# Photonics West® Show Daily

## THURSDAY EDITION

### Needle microscope triumphs in $10K Startup Challenge

Robert McLaughlin's cancer-testing scope scoops innovation award.

Scan QR code to view winning pitch


TODAY'S NEWS


**AND THE WINNERS ARE…**

**Awards for innovation: eight companies picked up Prism Awards during a gala banquet at the Marriott Marquis hotel in San Francisco last night.**
Credit: Joey Cobbs/SPIE.

# Double win for Hübner at 2014 Prisms

Industrial group Hübner won two Prism Awards at last night's celebration of photonics innovation. The Kassel, Germany, company won in both the defense and security category for its T-Cognition terahertz spectrometer and in the scientific lasers section for its C-WAVE optical parametric oscillator. The first T-Cognition system is about to be installed at a prison in Germany.

Also picking up awards were the Egyptian company Si-Ware Systems, whose tiny MEMS-based Fourier Transform infrared spectrometer shrinks a product that has historically been the size of a kitchen appliance to little more than that of a postage stamp. Si-Ware claimed the prize for test, measurement and metrology.

Other winners on the night included medical imaging firm AccuVein, whose AV400 system displays a vascular map on the surface of the skin in real time, and Tornado Spectral Systems, whose OCTANE-860 on-chip spectrometer for compact optical coherence tomography first appeared at last year's BiOS show.

Another winner to have made its debut at the show in 2013 is Nanoscribe's "Photonic Professional GT" 3D nanoprinter, which won in the advanced manufacturing category. Meanwhile NECSEL won for its frequency-converted green laser array, V-Gen claimed the industrial lasers prize for its short-pulse master-oscillator power amplifier, and Compass-EOS won in optics and optical components.

## Photonics West by the numbers

- Overall attendance: up 6%
- Exhibition visitors: up 11%
- More than 4,700 papers
- Record 1259 exhibitors

## Industry Events

- Photonics West Exhibition (10am-4pm)
- Prism Awards for Photonics Innovation winners at exhibition
- Photonics industry update: Measuring the market (9:15-9:45am)
- Technology-Transfer Showcase: Commercialization opportunities (10:30am-1pm)

See the technical program and exhibition guide for details on daily events.

All industry events are open to all registration categories.

## Inside this issue

**p.3:** LASE plenary
**p.4, 29:** Exhibition news
**p.7:** Peter Leibinger interview
**p.12:** First-time exhibitors at Photonics West 2014
**p.14:** European clusters
**p.19:** Michael Mertin on European photonics
**p.30:** Biophotonics in Brazil

World's Largest Inventory of Optical Components

# Edmund optics | worldwide

## STOCK OPTICS FOR INSPECTION SYSTEMS

**Imaging Lenses | Cameras | Illumination | Mounting**

- **Customize** to Your Application Needs

**Booth 1514**

TELL US WHERE **YOUR OPTICS GO**... and get your face on a cover!

- **Hands On Demonstrations**
- **Daily Technical Presentations** @ 10:30, 11:30, 1:30, & 2:30 pm
- **Happy Hour** @ 4-5 pm, Tues. & Wed. (Beer Included)
- **Daily Prize Drawing** for a GoPro® Adventure Camera

**Come see us – Booth 1514**


**WWW.EDMUNDOPTICS.COM/PW14**

# LASE plenary highlights global opportunities

As we move through the second decade of what many believe will become known as the "century of the photon," the laser and photonics industry is at a crossroads, according to speakers at the LASE symposium plenary session Wednesday.

Photonics technology has become deeply entrenched in our everyday lives, but there remains an urgent need for greater collaboration if the industry is going to realize its full potential, said Michael Mertin, CEO of Jenoptik, in his presentation on the European Photonics21 technology platform.

"Photonics opens up completely new opportunities and changes the landscape of the world's industry," said Mertin, who is also president of Photonics21. "However, it is too complex and diverse to be successfully driven by one country or company or individual. We need to cooperate across organizations and borders to make the century of the photon happen."

