PHOTONICS NEWS

Company Newspaper of the LASER COMPONENTS Group

January 2013
Issue 29

For the Highest Energy Densities in the Laser Cavity

Laser Optics for IR Wavelengths

Kidney stones are effectively shattered using shock waves. These shock waves are being created more and more with the help of laser systems (i.e., with lasers that emit in the mid-IR range between 2 µm and 3 µm, the two absorption wavelengths of water).

Our coated laser optics can be found in the cavity of many medical laser systems. As the quality and performance of these systems continue to increase, the components on the inside of these systems must also improve. Large pulse energies in these lasers require excellent damage thresholds of the laser optic coatings. High absorption rates of water and OH groups demand coating systems that are void of water molecules and selected substrate materials, such as for example sapphire or Infrasil®.

Know-how is required to manufacture coatings in the mid-infrared wavelength range (i.e., the wavelength range that meets medical requirements). We have used ion beam sputtering (IBS) technology for this purpose with great success.

IBS Coatings – Low Dispersion & Stable

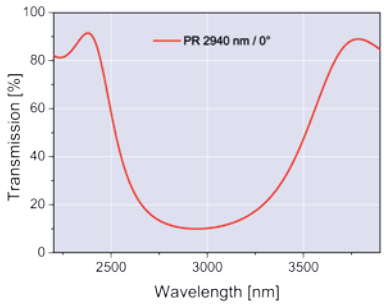
To produce IBS coatings, ions are accelerated in precious gas plasma at high energy toward a target. Highly-pure, dielectric material is thereby atomized and then condensed on the surface of the substrate. This method can be controlled so exactly that the desired optical properties can be precisely achieved.

Dispersion of the layers is extremely low. The layers have a high density and a low microroughness. The absorption is barely measurable. Stable when confronted with chemicals, moisture can barely penetrate the coating.

To reproduce the coating, a computer-controlled system records the growth of the layers and regulates the coating unit fully automatically.

Damage Threshold Ten Times Higher

The graph shows the transmission curve of a sapphire output coupler for Er:YAG lasers. The coating has a reflection rate of R=90% on the front side and an AR coating for λ=2.94 µm on the back side. Customer measurements confirm an improved damage threshold that is ten times higher than in a conventional e-beam coating!



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Thank You…

LASER COMPONENTS USA, Inc. experienced a very successful 2012 year. Significant revenue growth was realized at what we think is impressive at 39%. We found the 2012 economy to be robust with growth in diversified sectors and across customers. We would like to thank our customers as well as our suppliers for their support. We are pleased and happy that they also grow along with us.

Team LC USA looks forward to working with you in 2013 and beyond!

Gary B. Hayes
CEO / General Manager

405 nm and 445 nm Line Lasers

New Trend Color in Industrial Image Processing

Wavelengths between 400 nm and 450 nm are becoming more and more popular in machine vision applications. Blue line lasers provide a strong contrast, particularly when measuring red objects. They are, therefore, primarily used to measure red-hot steel. They are also used in the food processing industry (e.g., to classify salmon). The shorter wavelengths produce a thinner line than their red counterparts and thus enable higher resolutions.

All FLEXPOINT® MV modules are, therefore, available with a violet 405 nm and a blue 445 nm beam, effective immediately. The output power is in the range between 1 mW and 400 mW.

Beam profile. We will equip your laser with the required beam profile. Let us know which profile you desire and we will take care of it for you. Your profile options include the following: a homogeneous line, multi-lines, dot matrices, crosshairs, or circle lasers.

MV series. The right module is available for each application! Of the machine vision laser modules, there are six series available, each of which is designed for a very specific application. Naturally, we have something for everyone. The web code can be used to locate the datasheets for the individual laser module series.

Prototypes and customer-specific solutions. If you cannot find the ideal product, please do not hesitate to contact us! We will design a laser for your application – made in Germany!

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Improved Performance for Specific Wavelengths

Customized Glass Nanoparticle Polarizers

The nanoparticle polarizers produced by CODIXX AG feature wideband performance for the UV, Vis, NIR, or Mid-IR spectral regions. To improve performance CODIXX also manufactures polarizers for specific wavelengths of interest. Take, for example, the colorPol® Vis 633 BC4 C633. The transmittance at this popular laser diode and HeNe wavelength of 633 nm is improved to >90% while maintaining a high contrast ratio of >10,000:1. The possibilities for improved transmission or contrast performance extend throughout the 355 nm to 5 µm region.

