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optics.org product focus

SPIE Photonics West 2012 Edition

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Welcome to our latest **Product Focus** which we have published specifically for **Photonics West 2012**.

Here you can see a range of products from both exhibitors and non-exhibitors alike. We have included booth numbers (where available) making it easy for you to check out the products for yourself.

Also included in this handy product guide is an article looking at the work of researchers at IMEC and particularly how Fabry-Pérot filters can make HSI systems smaller and more versatile. We also provide a snapshot of the changes to US patent laws, but for a full explanation it would be worth attending Paul Davis' talk at 'Industry Events' on 26 January.

We're publishing further issues of the **optics.org Product Focus** for **Defense, Security + Sensing**, **Optatec**, **Optics+Photonics** and **Vision**.

To ensure that your product is included, contact **optics.org** as soon as possible as space will be limited.

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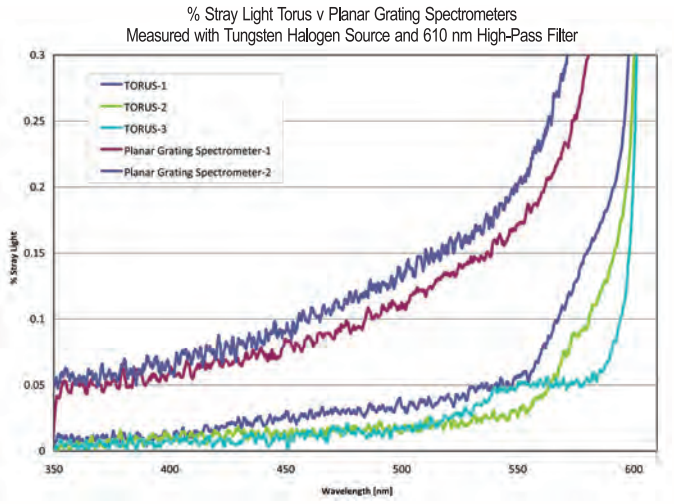

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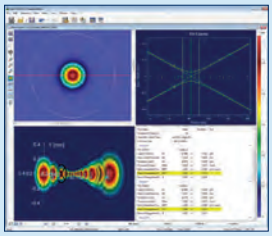

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IMEC shrinks size and cost of hyperspectral cameras

Integrated Fabry-Pérot filters can make HSI systems smaller and more versatile, especially for biomedical applications.

Hyperspectral imaging (HSI), in which spectral information is collected from several narrow but adjacent wavelength bands across a continuous spectral range, has proven its value as an analytical technique thanks to the higher resolution and selectivity it can provide over other imaging methods. The major drawback is that the imaging systems themselves tend to be large, expensive, and complicated to operate.

Researchers at IMEC, Belgium's semiconductor and nanotechnology research hub, have developed a solution that could help overcome these hurdles and push the technology into new applications, in particular certain biomedical procedures.

The key breakthrough lies in the use of Fabry-Pérot filters, a design of interferometer employing two parallel mirror surfaces between which incoming light is reflected multiple times. These filters can be made to transmit only a narrow band of wavelengths while rejecting the rest, and the physical orientation or tilt of the filter determines the peak wavelength for transmission.

The IMEC design integrates Fabry-Pérot filters monolithically on top of the image sensors, as Murali Jayapala of IMEC's Nvision imaging program explained to optics.org. "Conventional hyperspectral cameras typically use discrete optical components, including lenses, some form of diffraction grating or prism, and an image sensor. These separate components, in particular the diffraction grating/ prism, tend to make the system more bulky. The core of our new hyperspectral filter consists of two reflective surfaces of certain height, acting as a specific filter for a particular wavelength and which is placed directly on top of the image sensor. We spread filters for different wavelengths across the sensor, effectively replacing the usual diffracting grating with a Fabry-Pérot 'staircase', integrated monolithically directly on top of the image sensors."

This novel approach has not been successfully used before, not least since the core fabrication step of integrating the filters onto the sensor is, as Jayapala noted, "non-trivial." But HSI cameras based on this design should ultimately be cheaper than conventional systems, since the integration step could be incorporated into the existing manufacturing infrastructure used for the sensor itself, including assembly, testing, packaging and calibration. The design also produces a more compact system; the prototype now developed by IMEC measures only 1cm3.