Lasers and photonics have made a tremendous impact on our society over the last 50 years, said Mertin, who was joined by two femtosecond laser experts on the plenary stage.

"Imagine a world without photonics, without lasers," Mertin said. "Without these technologies, we would be somewhere in the pre-industrial time. Do we want to go back to that? No. This is why Photonics21 was created."

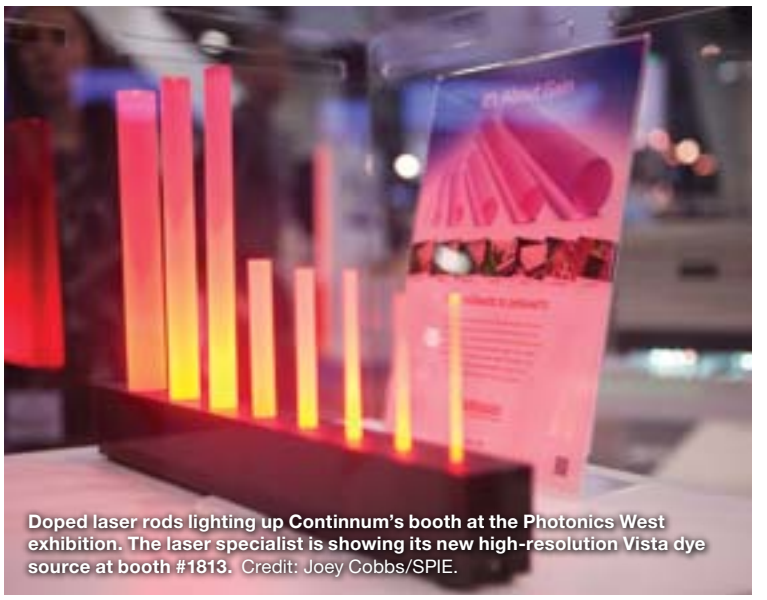
Founded in 2005, the mission of Photonics21 is to unify the photonics community and advise the European community on photonics research, development and innovation needs. Today it has more than 2000 members representing more than 1000 companies, research institutes and educational organizations. (*For more on Photonics21, see page 19.*)

Efforts made by Photonics21 and supporters of the US National Photonics Initiative are key to ensuring the growth of this industry, Mertin noted. They are also critical to ensuring that the political community – those who often hold the purse strings – understands the value of the industry's contributions.

"I can't imagine a more exciting industry to work in," he said. "And it is not only academia and industry that realize its potential, it is the politicians trying to understand that developing this technology will result in a higher standard of living by improving our healthcare, energy and communications and creating thousands of new jobs."

Femtosecond lasers have emerged as a key enabling technology for many of photonics' most exciting new application areas, from biomedicine and life sciences to data communications and nanomaterials processing.

In his talk on femtosecond laser micromachining for biological research technologies, Koji Sugioka of RIKEN and Tokyo University of Science described his group's advances in using femtosecond lasers for 3D micromachining of biochips on glass.



Doped laser rods lighting up Continnum's booth at the Photonics West exhibition. The laser specialist is showing its new high-resolution Vista dye source at booth #1813. Credit: Joey Cobbs/SPIE.

Femtosecond lasers can directly fabricate 3D microfluidic, micromechanic, microelectronic and micro-optical components in glass, and these components can be easily integrated in a single glass microchip that can enhance the ability to observe and manipulate microorganisms and cells, Sugioka explained.

"Femtosecond laser 3D glass micromachining is a powerful tool to fabricate 3D microfluidics and integrate micromechanics and micro-optics, which is of great use for fabrication of optofluidic and lab-on-a-chip devices," he said.

Meanwhile, researchers at Ecole Polytechnique de Montreal are combining femtosecond lasers and plasmonics to create a "nanosurgery tool for the 21st century," according to Michel Meunier, Canadian research chair in laser micro- and nanoengineering.

