PHOTONICS NEWS

Company Newspaper of the LASER COMPONENTS Group

July 2013
Issue 30

FLEXPOINT® MV femto – Shorter than a Match

Laser Modules for Industrial Image Processing

Shorter than a match, thinner than a pen: this is the MV femto, the smallest line laser for industrial image processing.

The new laser module measures 8 mm in diameter and is 40 mm long, which makes it suitable for 3D laser sensors that offer very little space.

We watch your waistline: the focus of the MV femto is factory-set to the working distance you require. This allows you to achieve the best line quality possible (i.e., as small and homogeneous as possible). The line thickness can be reduced to as low as 20 µm. Standard homogeneity reaches ± 20%, and enhanced homogeneity can even reach ± 15%.

Further specifications: the MV femto is available in two different wavelength ranges – red (635–660 nm) and NIR (785–850 nm). The maximum output power is 50 mW.

The line lasers can be operated with a voltage between 4.5 and 30 VDC. The laser modules are available with digital modulation or power control upon request.

Like all FLEXPOINT® lasers we can also customize the MV femto to fit your requirements. Just inquire with us, and we will take care of it!

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Win an iPad with Retina Display

Feel free to enter our contest. Simply answer the questions below and either e-mail them to contest@laser-components.com or Fax to (603) 821-7041. Those who are bold enough to play and answer 3 of the 5 questions correctly will be entered into a drawing on July 31st, when the winner will be rewarded with a new Apple iPad. To get you started here is a hint: all answers can be found in this Photonics News issue or on our Web site.

1) What coating technique does LASER COMPONENTS use to produce optics with high damage thresholds that are superior in femtosecond (fs) lasers?
2) What company produces the glass polarizers that LASER COMPONENTS sells?
3) What spectral region does the COUNT® Q count photons in?
4) What is the name of the laser at the Berkeley Lab Laser Accelerator project that uses optics produced by LASER COMPONENTS?
5) Who is your favorite LASER COMPONENTS employee?

We hope you give it a go – good luck!

By the way, LASER COMPONENTS is hiring a new sales engineer. For further information simply follow the QR code.

Gary B. Hayes
CEO / General Manager

LASER COMPONENTS Exhibits the Highest Damage Thresholds

French Petawatt Laser in the U.S. Equipped with German Mirrors

World record: the average power of the French laser is lower than the power of an average light bulb. Nevertheless, it holds the world record for power.

This is the Berkeley Lab Laser Accelerator (BELLA) project. In July of 2012, petawatt pulses were created for the first time that exhibit a power of $1.3*10^{15}$ W at a repetition rate of 1 Hz and a pulse duration of 40 fs. This corresponds to an average power of 40 W – a ridiculously small number for a light bulb; however, this is a matter of peak power levels achieved by compressing the average power into extremely short pulses: petawatts! A petawatt is more than the combined capacity of all power plants worldwide.

The expectations of the BELLA laser were high: it was supposed to become the first laser plasma accelerator to produce an electron beam with an energy of 10 GeV.

What sounds easy in theory looks pretty different in its practical implementation: BELLA is a compact particle accelerator. Across a distance of about 1 m, energies of 10 billion electron volts [GeV] can be reached. In comparison, the Stanford linear accelerator requires about 3.2 km to reach a power of 50 GeV.

In "conventional" particle accelerators, modulated electrical fields are used to accelerate charged particles such as protons or electrons. The BELLA laser accelerator, however, uses short laser pulses to separate electrons and ions in plasma in order to create strong electrical fields. These fields travel through the plasma and are used for acceleration.

The BELLA project laser is based on the chirped-pulse amplification (CPA) technique. A dozen synchronized pump laser systems create the input pulse for the CPA. Using optical elements the pulse length is temporally stretched, amplified, and subsequently compressed in order to generate femtosecond pulses of the highest power levels.

