PHOTONICS NEWS

Company Newspaper of the LASER COMPONENTS (UK), Ltd.

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#60 ▪ 03|18

Wine: Outstanding Vintage Expected

Analyser Filters for Agricultural Monitoring

UV Light Everywhere

Lasers for Packaging

New Products

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Dear Colleagues

Photonics West 2018 was a huge success for large numbers of the 20,000 participants whether presenting latest research, new products at their trade show booths, or visitors both new to photonics or those like me heading towards two decades of attendance. What was evident whilst spending three days meandering up and down the North and South Halls sporting 1,324 companies and more than 7,500 authors of scientific papers, was the palpable fervour of sensing applications using the latest advancements in component manufacture. Performance enhancements are leaping in great strides it seems.

There is a lot of publicity about autonomous vehicles such as cars, Uber taxis, robots and transportation machines in Greenwich using a mix of pulsed light sources (laser diodes, VCSELs, fibre lasers) and fast detectors (avalanche photodiodes, single and array, and InGaAs PIN photodiodes). Other technologies include lasers for advanced manufacturing and research, narrow wavelength light sources for healthcare especially Raman applications, high speed VCSELS for communications, and optoelectronics used in so many of today's consumer products.

It is fitting that this sixtieth issue of LASER COMPONENTS (UK) Ltd's Photonics News headlines 'food and beverage' in the modern sensing world . Advancements in detector arrays, optical filters and UV LEDs are just some of the components that permit innovative instruments to take the lead for companies seeking the next unique selling point (USP) to gain market share over their rivals. We at LASER COMPONENTS strive to stay ahead with product improvement, whether components we produce (now within three separate factories) or by our partner Suppliers.

We focus on topics close to many people's taste buds, and pleasure; vintage wine. Here we see how Fourier-transform infrared (FTIR) spectroscopy utlilises our extended InGaAs array with sensitivity out to 2.1µm (IG22 Series) and 2.5µm (IG26 Series). Together with our control module TEESS (Tempe Electronics & Software Set; Tempe Arizona where our factory is located) the carbonation level of champagne can be measured, thus providing the best moment for decanting wine.

In our last issue (PN59) we featured drone applications; they do seem to be an ever increasing presence in our modern lives now. Using precision optical filters to limit the spectral content reaching a suitable detector (mounted in a drone) one can image crops and deduce the amount of chlorophyll present. With intervention techniques greater crop yield can be realised or disease averted.

Recently great advances have been made with both the output power and with shorter wavelengths of UV LED technology thus opening up the economic advantages of smaller systems over large discharge tubes in the control of organisms that would otherwise hinder the lifetime of produce. UV light de-natures proteins thus preventing a dangerous build-up of toxins, for example, on our lettuce in the fridge.

We include a brief insight into the use of diffractive optical elements (DOEs) in this case a multiple spot element from a single laser source. With sufficient energy, pulsed arrays of laser spots puncture both packaging and the skins of fruit and vegetables to create longer lasting produce.

Please visit us at any of our planned exhibitions listed on the back page, we would be delighted to meet you and discuss your requirements.

Yours,

Chris Varney

IN VINO VERITAS

Looking Forward to the 2017 Vintage

Rolf Bogen, enologist and owner of BOGEN WEINMANUFAKTUR, from the town of Grünstadt in the Palatinate region has promised wine connoisseurs that 2017 will be an excellent year. The Indian summer decelerated the harvest; the last grapes were picked at the beginning of October and have a high must weight. Cool nights kept the late-blooming varieties, such as Burgundy and Riesling, healthy. Even small amounts produced high-quality yields. Wine connoisseurs may look forward to an excellent year with ripe, fruity white wines and portly, sophisticated red wines. ➔

www.bogen-weinmanufaktur.de

Good Wine – Not Just a Matter of Taste

IR Technology can be Used to Find Out Valuable Information about a Wine

In a product with a thousand-year-old tradition, it is not surprising that wine production depends very heavily on the experience and gut feeling of the wine-maker. It is only recently that science has found its way into this field. Almost all biochemical processes have been identified that are used to make wine from the juice of grapes. As vinification is a complex process, the quality of wine depends on many different factors. IR measurement methods are very useful to vintners during production.

The Grapes Make the Wine

During vintage, it is crucial that the harvested grapes be processed as quickly as possible. In a mill they are mashed together with the seeds and skin. In the production of white wine, this mash then stands for one to six hours before being processed into must. During this time, the first substances already take shape that then later affect the quality and taste of the wine.

Analysing Mash with the Help of Spectroscopy

For a long time, spectroscopic measurements in the mid-infrared range have provided press operators with a comprehensive analysis of the mash and its contents. This provides the press operator with the ability to not only identify undesired micro-organisms but to draw conclusions about the properties of the must.