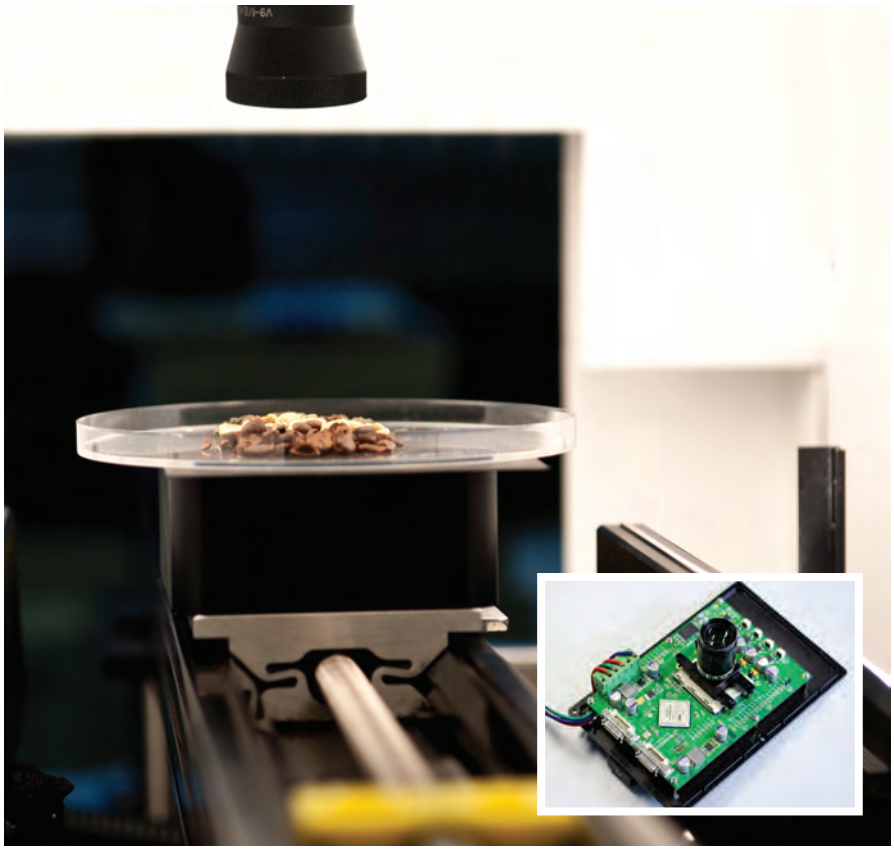

Photo courtesy of IMEC.

Setup for hyperspectral imaging. On the plate is a sample of coffee beans. A hyperspectral camera can discriminate between the beans and some stones that look very similar to the human eye. The IMEC research team is developing building blocks for a fast, low-cost, easy-to-use and small hyperspectral camera.

Fewer scans, faster scanning

The IMEC design brings with it a practical advantage, opening up a new approach to hyperspectral scanning in which the complete image sensor is utilized to take a full image of the scene of interest but different parts of the sensor yield different spectral information.

"Conventional hyperspectral line scanners scan a scene one line at a time, storing the spectral information for each line onto the image sensor," said Jayapala. "Spatial scanning is then needed to obtain complete 2D information from a scene, and the overall scanning speed is limited by the speed at which a single line can be scanned, rather than by the number of spectral bands. Our system can make scans at specific hyperspectral bands, where each scan is spread over several lines of the scene. This collects the complete information from a 2D scene through a mixed spatial/spectral scan, and means that fewer scans are needed in total."

The increase in speed allows the IMEC system to scan at greater than ten thousand lines per second and image at 25 frames per second, according to Jayapala, compared to the 180 lines per second of conventional HSI systems. The new prototype features hyperspectral filters incorporated on a 4 megapixel CMOS image sensor, transmitting 100 spectral bands of 5 nm bandwidth each. Transmission efficiency is said to be approximately 85%.

These advantages could make an impact in several different application areas, and IMEC expects that products using this technology could start coming to market in as little as two years. "The higher speed will have a big impact in food and other material sorting applications, and miniaturization in combination with

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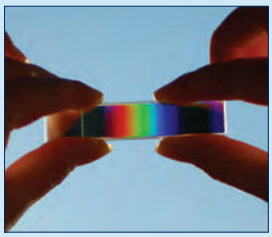

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Zeiss pushes boundaries after record sales

Company posts revenues exceeding €4 billion for the first time and plans €500 million infrastructure investment.