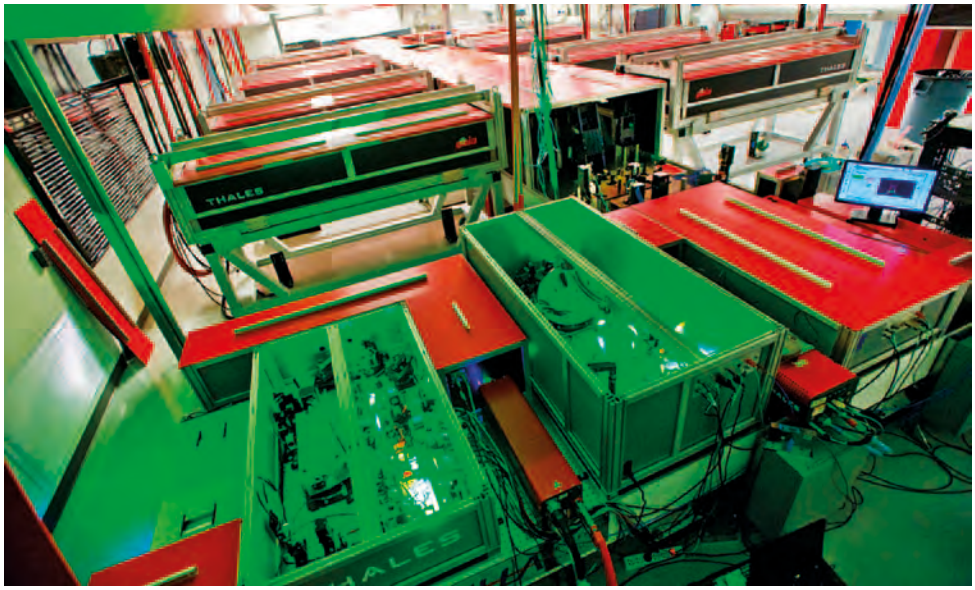

Photo Roy Kaltschmidt, Lawrence Berkeley National Laboratory

In the construction of this laser by the French company Thales, mirrors that were produced in house at LASER COMPONENTS were integrated. Prior to choosing the mirrors, Thales tested different manufacturers. Important aspects in the selection of suitable components included the possible size of the substrates to be coated, the reflection range, and the damage threshold at ps and fs pulses. We provided both our standard e-beam fs coating as well as our high power coating for testing, the latter of which impressed our customer.

Compared to other vendors, our mirrors achieved damage thresholds that were twice or even three times as high. Our standard high power coatings are coatings produced through physical vapor deposition (PVD) using an electron beam evaporation source, also called an e-beam. Another advantage for this project is the fact that, using this technology, we are able to produce large substrates at competitive prices in house.

We are very excited to have been able to contribute to the success of the BELLA project with our components. With the help of this compact setup, scientists in elementary particle research hope to develop new applications. The use of this high energy laser beam in security technology is very promising. The collimated laser beam can penetrate cargo in a non-destructive way, allowing inspectors to check the contents of packages from a distance.

With minor modifications, the BELLA laser can be used to generate narrow-banded X-ray radiation. In medical applications this could lead to particularly high resolution X-ray images.

Laser Optics according to Your Requirements

We will gladly contribute to the success of your project as well. LASER COMPONENTS manufactures laser optics based on customer specifications, even in small numbers. Depending on the requirements, we employ different coating technologies:

Physical vapor deposition (PVD) is the classic process. Here we have the option of manufacturing special fs as well as high power coatings. Both types of coatings feature the highest damage thresholds possible. The fs coating is only used in fs or cw lasers and excels with very high damage thresholds: an HR coating, for example, can achieve values of 0.5 J/cm² at 150 fs.

Very low-drift coatings, however, are produced using an IAD source. By employing an additional ion source, denser layers can be achieved. This has resulted in coatings that feature a lower drift compared to conventional methods.

We have had an ion beam sputtering (IBS) coater in house since 2010 for complex coatings which achieves even denser layers with a high damage threshold.

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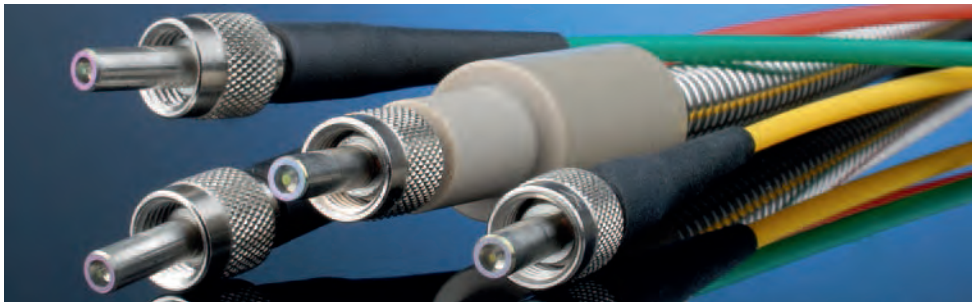
6% Higher Transmission Efficiency

AR-coated Optical Fiber Assemblies

Official measurements have confirmed it: Optical fibers with coated end surfaces yield a 6% higher transmission efficiency – and the coating is inexpensive!

LASER COMPONENTS has manufactured laser optics with hard dielectric coatings for almost 30 years now. Our technical know-how has been transferred in the past few years to the coating of optical fiber end surfaces and been made available for entry into the market!

After assembly, the fibers are coated using physical vapor deposition (PVD) to achieve high damage thresholds. Due to this fast coating method and flexible capacities, these coatings are surprisingly inexpensive.