Analysing Grapes with the Help of NIR Spectroscopy

Scientists at the State Educational and Research Institute for Viticulture and Pomology in Weinsberg have developed a method in which the quality of individual grapes can be tested before mashing.

Until now, the grapes provided have always undergone visual quality control and been sorted accordingly. Even experienced professionals can make mistakes because many micro-organisms that settle on the fruit in the vineyard are not visible to the human eye. Although the presence of yeasts can be quite desirable, some can lead to early fermentation, which can complicate vinification.

With the help of near-infrared spectroscopy - a new method in this field - important contents are measured while the grapes are added to the mill. Based on the concentration of glucose, fructose, tartaric acid, and malic acid, the degree of maturity can be determined. Acetic acid, gluconic acid, glycerin, and the ergosterol produced by mould show, however, that the degradation process has already started. Based on this data, the cellar master can adjust the further vinification process to suit the quality of the grapes.

A Long Fermentation Process Will Eventually Produce Wine

After mashing, white wine is pressed. The pomace (the solid components such as the skin and the seeds) is separated from the liquid must, which then ferments and ultimately turns to wine. This is the crucial difference between the production of white wine and red wine. As the red colour and many of the flavours come from the skins and seeds, the mash is fermented in red wine. It is not placed in the winepress until after fermentation is complete.

As little air as possible should enter the container during fermentation in order to achieve the best ethanol yield and prevent impurities. At the same time the carbon dioxide produced must be allowed to escape, otherwise the fermentation container would burst. This is achieved with special fermentation vats. Winemakers prefer to keep an eye on the development of the wine in this critical phase of vinification. IR technology helps in this respect.

X-InGaAs Line Array for Measuring Carbon Dioxide

WEB UK60-0280

If you would like to measure the CO_2 concentration in a champagne bottle, a single measurement point is not enough. It is better to have 256 pixels in a row from the start, such as in the extended InGaAs arrays from LASER COMPONENTS. The IG22 series covers a spectral range of up to 2.1µm, and the IG26 series arrays can even be used at wavelengths of up to 2.5µm. These sensor arrays have complex requirements for which we offer the electronic OEM control module TEESS. ■

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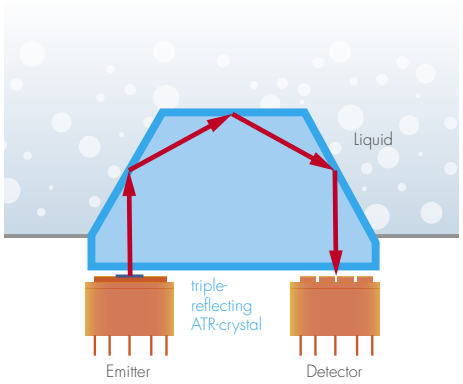
FTIR Spectroscopy during Fermentation

Classic FTIR spectroscopy is ideally suited for this purpose. In devices such as the OenoFoss by Foss, a single drop of must or wine is sufficient to analyse up to seven different parameters. This allows the winemaker to determine within a matter of minutes how far advanced the fermentation process is. The measurement results allow him the ability to draw conclusions about the finished wine and perhaps change something. These devices make it possible to make very precise measurements.

In-Situ Measurement

Another method originates from the US manufacturer VitalSensors. They work according to the principle of the attenuated total reflection (ATR) of MIR beams at the interface between crystal and liquid. The measurement system with a triple reflecting ATR crystal is applied directly to the fermentation tank or the pipes (see figure). The advantage of these in-situ measurements is that they do not allow air to come into contact with the fermenting must, and the cellar master can still obtain all of the important information on the temperature and concentration of the four important contents at any time. It does not matter whether the tanks contain a clear (white wine) or opaque (red wine) liquid.

This helps to convert the grapes into the best possible wine using infrared technology.



If it Bubbles

Sparkling and semi-sparkling wines can be produced using different methods. The best-known method is the "champagne method," in which the finished wine is fermented one more time in the bottle by adding yeast and sugar. It is crucial in the end product that the carbon dioxide produces negative pressure. This leads to the refreshing tingling sensation that champagne and prosecco drinkers love. At a positive pressure of 3 bars at room temperature, the wine is referred to as sparkling, and at a positive pressure of 1 to 2.5 bars, the wine is referred to as semi-sparkling.

How do you tell how much carbon dioxide is in an unopened bottle? IR technology can also be used here. An Austrian manufacturer has developed a device that measures the CO_2 concentration without having to open the seal. A laser beam is guided through the upper part of the bottle and analysed using a detector. The best part is that the bottle can still be used after that.