Photo courtesy of Carl Zeiss.

One of the priority areas in Zeiss' €500 million, five-year investment plan will be extreme ultraviolet (EUV) optics for next-generation lithography systems that ASML says are set to ship from 2012 onwards. This image shows a Zeiss employee working on cleaning a system used for the illumination of EUV optics.

Germany-based full-time employees of the optics giant Carl Zeiss have each received a €2000 bonus this year after the company posted record sales and an 86% increase in after-tax profits.

For the first time, the group of Zeiss companies, which produces a huge range of optical and optoelectronic products ranging from binoculars to high-end microscopy equipment and includes the Meditec subsidiary, made total sales of more than €4 billion.

The fiscal 2010/2011 figure of €4.24 billion represents a 10% increase from €3.85 billion last year, when calculated on a like-for-like basis that includes revenues from the group's acquisition of Carl Zeiss Vision – its eyeglasses division – in 2010. On the bottom line, Zeiss posted after-tax income of €386 million, up very sharply from €208 million in the previous year.

However, the company does now predict a slight fall in overall sales in fiscal 2011/2012 resulting from wider economic worries. Michael Kaschke, the group's CEO, said: "The lack of economic momentum and the rampant uncertainty in the global economy, partly triggered by the problem of national debt, are currently dampening optimism."

Despite those worries, Zeiss is pushing ahead with a bold investment plan that will see it invest €500 million in an expansion of its operations in Germany over the next five years. "We are modernizing our infrastructure over the long term," Kaschke said. "The funds are mainly being channelled into the semiconductor manufacturing technology and medical technology business groups, as well as into the research and development units."

"Innovation can be described as the company's DNA," the CEO added. "Pushing the boundaries of optics is our passion and our daily work."

EUV development

Zeiss' semiconductor business unit was the largest contributor to overall group sales in the latest year, which has been a very strong one for investment in semiconductor manufacturing equipment across the industry. The Germany-headquartered company supplies many of the high-quality optics used in lithography stepper and scanner equipment, and a large chunk of the €500 million investment can be expected to go into development of extreme ultraviolet (EUV) optics for the next generation of these systems for future chip production.

Highlighting how EUV technology should enable an increase in chip integration densities by a factor of ten over the next decade or so, Kaschke stated: "Carl Zeiss

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IMEC shrinks size and cost of hyperspectral cameras

lower cost will open up many consumer applications as well," commented Jayapala. "For example, we could see mobile phones incorporating a hyperspectral sensor used to analyze household materials, food, or even to monitor our general health."

One particularly promising application is in the use of endoscopes for medical assessments. Hyperspectral information can help with early diagnosis of cancerous tissues, but the endoscopes used in such procedures are too small to have conventional hyperspectral cameras integrated into them. A smaller, cheaper hyperspectral camera could be more easily incorporated into the endoscope itself.

Although the IMEC system currently employs a CMOS image sensor, the same approach can be applied to CCD sensors too. The spectral range is limited primarily to the visible range of the spectrum and the near infrared, from 400 nm to 1000 nm, but Jayapala foresees extending the integrated Fabry-Pérot approach to other types of sensor such as InGaAs sensors, and the spectral range broadened into the far infrared at around 2 microns. This would enable applications in plastic sorting and pharmaceutical applications, where molecular information is prominent in the infrared region.

"This is a significant step in our road map, as a validation of our core approach," said Jayapala. "We now have an operational prototype targeted at machine vision applications, and are in the process of developing custom solutions in bilateral projects with our partners for selected application areas. Our next target is to create a snapshot system in which a limited number of bands relevant for an application will be captured in one shot, so that scanning is not required. In addition, although our current work is based on the use of static filters which cannot be changed once they have been fabricated to a certain spectral range, we have started to investigate if the filters can be made tunable through MEMS-based solutions."

Tim Hayes

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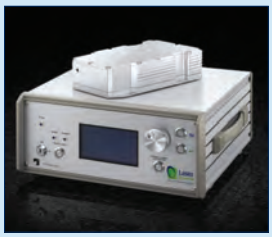

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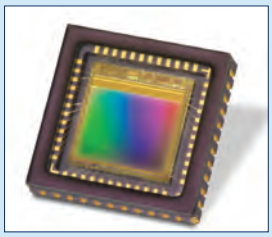

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8350K High Stability Galvanometer

Cambridge Technology Inc announces the 8350K High Stability Galvanometer

Ideal for steering 30mm-50mm beams, the 8350K extends the popular 83xxK family of galvanometers into demanding material processing applications.

