding the utilization and integration of such beam sources. EdgeWave caters to a diverse spectrum of industries, including, but not limited to, semiconductor, electronics, battery, hydrogen, photovoltaic, printing and more.

The Technology

EdgeWave's key products are diode-pumped solid-state lasers, based on the unique InnoSlab technology. Through an optimal combination of a slab shaped laser crystal, line shaped diode laser beam, large area conduction cooling and hybrid resonator design, InnoSlab lasers exhibit a unique array of characteristics that distinguishes them from other laser types:

- **constant high beam quality**
- **variable pulse length**
- **high pulse energy and high peak power**
- **high pulse repetition rate and average power**
- **scalability at high performances**
- **low cost of ownership**



The Application

Through the implementation of InnoSlab technology, the property profiles of EdgeWave lasers can be precisely customized to meet the specific requirements of a wide range of applications:

- **semiconductor industry, e.g. wafer dicing, milling, drilling and cutting, EUV generation**
- **electronics industry, e.g. milling, drilling and cutting of printed circuit boards**
- **hydrogen technology, e.g. drilling, structuring of electrodes**
- **glass industry, e.g. milling, drilling, cutting and marking**
- **printing industry, e.g. engraving of embossing cylinders**
- **photovoltaic, e.g. scribing, drilling and cutting of solar cells**
- **battery technology, e.g. surface structuring, cutting**
- **scientific, e.g. pumping of dye lasers, pumping of OPO and Ti:Sapphire lasers, particle imaging velocimetry**

The Product

EdgeWave offers a comprehensive range of standardized and customized short and ultrashort pulse InnoSlab lasers.

Parameters of short pulse lasers:

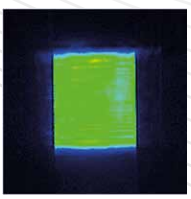
- **beam quality:** $M^2 < 1.2$
- **pulse energy:** up to 120 mJ
- **pulse length:** down to 1 ns
- **peak power:** up to 20 MW
- **pulse rep. rate:** up to 200 kHz
- **average power:** up to 800 W
- **wavelength:** IR, VIS, UV, DUV

Parameters of ultrashort pulse lasers:

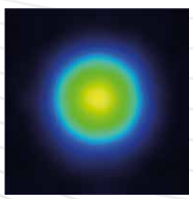
- **beam quality:** $M^2 < 1.2$
- **pulse energy:** up to 3000 µJ
- **pulse length:** down to 300 fs
- **peak power:** up to 3 GW
- **pulse rep. rate:** up to GHz
- **average power:** up to 600 W
- **wavelength:** IR, VIS, UV, DUV

The Tailored Beam Profiles

InnoSlab lasers boast a distinctive attribute in the form of their customizeable beam profile. It can be configured as circular gaussian, one-dimensional line-shaped top-hat or two-dimensional rectangular/square top-hat, tailored to suit diverse application needs.

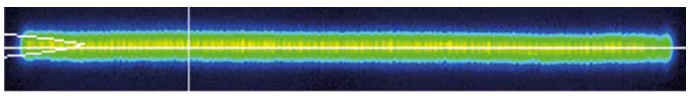


square top-hat



circular gaussian

rectangular top-hat

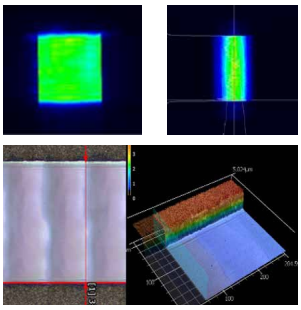


line-shaped top-hat

InnoSlab Lasers

Application Examples

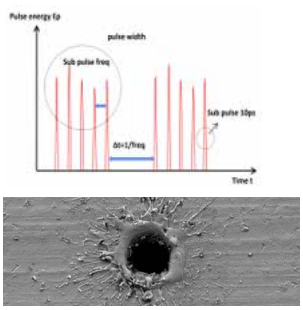
Tailored Beam Shape for Film Patterning



- 1D top-hat / 2D top-hat
- Wavelength: IR, Green, UV
- Pulse length: ns, ps, fs
- Energy up to multi mJ

· BIPV patterning, LIFT/LLO, Low-E coating deletion
· High energy and large spot size
· Area rate 30 cm²/(min·W)

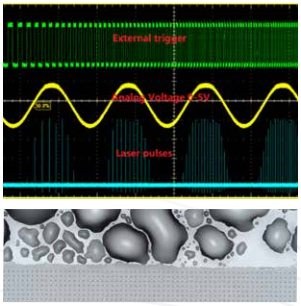
Versatile GHz Pulse for Volume Subtraction