This measurement method not only works in champagne and Cava but in comparably "primitive" drinks such as cola or other soft drinks. ■

Multispectral Analyser Filters for Agricultural Monitoring

Drones Detect Chlorophyll

WEB UK60-0850

Within modern agriculture, increasingly large scales lead to a number of challenges. Vast fields make accurately monitoring and analysing crop growth across the area very difficult. Inefficient crop growth in certain areas can lead to reduced crop yields and higher field maintenance costs. For some time, the use of satellite imaging has been popular within large scale agriculture in order to build up a picture of the crop growth across large areas. This method, although more efficient than ground based visual monitoring still has a number of drawbacks; satellite images must be ordered in advance, and are only available once per day. Image resolution is relatively low and is highly dependent on the weather. Satellite imagery can be a useful for understanding the general uniformity of crop growth, but for accurately mapping areas of poor crop growth which may need attention, a more precise method is required.

In recent years the use of unmanned drones has become more prevalent in a number of industries. Agriculture is no exception. By using drones equipped with visible and NIR sensors, one can map the Normalised Difference Vegetation Index (NDVI) across the field. The NDVI is a measurement of the amount of live vegetation in an area. Chlorophyll is highly absorbent in the visible part of the spectrum, and highly reflective in the NIR. As the amount of chlorophyll present in a plant decreases, the amount of near infra-red light reflected decreases. The NDVI compares the reflected intensities of visible and NIR light. Areas with a high NDVI indicate areas with a high density of plant life containing chlorophyll, and thus a healthy crop. In contrast, a mid to low NDVI could indicate an unhealthy crop, or an area with no plant life at all. The data required to calculate NDVI is obtained through multi-spectral analysis, whereby images are captured at specific wavelength ranges across the electromagnetic spectrum, in this case; blue, green, red, and NIR.

Agricultural monitoring drones are commonly equipped with either CCD or CMOS sensing technology. The sensitivity of both CCD and CMOS sensors stretches from UV to near infra-red, so in order to use them for multispectral analysis, optical bandpass filters are required. LASER COMPONENTS, alongside partners Omega Optical, now offers a new range of filters specifically designed for remote monitoring of plant health and growing conditions. When combined with CMOS or CCD sensors, these filters enable high-precision data capture for processing and analysis using the NDVI.

A number of filters with standard wavelengths for this application are available on short lead times, with a thickness of 1.0mm and can be cut to meet customer size specification. Designed specifically with multispectral analysis in mind, the series uses a single-surface coating in order to reduce secondary ghosting, filter weight and focus shift. A high effective index design allows the widest field of view possible with minimal spectral shift, and a minimised surface micro structure enhances resolution and pixel to pixel consistency. We are able to offer custom thicknesses for mounting filters directly on to CMOS or CCD sensors to maximise signal throughput by further eliminating reflections and ghost images. These filters are supplied with an optically matched adhesive to permanently bond the filter to your sensor. ■

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Automation in the Food Industry

Sorting, Analysing, Processing - Optoelectronic Methods are Almost Standard Today

"The good ones go on the dish, the bad ones remove if you wish." Even in fairy tales, food such as peas and lentils had to be separated from undesired foreign substances. This fundamental principle has remained the same, even today. However, whereas in the story world it was possible to call on a host of busy little birds, today in the real world we rely on state-of-the-art optical technology.

Industrial Image Processing with Food?

When we talk about "industrial image processing," we often picture robots in huge factory buildings. We seldom think of apples, potatoes, and rice. However, the production of food has little in common with romantic images of agriculture. The same technologies are used in both farming and in industrial manufacturing.

Quality Control

One of the most important applications of optical technologies is quality control. In facilities in which tons of fruit, vegetables, meat, and fish are processed daily, it would be unthinkable to carry out quality control by hand. The quality requirements are constantly being increased on a regular basis and consumers are becoming more and more demanding. It no longer comes down to just the objective criteria of quality for consumers. It is becoming increasingly important that food also looks good. Plump strawberries or carrots with two "legs" are considered less attractive by many, even if they do not have any defects.

The rise in such demand often leads to the increase in the ingenuity of engineers. We can observe a suitable sorting facility for each criterion.

Optical Sorting Machines

Different sensors are used depending on what a machine is designed to sort (i.e., most commonly laser systems and diverse types of cameras).

Simple cameras provide images of the size, shape and colour of fruit. They are always used when it is important to control the outer appearance of fruit.

Bad spots on apples and potatoes usually have a different colour than the healthy parts. Monochromatic cameras can be used to sort the good from the bad because they are sufficient for distinguishing the contrast between light and dark.

Polychromatic cameras are used to separate food when colour variations play a role (e.g., to separate red, yellow, and green gummy bears).

Surface Analysis Using Laser Light

Unlike pure camera detection, combining laser modules and cameras makes it possible to analyse the surface structures of objects.

At certain wavelengths, they can penetrate deeper into the tissue of food, and therefore providing insight that would not normally be visible during purely external controls. These properties are used in sorting facilities to separate stones, glass, and metal. The "defective" elements can also have the same colour as the "good" elements. Normally, potatoes and stones would be otherwise difficult to distinguish based on their outer appearance, but they have completely different surface structures.