He outlined his group's efforts to develop a plasmonics-enhanced ultrafast laser multinanoscalpel that could be used for cell nanosurgery and potentially adapted for therapeutic tools in the clinical environment.

"I strongly believe that in this century the great surgeon of the future will be the nanosurgeon, and femtosecond lasers will enable this," Meunier concluded.

KATHY KINCADE

## Wyant funds $10 million in scholarships

Optics entrepreneur James C. Wyant, professor emeritus and founding dean of University of Arizona's College of Optical Sciences, is donating $10 million to the college for graduate student scholarships.

The gift includes a $400,000 match from Wyant for each new donation of $100,000 to an endowed scholarship fund known as Friends of Tucson Optics.

That fund has 15 donors eligible for the Wyant match so far, including SPIE. SPIE President H. Philip Stahl presented the $100,000 SPIE donation at the college's 50th anniversary celebration held in San Francisco Tuesday night.

SPIE CEO Eugene Arthurs was among those on hand to personally thank Wyant, a past president of SPIE, for his generosity.

# Executives upbeat on the photonics market

A panel of executives offered a consistently upbeat view of photonics markets and their near-term potential in a session moderated by SPIE industry and market strategist Stephen G. Anderson on Wednesday afternoon.

Healthcare and the various markets for sensors were repeatedly cited as areas of impressive growth in the past year and good prospects for the coming year. While automatic spending cuts in the US, known as sequestration, did impact the defense industry in particular, some companies were less affected than anticipated.

Rick Plympton, CEO of Optimax, even looked at it in a positive light, saying, "Sequestration is going to realign defense spending." The industry will have an advantage in the new era, as government looks for cost savings that can be enabled by photonics, he said.

The sentiment was echoed by Tim Day, CEO and founder of Daylight Solutions. A detailed analysis of lifecycle costs will be a part of any defense acquisitions, and "photonics has a distinct advantage" when that is factored in, he said.

When asked where the opportunities lie in the years ahead, almost all seven executives on the panel mentioned life science and healthcare.

Dirk Rothweiler, executive vice president of optical systems at Jenoptik, also cited the proliferation of "ambient intelligence" — beyond the desktop or laptop computer, he said semiconductor manufacturing is benefiting from consumer items with programmable displays. And the automotive industry, he said, continues to be an important market, with photonics in displays, ambient lighting and potentially even self-driving cars.

An audience member asked what disruptive technology worries them as a threat to their business and markets, but most executives had difficulty coming up with an answer.

"There's so much opportunity, I see growth," said Jerry Jurkiewicz of IDEX. "If all of us on this stage organize our companies, our talents and our technology on those opportunities, I think the positive side of the ledger so far outweighs the negative side, that I do not lose sleep at night in this industry."

Near the end, Dennis Werth, a senior vice president at Newport, said that while opportunities abound around the world,

*"Photonics has a distinct advantage."*

he would bet on the US as the place the next big thing might come from. He cited Google, Amazon and eBay as examples of successful innovators.

"This country just has a repeated history of creating whole new industries," Werth said. "You just don't see that anywhere else."

David Nislick, of Excelitas, and Christof Lehner, of Trumpf's North America operations, also participated in the panel.

RICH DONNELLY


**Coherent's Matthias Schulze shows off the company's colorful range of Obis lasers.** Credit: Ford Burkhart/SPIE.

## BioRay lasers: the new Scotch tape?

Bright colors flashed as Coherent packed in crowds on Wednesday to see its expanded Obis and BioRay laser lines, light sources for builders of tools for cell analysis in life sciences and medical products, for example in flow cytometers.

The compact, mobile units will serve areas where cells are constantly counted, like HIV patients for whom a CD4 count is crucial. Tool builders may incorporate several lasers in a single device to add more colors.