Stability over temperature, positional accuracy / repeatability, and low dither are becoming increasingly important in precision material processing applications such as PV, precision cutting and welding. The 83xxK family provides stability comparable to expensive digital encoder galvanometers, but maintains the high speeds required by these applications. The 8350K is your cost-effective alternative to digital encoder galvos.

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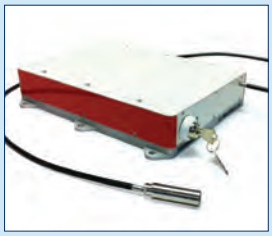
Fianium Ltd.

Visit us at Booth No. 417

Fianium launches the world's lowest cost, compact ultrafast supercontinuum fiber laser

Fianium, a leading supplier of ultrafast fiber lasers, unveils its newly designed, WhiteLase™ micro supercontinuum source. The micro is a quasi-continuous wave, 20MHz system which offers a generous wavelength range of 450nm extending to >2000nm, giving a total output power >200mW. The laser-like beam allows for easy collimation, beam steering and focusing to a diffraction-limited spot used in a variety of applications. The unit is operated by the flick of a switch and can be mounted onto an optical bench or incorporated into optical tools.



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Qioptiq Photonics Ltd.

Visit us at
BIOS Booth No.8503
Photonics West Booth No.1515

iFLEX-Viper

iFLEX-Viper, Qioptiq's compact multi-line laser source is now available with up to 60mW per line, measured after the fiber. Each system has 2-5 lines in the range 405-830nm, with options for modulation and software control.

Easy to use, it has replaced traditional free space laser combinations in biotech instrumentation and laboratories with impressive results.

There is no lengthy set-up, no daily maintenance and no need to align the system after installation.

Qioptiq's robust multi-wavelength iFLEX-Viper delivers stable, repeatable, laser light when you need it.

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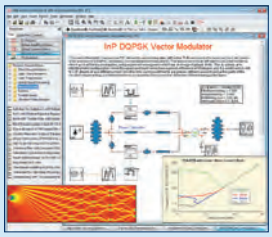
VPIsystems

Versatile design software for large-scale Photonic Integrated Circuits

VPIcomponentMaker™ Photonic Circuits provides a focused design environment for experts in photonic integration delivering wide spectrum models of active, dynamically tunable and passive elements. A huge variety of device and PIC design tasks is supported as you can build upwards from fundamental photonic elements, such as active and passive waveguides, directional couplers, branches, MMIs, star couplers and microring resonators. Applications include semiconductor lasers and LEDs (tunable, injection-locked, unstable), active PICs (switches, modulators, detectors), passive PICs (MUX, delay lines, filters) and systems modeling (noise, chirp, jitter).



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GPD Optoelectronics Corp

Visit us at Booth No. 2535

Extended Response InGaAs (to 2.6 microns)

GPD Optoelectronics Corp. now offers Extended-Response InGaAs photodetectors (to 2.6 microns) in die form, on submount or in TO or custom package, with single or multi-stage TE cooling available. Please visit us at Photonics West in Booth #2535 to discuss your application.

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Fax: +1 (603)894-6866

Frankfurt Laser Company

Visit us at
BIOS Booth No.8600
Photonics West Booth No.600

Mid-IR LED and Photodetectors

Frankfurt Laser Company announces a new line-up of LED's and Photodiodes added to its product range operating in the Mid-IR 1.58µm to 4.6µm.

LED's are ideally suited for use in gas measurement as these sensors offer a reliable, instant and non-contact method of gas detection

LED's can be either used in Quasi-CW or pulsed mode operation and available package options, are TO18 and TO5 can both LED's and PD's can be equipped with a parabolic reflector.

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continued from page 7

Zeiss pushes boundaries after record sales

is the right company for a technological revolution of this dimension. We are investing with vision and farsightedness. We have the strength and stamina to work on important innovations over the long term."

While the semiconductor unit's sales jumped 16% in the latest year, Zeiss' industrial metrology business fared even better, with revenues up 35% to €394 million. Among other things, the metrology business sells equipment used in three-dimensional machine vision applications for production quality control.