IR Spectroscopy

Another application is IR spectroscopy. It is used to determine the exact amounts of fat, protein, and other nutrients in meat. This makes it possible to correctly indicate these nutritional values on the packaging, which is required by law.

Sorting Process

Foreign substances and damaged food recognised by the optical systems are sorted using different methods. Today, small objects like the peas and lentils in the story of Cinderella by the Brothers Grimm would be catapulted from the ashes and collected in containers using compressed air nozzles. Larger items such as apples and potatoes are often mechanically redirected to land in the appropriate boxes depending on size and grade of quality.

From grains of rice to fish fillets, there is nothing today that cannot be analysed, cleaned, sorted, and processed by machines with custom optical methods.

Only food that meets all quality requirements makes it into the supermarket. ■

When Plants Glow Red

Sorting machines use a unique feature of chlorophyll to differentiate green fruit and vegetables from other green objects. If the tissue is exposed to UV light, the plant parts appear to glow red.

The reason for this is chlorophyll. This pigment is crucial to the metabolism of plants. Under "normal" conditions, it absorbs blue and red wavelengths and uses their energy for photosynthesis. The green light is reflected. This is why grass and trees appear green. Long-wave UV radiation exposure, however, results in chlorophyll fluorescence. Part of the pigment, so-called chlorophyll a, converts a part of the incoming UV radiation and emits it in the form of heat. The rest is emitted as light in the visible spectrum - in this case at a wavelength of approximately 670nm. This is the reason that the corresponding plant parts do not appear green but red. In objects without chlorophyll, however, this effect does not occur. This means that the objects can be clearly defined as not plant based, and sorted out.

Bit by Bit

A Question of Weight

WEB UK60-0740

More and more food arrives pre-portioned on the supermarket shelves. How can you be sure that all portions are the same weight? Laser technology can also be used to answer this question. The shape of objects can be measured three dimensionally with the help of laser modules, no matter how crooked or misshapen they are. Based on this data and the average weight of the goods, a computer can calculate where the cuts have to be made for each section to have the same weight. ■

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UV LIGHT EVERYWHERE

… and Chickens

Birds perceive the world differently to people. They not only have receptors for blue, green, and red light, but they also partially perceive the ultraviolet spectrum. The artificial light on poultry farms is commonly designed to be pleasant for chicken farmers. Scientists are currently testing what effect lighting with a larger percentage of UV radiation has on the well-being and "productivity" of laying hens.

Sterile Baby Bottles

State-of-the-art technology is never a bad thing when it comes to the well-being of children. One US company is currently developing a portable UV device to be used for sterilising baby bottles. They are using the same technology that hospitals already use for disinfecting.

Fruit and Vegetable Cultivation

Research scientists in the USA are testing the effects of LEDs and UV radiation on the growth of fruit and vegetables. The results: UV radiation leads to fewer pests, red LEDs lead to more blossom and fruit, white LEDs lead to faster growth, and blue LEDs lead to higher yields. While NASA is currently testing this method in terms of its suitability in space, hydroponic plant kits with LED light are popular among home growers.

Even Healthier

UVB radiation helps the production of vitamin D. This prohormone plays an important role in bone development and the regulation of calcium levels in the blood. A deficiency can also lead to severe heart disease. Mushrooms that have been exposed to UVB radiation contain more vitamin D.

Oral Hygiene

UV radiation is also used in the bathroom for disinfecting. There are now a whole range of devices available for disinfecting toothbrushes.

Pain Relief

Medical science can also profit from UV technology. UVB radiation facilitates the production of cannabidiol and THC in hemp plants. These substances have an anti-spasmodic, anti-inflammatory, and anti-nausea effect.

Goodbye Mould!

UV LEDs Keep Things Fresh and Have an Antibacterial Effect

Everyone has had experience with mould at one time or another. You have probably gone food shopping, brought your vegetables home, put them into the refrigerator, and brought them back out again a few days later to use for cooking just to find - mould! How was that disgusting fungus able to spread when the refrigerator is designed to keep food fresh? The answer is simple - mould thrives even at temperatures below freezing. The refrigerator - where the temperature is cooled to between 2°C and 8°C – provides no threat to mould. If mould starts to form on food, the only place for it is the rubbish bin, especially because the toxins are some of the most hazardous substances in the world.

Traditional methods, such as salting, reduce mould formation but also change the taste of food. Some food manufacturers use strong chemical substances. However, many consumers do not want their food to contain fungicides or conservatives. This is where UV lighting could help. Tests have shown that mould spreads much more slowly under exposure to UV lighting in the wavelength range from 220nm to 340nm. The exposure also destroys some of the dangerous toxins.[1] There is also the well-known antibacterial effect - even the much-feared salmonella bacteria cannot withstand ultraviolet waves.