While the Obis products launched at Photonics West two years ago serve higher-end markets, the more economical BioRay lasers should expand options elsewhere. "BioRay lets the life sciences industry make things happen in the desert in Africa, with no technical skill on site," said Matthias Schulze, director of marketing for OEM components and instrumentation.

"This is the future. These will be like Scotch tape. They are the new industry standard," he said. "You just bring the 12 volts of DC and you're ready to go."

The "plug and play" kit meets a need for instruments to support more steps in analysis, to serve more medical protocols, he added. Some customers will take 10 or 15 of the boxes to cover their spectral requirements, from 375 to 785 nm.

# PV panel focuses on efficiency challenge

A Green Photonics symposium panel session ostensibly about the environmental aspects of solar power developed into a "state-of-the-union" discussion of recent technology developments and the likely evolution this fast-growing sector.

Symposium chair Steve Eglash from Stanford University chaired the panel featuring Homer Antoniadis, director of Dupont Photovoltaic Solutions, Raffi Garabedian, CTO at First Solar, and University of New South Wales researcher Martin Green, director of the Australian Centre for Advanced Photovoltaics.

Eglash first asked the panel if there were only a couple of essential technology approaches left for photovoltaic conversion: "Apart from cadmium telluride (CdTe) and silicon, is it game over for other PV technologies?"

Garabedian said First Solar was committed to further developing CdTe technologies. Green responded, "But CdTe is not always the optimal solution; we also need to look at crystalline silicon for space-constrained applications. The same technology that leads to a record conversion in the lab does not always lead to a commercial solution in the field."

"Evolving towards higher and higher efficiencies is where we want to go," said the First Solar CTO. Present modules typically vary from 13-20 percent so we are trying to get up to 40 percent. However I think the mainstream of PV technologies will continue to be based on an unfocused, single-sun approach."

Eglash asked the group about the recent rash of perovskite developments — a subject that was also the focus of Green's well-attended presentation on silicon tandem cells earlier in the day — which has arrived out of the blue in the past two years. Garabedian replied, "We still have a lot more to discover and perovskites are really just another beginning. Will we continue to use today's PV technologies in 20 years time? I doubt it because there will be other new photochemistry models, without the current instabilities."

Antoniadis said: "More than 90 percent of today's activity still depends on crystalline silicon. We need to think of new improved absorbers, that can deliver conversion beyond 20 percent."

Echoing his earlier talk, Green said: "Perovskites seem like an attractive development route. Also the industry and marketplace is not really dominated by the two poles of high efficiency/high cost and low efficiency/low cost. There is a lot of work happening in the middle."

Garabedian agreed: "The majority of the PV industry today, 90 percent or so, is still working in the area of 15 to 16 percent efficiency cells. Because of the cost model at this level, these medium efficiency cells are still attractive. As you go up towards 20 percent efficiencies the development and installation costs really go up." He also noted that in China, the state does not now allow PV module manufacturers to expand their production unless they can also increase the efficiency of their PV cells.

Speaking earlier in the day, Green said that although much still needed to be resolved with perovskite — not least the fact that the most effective chemistries are based around lead compounds — the very rapid progress now being shown with the material suggests that it could dramatically change the economics of solar electricity generation.

Perhaps most interestingly, UNSW models indicate that a layer of perovskite in a tandem design could have the greatest impact on lower-quality but cheaper silicon cells, boosting their efficiency from just 16.5 percent to 22 percent. If implemented at scale, that could seriously change the PV landscape.

"The fact that [perovskites] came from nowhere is really exciting," Green said. "It's an unusual structure and we don't really know why it works so well, [but] very rapid progress is being made and it will catch up with CIGS and CdTe. We have got to get to higher-efficiency silicon to leverage costs."

MATTHEW PEACH
AND MIKE HATCHER

## 3D printing a big Texas DLP smile

Texas Instruments DLP is showcasing on its booth (#2223) a range of applications of its LightCrafter 4500 flexible light steering projector, which features the firm's DLP 0.45 WXGA chipset.