Meanwhile, the microscopy business unit showed strong but more modest sales growth of 7% year-on-year to €423 million. The group's medical technology business unit, which reports slightly different figures to the Carl Zeiss Meditec subsidiary, showed a 13% increase to €854 million, while sales of consumer optics like camera lenses and binoculars were nearly flat, at €316 million.

Largely as a result of its 2010 acquisition of the vision care eyeglasses business, Carl Zeiss now employs more than 24,000 people – nearly twice as many as it did before that deal. But the group has also grown organically in the past year, creating some 1200 new jobs worldwide, it says.

As a result of the €2000 bonus awarded to the 10,000 or so full-time employees who are based in Germany, plus a novel €360 additional bonus in the form of a non-transferable security similar in nature to a five-year, interest-bearing bond, the company says it has paid out €24 million in bonuses to its staff in Germany.

See Carl Zeiss technologies in action at Photonics West 2012, booths #4601 and #4415.

US patent changes explained

With the US now adopting a first-to-file patent system, Paul Davis will guide attendees through the implications for photonics.

From high-profile spats like Apple versus Samsung, to more parochial matters like the recent IMRA vs IPG Photonics case, there's no denying the influence and impact of a strong intellectual property portfolio – that and a good legal team, of course.

In September 2011, President Obama's signature on the America Invents Act set in motion what the White House has described as the most significant reform of the US patent system for more than half a century.

Those long-awaited changes are aimed at harmonization with key trading partners, speeding up the filing process, reducing a backlog of close to 700,000 applications in the system, and cutting the likelihood of a dispute ending in drawn-out litigation by offering new ways to establish and challenge patent validity.

But what will all this actually mean in practice for photonics companies and budding entrepreneurs? Paul Davis, a partner in the business law department at Goodwin Proctor in Menlo Park, California – and previously at the laser company Spectra Physics – will focus on the implications in a Photonics West 2012 presentation.

For Davis, the key change is the switch from a first-to-invent to a first-to-file system. That, he explains, will not only harmonize the US with Europe and Japan, but greatly reduce the burden on smaller companies looking to protect their inventions.

"To prevail in a first-to-invent system is a real challenge," Davis told optics.org. "You need to be able to prove that through evidence and corroboration, and that's difficult for a sole inventor. It's something that can cost several hundreds of thousands of dollars."

Small company benefits

Davis believes that the changes to the system will benefit smaller companies in particular, not least because in the more efficient system it will become much easier for them to challenge patents through an in-house appeals process, rather than through the courts.

And even though the first-to-file element of the act does not become effective until March 2013, Davis is now suggesting to clients that they file their patents early to take advantage of the pending changes.

Under the new system a fast-track option will guarantee patent reviews for what those companies consider to be their key technologies within one year (under the current system the typical wait time is more like three years), for a small additional fee. A "prioritized examination" option came into force within days of the Act's signing, while the "priority examination for important technologies" element is set to become effective from September 2012.

Also coming into force at that time will be the "post-grant review" process – a measure that is designed to allow challenges to patents to be resolved in-house by the US Patent and Trademark Office (USPTO), rather than through the tortuous, expensive route of court litigation that is simply not an option for many smaller companies.

Davis is particularly happy to see this part of the process change. He described the old system as "very broken", largely because of the limited resources available in terms of USPTO examiners, and sees the new approach as one that will help inventors as they look to attract venture funding: "We needed to reduce the cost of litigation, which is absurdly expensive in the US. I really believe that this will level the playing field," he said. "Venture capitalists do not want to buy legislation."

Whether the USPTO is able to meet its goals of cutting wait times and patent litigation remains to be seen (establishment of at least three 'satellite' offices to provide additional processing power are only slated for September 2014 – and even then will be subject to available resource), but what certainly seems true is that the harmonization with much of the rest of the world will make it easier for US inventors to simultaneously market products in the US and for export.

"Expanded work-sharing with other patent offices around the world [will] increase efficiency and speed patent processing for applicants seeking protection in multiple jurisdictions," stated the White House of what is seen as another important change.

Paul Davis will present a talk entitled "Changes to Patent Laws" as part of the Photonics West 2012 "Industry Events" track at 8.45am on Thursday January 26. The track is open to all attendees.

Cambridge Technology, Inc.