Many refrigerator manufacturers now offer models with UV lighting, but you also have to be careful with certain beverages. Some components in beer, wine, and milk change under the influence of UV light. This results in the well known "light taste" that makes these beverages less enjoyable. These beverages should be stored in a UV refrigerator in a way that protects them from the light. Standard brown and green bottles for wine and beer are sufficient to block UV lighting.

Scientists have found the blue light also to be effective in mould control so perhaps there is competition for UV light sources! ■

Questions on UV-LEDS?
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WEB UK60-0810

[1] https://www.heise-gruppe.de/presse/Technology-Review-ueber-UV-LEDs-im-Kuehlschrank-1897555.html

Pleasant Atmosphere

In State-of-the-Art, High-Tech Packaging Food Stays Fresh Longer

Fruit and vegetables are the alpha and omega of the health-conscious person of today. However, vegetables from the farmers' market are present in fewer and fewer kitchens. Cooking and gardening are more like hobbies than daily tasks required for subsistence in our hectic times. Shopping should also be quick and easy. The supermarket has long since replaced the corner shop as it is much more convenient to buy everything you need in one place, but produce should still fresh and crisp.

Air Is a Thing of the Past

Meat, fish, fruit, vegetables, milk products, and bread - really fresh food only stays fresh for a few days at the most. How do supermarkets manage to keep the shelves stocked every day with fresh food that looks so inviting and seems to call out to us "Buy me!"?

The secret is in the packaging.
In so-called **modified atmosphere packaging** (MAP), the packaging is filled with a gas or gas mixture instead of air, most commonly, nitrogen and carbon dioxide. Oxygen is not desirable in these cases because it is not only the main cause of oxidation-related spoiling of food, but it also promotes the growth of aerobic micro-organisms.

The composition of a substitution atmosphere depends on the contents of the packaging. For example, the percentage of CO_2 for beef is 20%, for fish is 80%, and for pasta products is 60%. Products packaged with MAP stay fresh for significantly longer - often twice as long as when stored in fresh air. They can sit on the shelves longer and do not have to be disposed of within a few days.

Protective atmospheres are not only used in comparably small supermarket portions. Controlled atmospheres can also be used to prevent the early ripening of bananas when transporting from Colombia to Europe. In other food, such as milk products, manufacturers can often completely forego the use of preservatives thanks to MAP.

Sometimes Holes are Desired

One special challenge is packaging for fresh fruit and vegetables. After harvest, these products are still living organisms in which biochemical processes take place: the fruit "breathes" (respiration) and "sweats" (transpiration). To ensure that they stay fresh in their packaging, a small amount of oxygen must have continuous access and the CO_2 produced during respiration must be able to escape.

This can be achieved via laser perforation. Microholes are burned into the packaging in a targeted way that suits the respiratory activity of the product and regulates the oxygen content accordingly. Depending on the food and material, these holes can range in diameter from between 50µm and 300µm.

Lasers ensure that a unique perforation is the result, even at these small sizes, and one that meets all of the requirements of the packaging industry.

Pulsed CO_2 Lasers for Microholes

To ensure that the beam penetrates all layers of the packaging, CO_2 lasers with high pulse intensities are most commonly used. To achieve an even distribution of the holes at exactly defined intervals, diffractive optical elements (DOEs) are used. A 15 x 15 multispot element can produce 225 partial beams from one laser beam. These partial beams burn 225 holes into a film with one shot. The size and distance between the holes can also be changed with the help of an additional optic.

... and How Do I Access My Food?

To maintain the protective atmosphere in the packaging, everything must be perfect. The majority of packaging films are multilayer structures and, therefore, consist of several stacked layers.

Each material has its own function: PET is responsible for firmness and aroma conservation; flexible but tear-resistant PE serves as a sealing medium; PP is impermeable to water vapour; and aluminum protects light-sensitive food.

Robust packaging is one thing, but the consumer does want to be able to open the package easily and without a fight. Lasers help here, too - they are not used as light swords, they are used as tools in the manufacturing of packaging.

Manufacturing Tear Strips with Lasers

The trick to tear strips is to weaken the mechanical layers of the composite plastics in a targeted manner while maintaining other functions such as aroma conservation and light protection. This is possible via laser scribing.

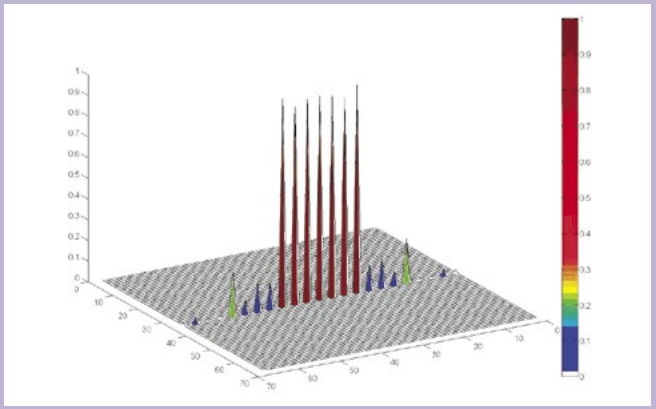
Individual layers can be processed with the laser while other layers remain intact because the components of the composite material have different optical properties. Computer-controlled scribing systems are most commonly used to achieve the complex designs in the material. Industrial image processing systems make correct positioning on the packaging possible. The beam can then be controlled as necessary for each individual package with a corresponding software programme.