In one commercialized application, Carestream Dental from Atlanta, Georgia, has used the technology in its CS 3500 Intraoral Camera, which acquires true color, 3D images that can be used to produce teeth molds and to design replacement crowns.

Texas DLP's Chelsea Swan demonstrated the effectiveness of the camera on a lower set of teeth. The 3D images gathered by the system can be subsequently re-projected in an additive manufacturing application of the Lightcrafter to create accurate models of patients' teeth to a resolution of sub-20 microns to optimize dental treatment.

In another application of the DLP LightCrafter 4500, University of Puerto Rico computer engineering undergraduates Jose Oyola and Fernando Lopez developed an additive manufacturing system that can produce 3D polymer pieces up to several tens of millimeters in size with a resolution of about 0.5mm. The students developed their own software and designed the tool with its polymer bath, stepper motor and projector.

**Chelsea Swan from Texas Instruments DLP shows how the company's digital light processor is finding new applications in dentistry and additive manufacturing.** Credit: Matthew Peach/SPIE.

## Spectrometer pushes OCT bandwidth

North Carolina optical coherence tomography (OCT) equipment specialist Bioptigen revealed its "SD800 XHR" spectrometer at the BiOS exhibition on Saturday. The company, started up several years back by Duke University's Joe Izzat and Eric Buckland, says that the new kit features an extra-broad bandwidth of 300 nm, and that it is the world's only OCT spectrometer to combine such bandwidth with 70 kHz, k-linear operation.

The combination of features yields very high-resolution images, deeper imaging capability (to 2.5 mm) and superior signal fall-off performance. Compatible with either supercontinuum or Ti:sapphire laser sources, it is being aimed primarily at researchers working in the OCT field, with potential application in ophthalmology, cardiology and small-animal imaging studies.

*Silence (ˈsaɪləns)*

n
1. the state or quality of being silent
2. the absence of sound or noise; stillness
3. refusal or failure to speak, communicate, etc, when expected: his silence on the subject of their promotion was alarming.
4. a period of time without noise


NEW
See it at
booth #711

# Koheras BASIK X15

The World's most silent fiber laser for sensing

- Industry leading low phase noise
- Hz range linewidth
- Rugged industrial package
- High reliability, 24/7 maintenance free operation


+1 732 972 9937 / +45 4348 3900
www.nktphotonics.com/X15
laser_sales@nktphotonics.com

NKT Photonics
the power of light

pco.

# on the cutting edge

pco.edge cameras from the pioneers
in sCMOS image sensor technology

Photonics West
Booth 2023



europe +49 (0) 9441 2005 50 america +1 (248) 276 8820 asia +65 6549 7054

www.pco.de

# Trumpf looking forward to ultrashort-pulse future

## Peter Leibinger's take on the key trends now influencing the industrial laser sector.

Peter Leibinger, the head of Trumpf's laser division, is a regular visitor to Photonics West, keen as ever to catch up with former colleagues who have decamped to the US west coast. And, like many executives, a long list of business meetings will keep him from seeing all of the technical presentations that he would ideally want to.

This year sees the Germany-headquartered bellwether of the industrial laser scene revealing plenty of its own technical innovations in the LASE conference rooms as well as on the Photonics West show floor, where visitors will get a sense of just how important the field of ultrashort-pulse lasers is set to become.

Recognized with the award of the German federal president's Future Prize in December, these lasers have long been tipped to emerge as one of the key tools for 21st-century manufacturing. Leibinger says that picosecond sources are now gaining significant ground, accounting for a growing chunk of Trumpf's revenues.

"They are not suddenly going to become responsible for half of our revenues, but they are gaining a strong foothold in the market for applications like sapphire machining and fuel injectors," he says. Sapphire, whose tough and unscratchable properties are increasingly being exploited by the likes of Apple and Samsung in smart phone and tablet devices, could prove critical to the future market for ultrashort-pulse lasers.

