



**Custom Pulsed Fiber Lasers**  
(High Energy Pulses Down To Single-Shot)



**Pulsed Fiber Lasers (MOPA-M, MOPA-PV, MOPA-SM)**  
(for Materials Processing, Photovoltaics, Precision  
Marking and Engraving)



**Pulsed Fiber Lasers (MOPA-L)**  
(for LIDAR and Ranging)

## What we offer

Multiwave offers next generation pulsed fiber lasers that allow the user to control its key operating parameters in unique ways, as well as other types of innovative optical sources based on fiber-optic technologies.

## Where resides our strength

Multiwave's strength resides in the breath and depth of experience of its team in designing, developing, testing, engineering and integrating all key technologies and building blocks that are necessary to build reliable high performance fiber lasers: fiber-optic components, packaging, thermal management, real-time control electronics, firmware and user control interfaces.

### Multiwave Photonics, SA

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#### Glossary:

MOPA: Master Oscillator Power Amplifier  
PM: Polarization Maintaining  
SPM: Single Polarization and PM  
ASE: Amplified Spontaneous Emission

## Who are we

Multiwave was established in September 2003. The team includes highly experienced managers, scientists, engineers and technicians focused on resolving customer needs, with a full commitment to deliver superb customer value with ISO 9001:2008 and NP4457:2007 quality.

Multiwave's team formed over 15 years during which it implemented R&D, product development and industrial management activities focused on exploring the advantages and potential of fiber lasers and fiber-optic technologies. During this period the team published over 100 scientific papers in leading journals, filed over 10 patents and proved itself in industrial projects. Multiwave operates in a custom designed facility near Porto, in northern Portugal, that includes a clean room for fiber-optic component fabrication and packaging, as well as facilities for product development, testing and manufacturing.

## Who advises us

Multiwave receives strong support from leading academic and industry experts.

### • Business Advisory Board

- Prof. Robert Byer, Stanford University
- Dr. Antonio Dias, Photonics Consultant
- Dr. Nadim Maluf, EIR at US Venture Partners

### • Scientific Advisory Board

- Prof. Anthony Siegman, Stanford University
- Prof. Joseph Goodman, Stanford University
- Prof. Erich Ippen, MIT
- Dr. Michel Dignonnet, Stanford University

## Key Products (1)

### MOPA-M Pulsed Fiber Lasers

*for Materials Processing*

- Next generation pulsed fiber lasers that offer much flexibility for materials processing:
  - User-controlled laser pulse bursts over a wide operating range
  - Laser pulses with peak power locked to the maximum peak power as the pulse width is made shorter and/or the pulse repetition frequency is varied down to single-shot
- Pulse width selectable from 10 ns to 200 ns
- Pulse repetition frequency from single-shot to 500 kHz
- Maximum pulse energy >0.6 mJ, maximum peak power >12 kW
- No residual lasing between pulses, allowing cleaner processing
- Simple and effective control interface; easy integration
- Optional CDRH compliant power supply and control unit available

### MOPA-PV Pulsed Fiber Lasers

*for Photovoltaics*

- Optimized for shorter pulses and higher throughput

### MOPA-SM Pulsed Fiber Lasers

*All single-mode-fiber design*

- Entirely built with single-mode fiber technology for diffraction-limited output
- Maximum peak power ≈1.5 kW
- Extended operating range: 10 to 200 ns, single-shot to 500 kHz
- No residual lasing between pulses

## Key Products (2)

### MOPA-L Pulsed Fiber Lasers

*for LIDAR and Remote Sensing*

- Single frequency 3 ns pulses at 1550 nm, 25 μJ pulse energy
- Peak power >5 kW, average power >1 W, 20-150 kHz
- Single-mode fiber laser design, diffraction limited output beam

### Other Products

- Broadband / Narrowband ASE Sources at 1 μm
- Tunable Narrowband ASE Source at 1 μm
- PM and SPM Yb and Er Doped Fiber Amplifiers
- Compact Laser Diode Driver - Lasers, SOAs, SLEDs

## Contract Dev. & Services

Multiwave also offers custom product design and development services to deliver cost-effective and reliable products meeting specific customer requirements. Multiwave works closely with customers to ensure complete satisfaction. Multiwave also provides engineering and training services to its customers. Please contact Multiwave for details.