Integrated Pressure Cooker

Laser perforation not only keeps food fresh but also makes it possible to quickly and easily prepare ready-to-eat meals. Vegetables, meat and fish are placed together with the packaging into the microwave and cooked. The package remains closed the entire time and it is not necessary to add water. Similar to a pressure cooker, the container builds up pressure to quickly and gently cook the contents. The trick is an integrated valve in the protective foil which opens if a certain amount of inner pressure builds up to allow the steam to escape. ■

In Excellent Shape with Diffractive Optical Elements

Diffractive optical elements (DOEs) are substrates into which microstructures are etched using a lithographic process. The diffraction effects allow laser beams to be split, bundled, or formed into almost any shape. The application possibilities of DOEs are quite versatile. Unlike classic beam-shaping processes, DOEs have the advantage that the desired structures can be provided with a single optical element and the beam energy almost completely utilised. Our partner Holo/OR manufactures DOEs for application in high-power lasers. ■



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WEB UK60-0031

New Products

1 **The 'Slim' Line** - First 1064nm PLANEX Laser from RIO ■
2 **UVC Modules** - Water Resistant and Waterproof Housings ■
3 **Extended Range of DOEs for Laser Modules** - New Patterns Available ■
4 **High Precision Alignment Lasers** - Two New Additions to the Portfolio ■
5 **New 28 Gbaud PAM-4** - Reference Transmitters from iXBlue ■
6 **Pulsable IR Emitters** - EP Range ■
7 **New Picowatt Photoreceiver** - from 320nm to 1060nm and 900nm to 1700nm ■
8 **Beam Waist Analyser Camera** - Real Time Laser Beam Measurement, Analysis and Monitoring ■
9 **DLaTGS Pyroelectric Detectors** - Manufactured by LASER COMPONENTS ■
10 **QuickSwitch** - 905nm High Power PLD ■

The "Slim" Line

1064nm PLANEX Laser

WEB UK60-0830

Redfern Integrated Optics, Inc. (RIO) announced its first PLANEX laser emitting the classic YAG wavelength of 1064nm, featuring narrow line width (15kHz), low noise and high coherence length. Its compact housing and standardised electrical connections make it an easy drop-in replacement for existing designs. RIO lasers are available from LASER COMPONENTS in Germany and in the UK.

RIO's proprietary PLANEX technology is a combination of a gain chip and a planar light wave circuit (PLC) with an integrated Bragg grating. The combination of these components forms a cavity with significant benefits: up to 20mW output power, very low RIN, low phase noise as well as very low wavelength sensitivity to bias current and temperature.

External Cavity Lasers are the best choice for all applications that require narrowband beams with narrow line widths - such as communications, LIDAR, metrology and research. ■

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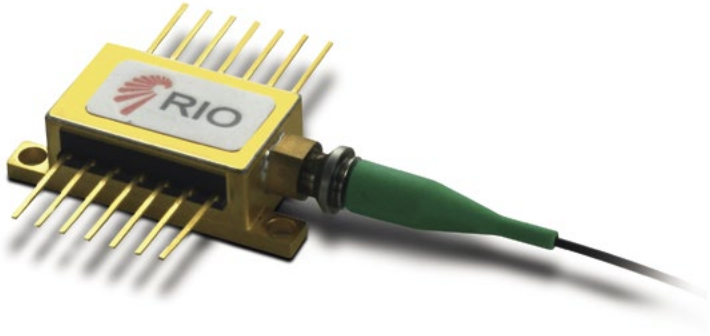

Waterproof Housings

UVC Modules for Disinfection

WEB UK60-1810

Ultraviolet beams are an efficient means of water purification or sterilisation. LG Innotek, industrial partner, and LASER COMPONENTS, announce the first UVC modules with water resistant (IPX7) and waterproof (IPX8) housings. They can be applied close to or even in liquids, thus providing highly efficient purification and low dispersion losses.

Both modules are equipped with SMD LEDs emitting at 278nm and featuring an optical power of 2mW. They only require 12VDC power sources. With sizes of only a few centimetres, they can easily be integrated into a vast range of applications. ■

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Extended Range of DOEs for Laser Modules

New Pattern Generators

WEB UK60-1740

LASER COMPONENTS presents an extended portfolio of pattern generators for FLEXPOINT® laser modules.

These new DOEs include several new patterns for green lasers with a wavelength of 520nm, such as a green cross with an opening angle of 50° or a rectangular pattern featuring 15 parallel lines.