Trumpf's Photonics West booth this year sees the company raise the stakes in the sub-picosecond regime too, with an 80 Watt version of the femtosecond laser it launched last year. It offers twice the average power of the similar source that was unveiled at the 2013 Laser show in Munich.

Anticipating double-digit rates of sales growth for Trumpf's ultrashort-pulse lasers in the coming years, the importance of these sources in Leibinger's mind are clear when he says that he will "see to it personally" that the necessary investment is made in terms of development work.

### Solid-state progress

The advance of the solid-state laser, most obviously embodied at Trumpf by the company's thin-disk sources, is of course another key trend. One manifestation of this, says Leibinger, was the opening of the company's new development center for solid-state lasers in Schramberg — shortly after last year's Photonics West event.

"Schramberg represents both the culmination of recent efforts and an important move for the future," says Leibinger. It is the strong connection to Trumpf's recently expanded laser diode production facility in Princeton, New Jersey, that is the important thing here, he adds, indicative of just how much the emergence of the diode has changed the Trumpf laser business since the days when carbon dioxide lasers were the overwhelmingly dominant technology.

"The adoption of solid-state lasers in machine tools is happening more quickly than we had expected," he admits, something that is perhaps a reflection of the increased competition in this sector — largely, in Trumpf's case, from the fiber laser maker IPG Photonics. As a result, Trumpf's Princeton site is already running at close to its maximum output, despite the recent doubling of production capacity.

With rapid declines in the cost-per-Watt of solid-state laser output, Leibinger says that there has been a similarly rapid increase in the unit sales of Trumpf's high-power thin-disk sources, used extensively in the same company's own machine tools. Leibinger is particularly proud of the "Bright Line fiber" innovation for 2D laser cutting, which he says turns tools fitted with solid-state lasers into much more versatile machines, capable of dealing with thick materials as well as thin metal sheets.

"The Bright Line fiber-delivered solid-state laser now almost matches the quality that can be achieved with a carbon dioxide laser, and that makes the switch to solid-state a compelling proposition," he says. Using Trumpf's 5kW disk laser, aluminum and stainless steel of up to 25mm in thickness can be cut to a quality that virtually matches what is possible with a carbon dioxide source.

**Peter Leibinger shows German Chancellor (and physical chemist) Angela Merkel the inner workings of one of Trumpf's industrial lasers.** Credit: TRUMPF Group.

### EUV lithography

On two of the hot-topic applications that dominate much of the photonics indus-

**continued on p.9**


Sharing Excellence in Laser Technology

Jenoptik is one of the leading providers of laser technology and offers products and solutions along the entire value-added chain of laser material processing - starting from unmounted laser bars and single emitters to diode laser stacks and high brightness diode laser modules up to solid-state lasers such as disk and fiber lasers.

We are your partner for applications in material processing, medical technology, science, defense as well as show & entertainment.

Be part of it -
South Hall, Booth # 1215

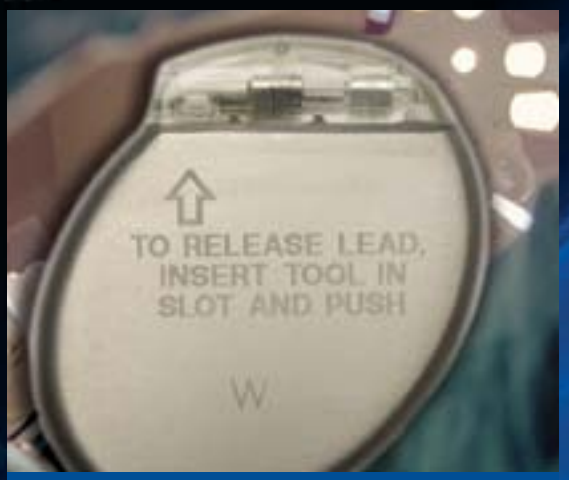
www.jenoptik.com/lm

JENOPTIK

Cambridge Technology

Focusing Our Products on Your Applications.