Different Anti-reflection Coatings

Anti-reflection (AR) coatings are available for one, two, or three wavelengths. You may choose from the following options:

- Single AR: Coating for one wavelength (e.g. 808 nm)
- Dual AR: Coating for two wavelengths (e.g. 808 nm + 980 nm)
- Broadband AR: Coating for a wide wavelength range (e.g. 460 –700 nm)

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Small, Smaller, Smallest

The Smallest OEM Laser Modules–The LC LMD Series

These are the smallest laser modules available worldwide, and they are available in stock in several wavelengths. The complete modules are barely larger than the laser diode itself and have the advantage that the entire drive electronics is already integrated!

Our Smallest Laser Module

The smallest laser module, a 650 nm dot laser available either in a plastic or a metal housing, has a diameter of 3.3 mm. Depending on the version, the maximum output power is less than 0.9 mW / 3.0 mW.

For larger diameters between 6.2 mm and 10.5 mm, wavelengths other than 650 nm are also available: 635 nm, 780 nm, and 850 nm. Would you like to focus the laser beam? We also offer a product for this purpose, even at an output power of 2.0 – 5.0 mW.

Our Smallest Line Laser

With a fan angle of more than 120°, LASER COMPONENTS offers the smallest line laser in its product range: The laser module, which emits at 635 nm (in the photograph, on the right), has a diameter of 11.5 mm and a length of 30 mm.

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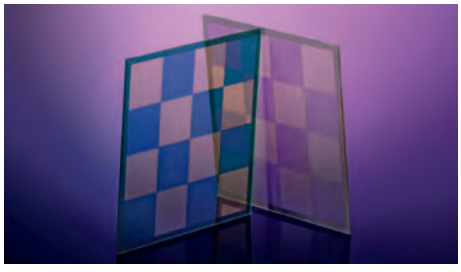
Unique Technology for Patterned Polarizers

Multiple Polarization Axis in Different Polarizer Regions

CODIXX's uniform polarizers exhibit high extinction ratio (ER) of 100K+:1, depending on high transmission values across the *entire* polarizer, with excellent temperature and environmental robustness for use in the UV, Vis, NIR, and Mid-IR regions.

Many applications like polarization analyzers, optical interferometric analyzers, hyper-spectral imaging require multiple polarization: 0°, 45°, 90° in different regions of the same polarizer, a pixel pattern. CODIXX's patterning technology enables regions orientated in *different* directions/wavelengths/performances. Mosaics are segmented polarizers in complex structures. Current lithographic designs enable a precise, higher resolution, see picture. Often these patterned polarizers exhibit CODIXX's classic high ER.

CODIXX continues at the forefront of patterned polarizers and has been developing new designs where even higher resolution is even more critical than typical CODIXX high ER. Stay tuned for future issues of Photonic News as this technology develops.



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InGaAs APD-based Photon Counter

COUNT® Q: Counting Photons up to 1650 nm

Individual photons play an important role in many quantum research experiments. In order to detect these photons, counting modules that possess a high sensitivity in the near IR are required. LASER COMPONENTS introduces an InGaAs APD-based photon counting module under the name COUNT® Q. The existing product portfolio of photon counters will be optimally expanded by this new module.

The COUNT® Q can be used in the spectral region between 900 nm and 1650 nm. Further technical data can be found in the datasheet available on our website.

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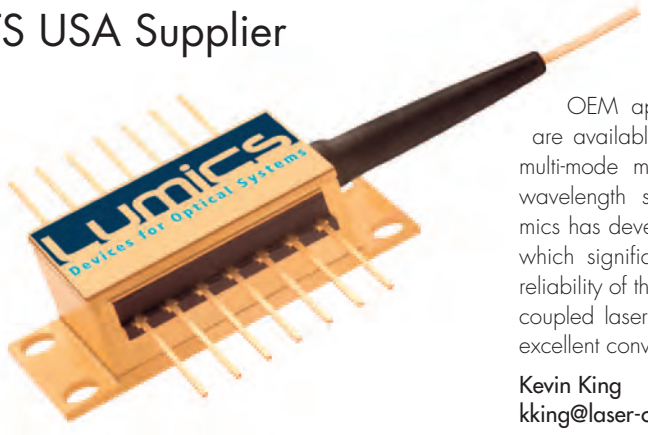
LASER COMPONENTS

Lumics GmbH

New LASER COMPONENTS USA Supplier

We are pleased to announce an exclusive distribution arrangement where LASER COMPONENTS will act as a business development resource for the Lumics GmbH line of high-performance semiconductor laser products in North America. Lumics GmbH production of laser chips in the wavelength region of 750 nm to 1550 nm is based in Berlin. Single-mode and multi-mode diodes that are fiber coupled are available for seed lasers in fiber lasers, sensing, medical, materials processing and illumination



OEM applications. Single-mode modules are available up to 500 mW of cw power, multi-mode modules up to 900 W. Custom wavelength solutions are also available. Lumics has developed a breakthrough technology which significantly improves performance and reliability of their laser diodes that results in fiber-coupled lasers having high power density and excellent conversion efficiency.

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