Several new matrix patterns have also been added, including 10x10 and 4x6 matrices for green and a 5x15 grid for red light. For the first time, LASER COMPONENTS also offers a pattern generator for a blue cross with a wavelength of 450nm and an opening angle of 60°. Due to the rapidly growing field of 3D imaging, we have also added several new pseudo random pattern generators for red and infrared lasers modules.

Pattern generators are DOEs that divide laser beams into several dots or form them into patterns. Depending on the application, these can consist of circles, lines, crosses or dot matrices. LASER COMPONENTS offers FLEXPOINT® laser modules with integrated pattern generators as well as separate removable DOEs in a plastic cap for multi-use with different laser modules. All DOEs are optimised for specific wavelengths. ■

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High Precision Alignment Lasers with Small Beam Profile

Laser Module LT-PLM-635-01-C1 / LT-PLM-IRB-635-01-C1

WEB UK60-2740

LASER COMPONENTS would like to announce two additions to its portfolio of high-precision alignment lasers: LT-PLM-635-01-C1 and LT-PLM-IRB-635-01-C1. At the exit point, the beams of these precision modules feature diameters of 1mm and a squint angle of just 0.05mrad, which equals 5/100mm per metre distance from the target. With standard modules, the aberration from the centre of the housing is considerably higher at 8.7mm.

The small exit diameter also produces an exceptionally small dot on the target area allowing for very precise positioning. Due to its higher divergence, their use is recommended at distances of up to 3m. For longer distances, we recommend using our standard version with a beam diameter of 4.5mm. Both profiles are available in 24mm housings with M12 connections or as a mobile version with an integrated battery in a 35mm housing.

The so called "squint angle" defines the aberration of the laser beam from the central axis of the housing. This effect can be watched by putting the laser module on a plane surface and rotating it along its longitudinal axis. The laser spot will then move in a circle on the wall. The laser is positioned so it hits the target at thte desired location. Precision modules are used whenever a target spot has to be aligned to a straight axis. ■

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New 28 Gbaud PAM-4 Reference Transmitters

Available at 850nm, O-Band and C-Band

WEB UK60-0960

LASER COMPONENTS introduces the new 28 Gbaud PAM-4 reference transmitters from iXblue. These ModBoxes are a turn-key reference transmitter for optical telecommunication laboratories and production test beds for 4-level Pulse Amplitude Modulation (PAM4). They provide clean, high quality, robust, eye diagrams with low jitter and fast rise/fall times. The PAM-4 ModBoxes are available at 850 nm, O-band (CWDM) and C-band operation and can integrate a high grade CW laser to provide more than 5dBm of modulated optical output signal.

The ModBox also provides vertical eye closure capability with the VER (Variable Extinction Ratio) option.

iXblue also offers reference transmitters for other modulation formats, including NRZ, DPSK, QPSK and QAM, in the O-band, C-band, and 850 nm region. ■

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Pulsable IR Emitters - EP Range

Mid IR Radiation to Beyond 5µm

WEB UK60-0310

LASER COMPONENTS offers unique pulsable infrared emitters from our EP range, fitted with a tungsten filament providing mid IR radiation to over 5 microns. The device comes in a standard TO8 package and has an expected lifetime of three years which is ideal for fit and forget applications such as gas sensing. The tungsten filament achieves the highest temperature and power of any material and is therefore a cost-effective source of near infra-red radiation.

Glass and quartz glass envelopes are most commonly used in incandescent light bulbs but do not transmit well in the infra-red, sapphire is a much better choice. The EP emitter has a patented design that integrates a sapphire window with a tungsten filament in a sealed metallic package, providing a robust source for spectroscopic instruments.

Tungsten filaments are provided in a variety of sizes to accommodate various frequency and modulation requirements. Operating temperatures up to 1900K are standard with the EP source, all the devices include a gold plated parabolic reflector and an inert gas backfill. ■

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Picowatt Photoreceiver from 320nm to 1060nm and 900nm to 1700nm

Latest Innovation from FEMTO Messtechnik GmbH

WEB UK60-0620

The new picowatt photoreceiver series PWPR-2K with switchable gain (10^9 V/A, 10^{10} V/A) and a bandwidth from DC to 2kHz is the perfect choice for cw-measurements, time resolved signal acquisitions and highly sensitive modulated measurements, in addition to precise and fast cw-measurements.

Particularly the combination with lock-in amplifiers results in ultra-sensitive measurement systems being almost immune to disturbances from external sources. In this way the PWPR-2K can easily detect optical powers from about 100fW up to 10nW.

Offering both free space and fibre coupled formats, both Si and InGaAs PIN diode options are available. Carefully designed EMC housings include fixing holes for both laboratory and OEM constructions.