Laser Treatment




Marking

Remote Cutting

TECHNOLOGY ▪ PERFORMANCE ▪ QUALITY ▪ VALUE ▪ RANGE OF PRODUCTS ▪ APPLICATIONS EXPERTISE

SEE US AT PHOTONICS WEST #1701

Learn more at www.cambridgetechnology.com

Innovations in Low Light Imaging

Providing Digital and Optical Solutions in Low Light

*See why PHOTONIS is a global leader in low light imaging solutions*

**Digital CMOS Low Light Cameras**
<4e- read noise
High speed and high resolution

**Photon Imaging Components**
Sub-nano second timing
Customize to spectral response



PHOTONIS

www.photonis.com

See us at Booth 5517

## Trumpf

continued from p.7

try's chatter — extreme ultraviolet (EUV) lithography and laser-additive manufacturing (or 3D printing) — Leibinger has starkly divergent views.

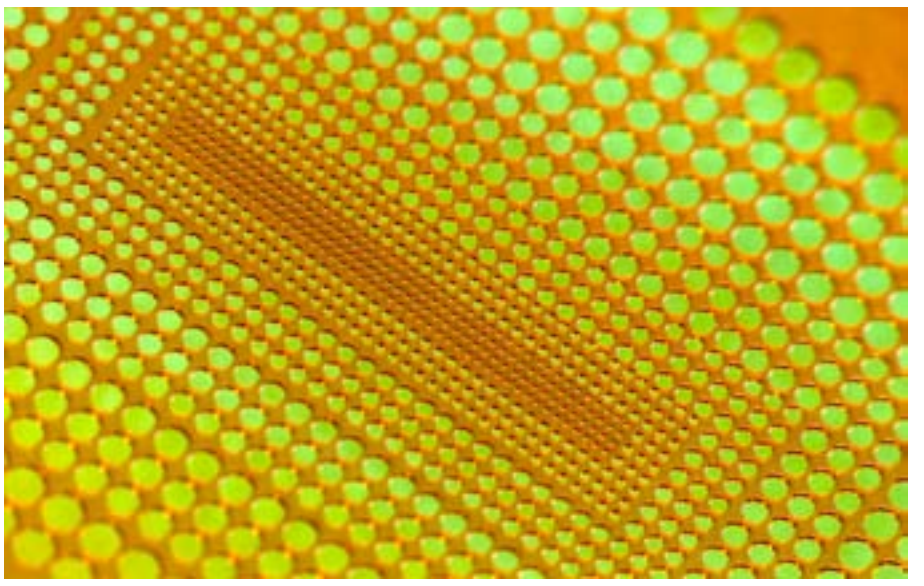
Having first backed the development of advanced lasers for EUV as long as eight years ago, Leibinger maintains his belief that this technology will emerge as the key new application for carbon dioxide lasers — at a time when they are being usurped by solid-state sources in more traditional materials processing applications.

EUV technology has been beset by technological difficulties over several years, and Leibinger admits that this has made development of the specialized high-power sources — used to generate an EUV-emitting plasma when they strike tiny droplets of tin in the EUV tool's source chamber — something of a managerial challenge. But he adds that for Trumpf this has been about much more than the development of another laser.

"Originally we decided to develop this technology for cultural, as well as commercial reasons," he says. "The prospects for EUV were very dim then, but what that did was expose Trumpf's laser developers to new ideas and a different way of working."

Before that, Trumpf's laser development engineers had been almost exclusively used to working on sources destined for machine tools, where the priority was for ultra-reliable performance in production manufacturing, and development work was guided by the "must-not-fail" mantra. With EUV, the requirements have been radically different.