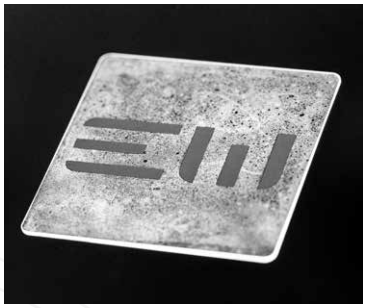


· MHz or/and GHz, incl. burst-in-burst
· Wavelength: IR, Green, UV
· Pulse length: ps, fs
· Power up to 600 W

· Hydrogen energy, water treatment, Semiconductor dicing
· Scan/Punch process
· Ablation rate:
  Steel: 0.5 mm³/(min·W)
  SiC: 0.3 mm³/(min·W)

High Frequency Pulse for Surface Texturinng

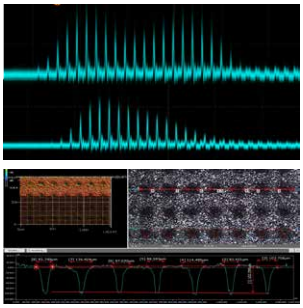


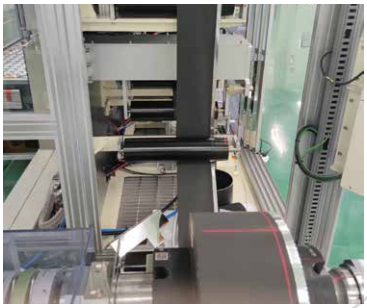


· Free Trigger up to 8 MHz
· Addressable pulse energy
· Pulse length: ps, fs
· Gaussian, top-hat

· Hydrophilic/hydrophobic, anti-fog/anti-corrosion surface properties
· Arbitrary patterning/ functionization
· PSO function at very high speed

Tunable Pulse Form for Structuring

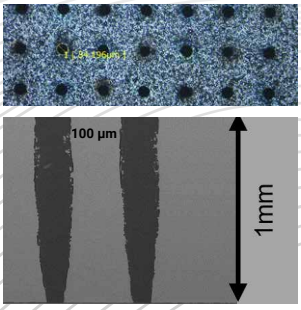


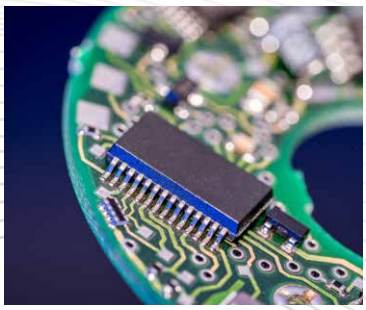


· Programable pulse profile
· Rep rate up to 8 MHz
· Power up to 600 W
· Energy up to 20 mJ

· Solid-state batteries
· Surface deterministic/statistic structuring, film cutting
· 250 W up to 378,000 holes/s

High Energy Pulse for Through Vias Drilling

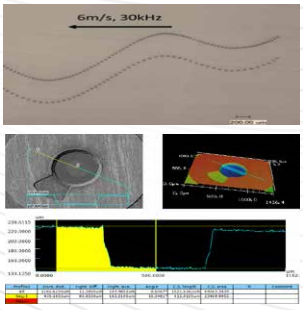


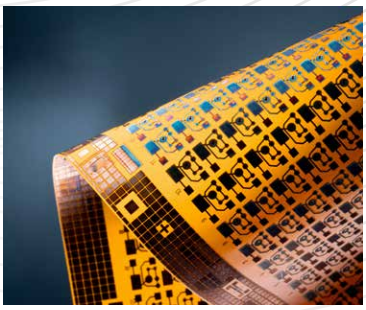


· Adjustable pulse length: ns via µs to cw
· Flexible rep rate: single shot to 8 MHz
· Wavelength: IR, power up to 600 W

· 3D packages / 3D MEMS in electronic engineering
· Through Via drilling by punch
· High energy for large aspect ratio, >1:10 vias on 1 mm thick Si wafer

Free Triggerable Pulse for Microelectronics





· Free Trigger up to 8 MHz
· Analog modulation of pulse energy up to 2 MHz
· Wavelength: IR, Green, UV
· Pulse length: ns, ps, fs

· Blind Vias in flexible PCB
· PSO signal enhanced constant pulse density
· Scalable process speed with high frequency/high power lasers

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