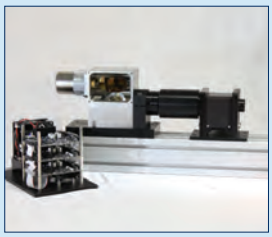
Visit us at Booth No. 1801

CTI Showcasing exciting new laser scanning solutions at Photonics West

CTI continues to invest heavily in new technology for laser scanning material processing applications. At this exhibition, you will see our latest Lightning II all Digital 3 Axis Scanning System, ideal for applications that require:

- large variable, field of view (up to 1.2square meters),
- focused spot size (to 18um @ 1064 nm),
- 3D applications (like 3D micromachining and Additive Manufacturing),
- high power (up to 5 KW)
- High speed (linear speeds to 50m/s)
- High accuracy (24 bit encoder feedback)

The product line now has enclosed and modular designs with high performance scanners for a broad array of laser wavelengths.



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Frankfurt Laser Company

Visit us at
BIOS Booth No.8600
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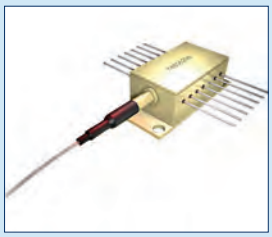
Frankfurt Laser Company offers a wide range of military and space qualified laser diodes and superluminescent diodes.

Laser diodes emitting in the near-IR wavelength band up to 2W power output demonstrate stable operation in -60ºC to +70ºC temperature band in CW and long pulse mode. They are available in TO-3 housing with free space and optical fiber output.

Superluminescent diodes in 810-1670nm wavelength range. They demonstrate wide emission flat spectrum, low ripple <1% and negligible to none secondary coherence subpeaks. Superluminescent diodes are supplied in industry standard cooled (TO-3, DIL-14 and butterfly) and uncooled (TO-56, SOT-148, coaxial) free space and fiber-coupled packages.



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Mad City Labs, Inc.

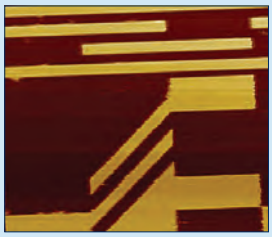
Visit us at Booth No. 526

MadPLL® + Nanopositioning Systems = "Instant" AFM

An automated, high resolution, resonant probe AFM can be assembled in 30 minutes using Mad City Labs closed loop **nanopositioning systems** and the **MadPLL® instrument package**.

MadPLL® is a fully integrated instrument package that allows the user to create an "instant" closed loop SPM, AFM or NSOM at a fraction of the cost of commercial systems. MadPLL® is ideal for research and industrial environments, offering high performance, versatility, and simplicity. MadPLL® is suitable for nanoscale characterization and nanoscale fabrication applications.

For additional information about building an SPM with Mad City Labs systems, visit Photonics West Booth #526.



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Xenics Infrared Solutions

Visit us at
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Photonics West Booth No.4831

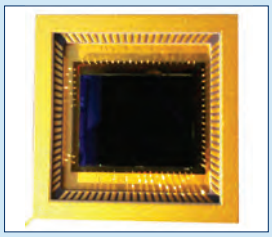
Extreme SWIR imaging for demanding low-light-level applications or gated imaging

New: Liquid Nitrogen (LN2) cooled **XFPA-1.7-640-LN2**

detector is designed for photo-emission or electroluminescence in failure analysis, and R&D spectroscopy featuring:

- Lowest noise and high sensitivity for measurement of low-light signals
- High resolution 640 x 512 InGaAs detector
- Liquid Nitrogen (LN2) cooled at 77K
- Long integration times

New: Bobcat-Gated camera integrating at 80 ns in the SWIR range. Optimized for inspection of light bulbs or hot and fast moving objects such as turbine blades.



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Synopsys, Inc.

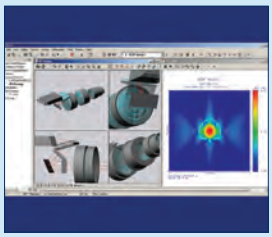
Visit us at Booth No. 700

CODE V Optical Design Software

New features in CODE V 10.4 enhance beam propagation analysis

CODE V 10.4, now available from Synopsys, delivers enhancements to its Beam Synthesis Propagation tool that enable optical designers to model and analyze diffraction effects in optical systems with increased flexibility, speed and accuracy:

- General complex field input supports custom light source definitions
- Birefringent crystal modeling is included for microlithographic and optical telecommunication devices
- More robust pre-analysis feature minimizes setup time and maximizes ease of use
- Multiprocessor support speeds computation time



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