The output voltage range is up to +10V, with an offset adjustment by a potentiometer. The photoreceiver includes output short-circuit protection. As is standard for all FEMTO products, a power supply with ±15V via 3-pin Lemo® socket, PS-15, is supplied separately. ■

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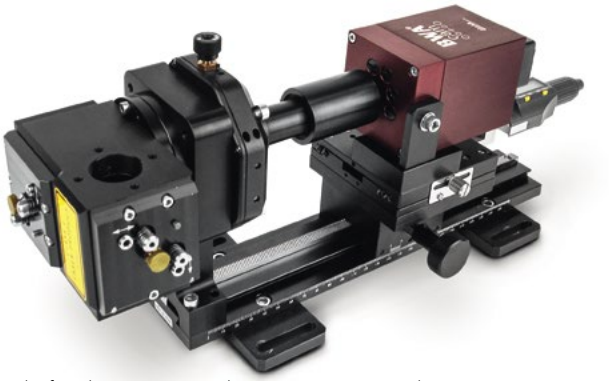
BWA-CAM

For Use with any Focal Length Greater than 100mm as Standard



WEB UK60-0010

The Beam Waist Analyser Camera (BWA-CAM) from Haas enables real time laser beam measurement, analysis and monitoring for high power CW and pulsed lasers. For applications such as materials processing; monitoring the laser beam's spatial profile, circularity, centroid, astigmatism and M2 gives an early warning of any problems with the laser, and entire beam delivery optical system. This can give increased quality process reliability and reduced scrap.

The BWA-CAM is simply placed after the focussing lens of the laser under evaluation and adjusted until the beam waist can be seen. Displaying a number of spatial cross sections along the beam waist, the software automatically tracks and sizes the regions of interest for accurate M2 measurement.

The Beam Waist Analyser Camera is suitable for use with any focal length greater than 100mm as standard and can be used for focal lengths less than this with an optical focal length adaptor which mounts to the entrance port of the BWA-CAM. ■

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DLaTGS Pyroelectric Detectors

High Currie Temperature

WEB UK60-0330

LASER COMPONENTS is a leading manufacturer of Deuterated L-Alanine doped Triglycine Sulphate (DLaTGS) pyroelectric detectors for infrared spectrometers. From our research and production facility in Florida we supply customers all over the world with these industrial grade detectors.

DLaTGS has several advantages over standard TGS, the material is doped with deuterium to raise the Currie temperature to 61 degrees centigrade, while doping with L-alanine prevents permanent depoling after excursions above the Currie temperature. These features make DLaTGS one of the highest performing pyroelectric materials available today.

The devices are manufactured in standard TO style packages that can be fitted with a range of windows including CaF_2, KBr, BaF_2 and ZnSe-Ar. Thermoelectric coolers can also be supplied in TO-99 and TO-37 packages, the TEC can be used to tune the detector temperature to maintain maximum responsivity.

FTIR spectroscopy was developed to overcome the slow scanning limitations encountered with dispersive elements and so ideally, the interferogram needs to be processed quickly. The broad spectral response and short time constant of DLaTGS makes it ideal for this application ■

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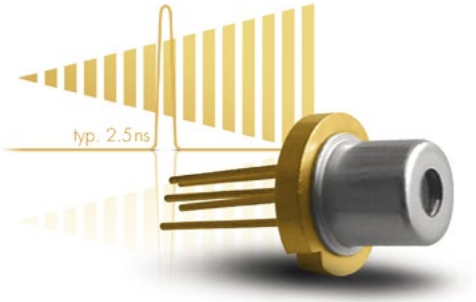
High Power PLD QuickSwitch

Extremely Short Pulses for Precise Measurement

WEB UK60-0410

At Photonics West, LASER COMPONENTS presents QuickSwitch – a hybrid 905nm high-power PLD generating the world's shortest pulse width of 2.5ns typical at a pulse frequency of up to 200kHz. Various storage capacitors are available, depending on which, it achieves an optical peak power up to 89 Watts. The pulse width of the optical output does not depend on the width of the trigger input pulse. Therefore the device is extremely easy to use.

PLD, high current switch and charge storage capacitor are enclosed in a compact TO56 housing. The high current loop is fully integrated into the housing, there is also an additional ground pin independent from both the signal and supply returns. This results in a Faraday cage eff ectively protecting the QuickSwitch and its surroundings from electromagnetic interference.



Laser sources with short pulses and a high pulse frequencies allow for higher resolutions in laser-based distance measurement (LiDAR) and scanners for security and aerospace appliances. With its QuickSwitch PLD, LASER COMPONENTS provides these industries with a compact and cost efficient solution. ■

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TRADE SHOWS

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MASSIVE IMPACT

Photonex London
April 18, 2018
University College London
Booth S14

Photonex Edinburgh
June 14, 2018
University of Edinburgh
Booth S5

Photonex Europe
October 10–11, 2018
Ricoh Arena, Coventry
Booth D15

Photon
September 4–5, 2018
Aston University

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