All polarizers are cut to the specific circular or rectangular size and orientation required by the customer. Additional patterned polarizers feature regions of varying polarization regions. Combined with outstanding temperature and environmental performance, these nano-polarizers often exceed the most demanding performance requirements.

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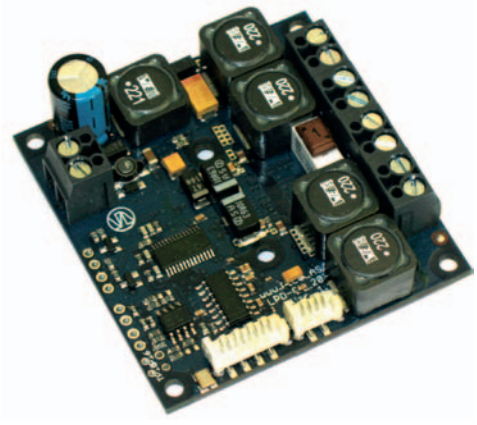
Fully Digitally Controlled

Driver for TEC Modules

A very small, safe and accurate controller for Peltier thermoelectric cooler (TEC) modules. An ultra low-drift chopper amplifier maintains ±0.001 K temperature stability. Output current rather than voltage is directly controller to eliminate current surges. Individual heating and cooling current limits and voltage limits provide the highest level of TEC protection.



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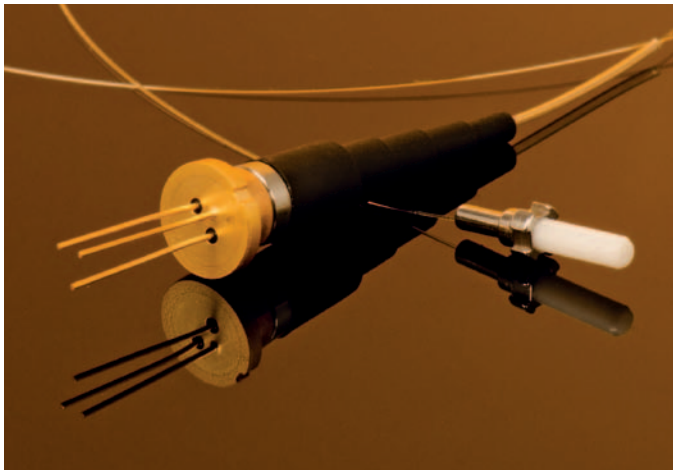
Homogeneous Beam Profile in Pulsed Laser Diodes

PLDs with Microoptics or Fiber Pigtails



Diode lasers are inexpensive, energy saving, and easy to operate; therefore, they present a viable alternative to conventional lasers. However, laser diodes are semiconductor lasers and, thus, have worse beam characteristics than solid state lasers, for example.

Therefore, in order to capture each target in distance measurement technology the laser diodes require additional optical components that shape the laser beam.

FAC Lenses. LASER COMPONENTS Canada offers pulsed laser diodes (PLDs) with integrated microoptics, a so-called fast-axis collimation lens. Mounted directly in front of the laser diode chip, the divergence of the "fast" axis is reduced to 5 or 10 mrad.

Both a PLD and an FAC lens fit together into a tiny, hermetically-sealed TO-18 housing. The housing can withstand acceleration rates of > 1000 g/ms; thus, it meets the standards set by military technology.

PLDs with a fiber pigtail. An almost homogeneous beam distribution in laser diodes can be achieved by mixing the modes in an optical fiber.

These PLDs have an optical output power of up to 100 W. They are, therefore, ideally suited for medical applications in which a high amount of peak power must be delivered to a point as loss-free as possible.

Customer-specific products.

LASER COMPONENTS produces more than just standard components. Our strengths include the quick and inexpensive development of customer-specific products. Inquire with us about your desired product!

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Diffractive Optical Elements

Vortex DOEs for Laser Material Processing

Lasers have Gaussian-shaped beam profiles; this is often hindering in material processing. Diffractive optical elements are used to convert them into a uniform beam profile. Tophats are usually requested for this purpose; however, we generally recommend using Vortex DOEs.

Vortex DOEs produce a donut-shaped beam profile from a TEM00 laser beam. The "intensity hole" created causes the outside edges to become steeper; this is particularly advantageous in welding, cutting, and drilling because the intensity in the beam center only contributes marginally to the process.

Vortex DOEs are flexible and easy to use. Unlike tophats, they can be used at any beam diameter and working distance. In addition, the Vortex

elements are not sensitive to adjustment; that is to say, it is only necessary to hold the lateral position.

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Price Reduction: PLD Modules and High Voltage Supplies

Increased production output and optimized manufacturing capacities have led to tumbling prices. Small production quantities of pulsed laser modules and high voltage modules have been radically reduced in price. Ask about our new prices!

High Voltage Modules

The ABC550 and dBC series high voltage modules are particularly well suited for use in the operation of avalanche photodiodes (APDs), for example discrete APDs, APD modules, or APDs with an integrated temperature sensor. In the range between ±10 V and ±550 V, the output voltage can be adjusted in a stable and precise manner. The temperature coefficient of the output voltage can be exactly adjusted according to the properties of the APDs. The output current is limited to a safe value to protect the APD from overload. A precise voltage source is integrated as a reference.

ABC series. In the ABC (analog bias controller) series, the output voltage is adjusted using either a simple potentiometer or a control voltage.

dbC series. In the dBC (digital bias controller) series, digital control is also possible. An RS232 or SPI interface can be used for this purpose.

In both modules, an additional control voltage makes it possible to either regulate the amplification of the APDs in a closed control circuit or modulate it directly.

Pulsed Laser Modules

Our PLD modules are as small as a matchbox. All the functions for safe operation are fitted into one compact housing. Only a voltage of +12 VDC and a trigger signal – and nothing more – are necessary for operation of these modules.

The 905 nm and 1550 nm modules are available with parameters that are either fixed (LC series) or variable (LS series) in their adjustability:

- 905 nm module
  Optical output power: 3...220 W
  Pulse length: 4...150 ns
- 1550 nm module
  Optical output power: 5...80 W
  Pulse length: 4...150 ns

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LASER COMPONENTS

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Photodiode Modules for Direct Application on an Optical Bench

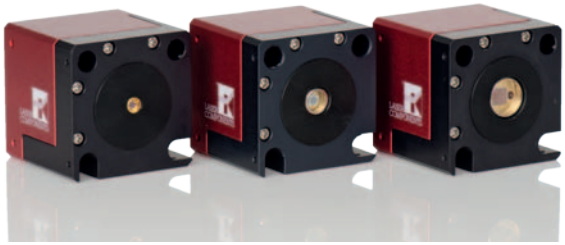
P-CUBEs – The Die Has Been Cast!

Precise measurement technology in a compact measurement setup: this describes the new P-CUBEs!

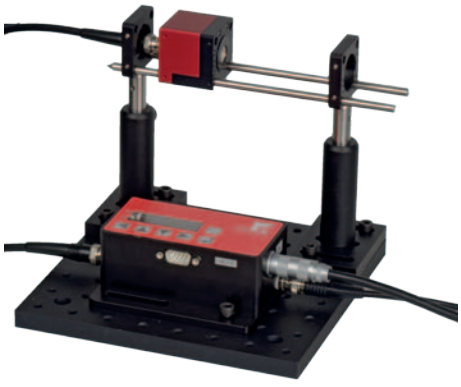
Low-noise, sensitive PIN photodiodes are housed in cubes. The CUBEs have an edge length of only 40 mm. To integrate them into optomechanical setups, the CUBEs can be attached to a rod system.

The following versions are available:

- **GaP photodiode** – Particularly low noise; sensitivity: 190 – 570 nm
- **Si photodiode** – Enhanced in the blue spectral range; sensitivity: 200 –1050 nm
- **InGaAs PIN photodiode** – Enhanced in the NIR; sensitivity: 800 – 2200 nm



The photocurrent is obtained using a BNC connector. The P-CUBE is also available with an optical FC connector.



iAMP-700.

The programmable iAMP-700 current amplifier is directly connected to the P-CUBE with a BNC connector. It is possible to achieve amplifications of 10^2-10^{11} V/A with the iAMP-700.

P-CUBE & iAMP – A Strong Combination

By combining the P-CUBE and iAMP-700, the smallest amount of light can be detected reliably. The iAMP's EMC housing allows application in close proximity to the source. The P-CUBEs require a bias voltage between -10 V and +10 V. This can be obtained directly from the iAMP.

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Visit us!

Upcoming Trade Shows

BiOS SPIE Photonics West

BiOS 2013
Booth 8517
February, 02 – 03, 2013

Photonics West

Photonics West 2013
Booth 517
February, 05 – 07, 2013