**Medical stents, used to aid blood flow in constricted arteries, must be absolutely burr-free. Stents made from the shape-memory alloy nitinol can be precisely machined with an ultrashort pulse laser — eliminating any refinishing work and making their production far cheaper.** Credit: TRUMPF Group.



**Holes in a polyimide film, used in printed circuit boards, generated with one of Trumpf's new picosecond lasers.** Credit: TRUMPF Group.

"We have to deliver on time, perhaps more quickly than we would have done normally — so this is helpful on a cultural basis," Leibinger explains. "And this has succeeded. Yes, the delays in wider EUV development can be frustrating, and I have had to convince people that it is worth doing, but I am now one-hundred-percent convinced that EUV will be a success."

### 3D printing: hyperbole?

To all intents and purposes, and certainly in the Western hemisphere, Trumpf is the only laser company playing in this emerging space, and demand for EUV tools is set to breathe new life into its sales of carbon dioxide lasers. The only remaining question, feels Leibinger, is exactly when that will happen.

He and the company are set to find out pretty soon. It is expected that some of the key chip manufacturers who are looking to adopt EUV lithography in full production will make critical decisions about its implementation this spring. If they accept EUV for their next production "node" (10nm), that will mean a likely requirement of around thirty EUV tools and associated lasers in 2014. "One risk is that the ramp in demand is quicker than expected," Leibinger says.

But if those same chip makers decide to delay EUV until the following "node" (7nm), Leibinger and the 200-strong team at Trumpf working on the application will be looking at a two-year delay until production is ramped. To deal with such uncertainties, something that Leibinger freely admits would be much more challenging were Trumpf a publicly-listed company, simply comes with the territory when it comes to the semiconductor industry.

On the subject of laser-additive manufacturing and the much-vaunted 3D printing "revolution", Leibinger is nothing if not forthright. He says of the accompanying hyperbole: "It's complete hype, the media reaction has been absurd and companies in this space have gained crazy valuations — the bubble is going to burst."

That is not to say that there won't be a place in the industrial sector for 3D printing — far from it. But Leibinger asserts that this technology is not going to be quite the revolution in manufacturing that many appear to be hoping. In fact, Trumpf was ahead of the game in this space, launching a product for additive manufacturing more than a decade ago. But after concluding that it was not fast enough for the production environment, and that finished surface quality was not sufficient for anything but rudimentary and prototype designs, the product was withdrawn.

"Perhaps I overlooked the fact that for certain small-run production batches, these shortcomings are acceptable," says Leibinger, admitting that some customers do make enquiries to ask if Trumpf will restart its earlier product line. That is still under evaluation, but one thing that Leibinger will not sanction is any "me-too" products from a company whose spirit is wedded to innovation and cutting-edge designs, and which employs nearly one-sixth of its workers in research and development activity.

MIKE HATCHER

*Trumpf Inc. is showcasing ultrashort-pulse lasers and other new product innovations at Booth #1033 in the South Hall. The company is also co-sponsoring the Photonics West Startup Challenge and LASE symposium Best Student Paper Competition.*

## Trumpf's 2013 timeline

**MARCH:** Trumpf officially dedicates its new solid-state laser development center in Schramberg, southern Germany, following a €13.5 million investment. Local mayor Thomas Herzog is among the 250 guests attending the ceremony.

**APRIL:** The laser company reveals details of its five-amplifier-stage, 20 kilowatt carbon dioxide laser, which has been developed for the forthcoming generation of extreme ultraviolet (EUV) lithography scanners. Trumpf was able to draw on its vast experience with these types of lasers, stretching back almost thirty years.

**MAY:** Trumpf unveils its first femtosecond laser — the TruMicro 5050 Femto Edition — in Munich. A higher-average-power version of the ultrashort-pulse laser is on show this week in San Francisco.

**JUNE:** The firm's laser marking systems subsidiary in Switzerland expands by about 3,300 square meters the floor space for its product development and manufacturing activities in Grüsch.

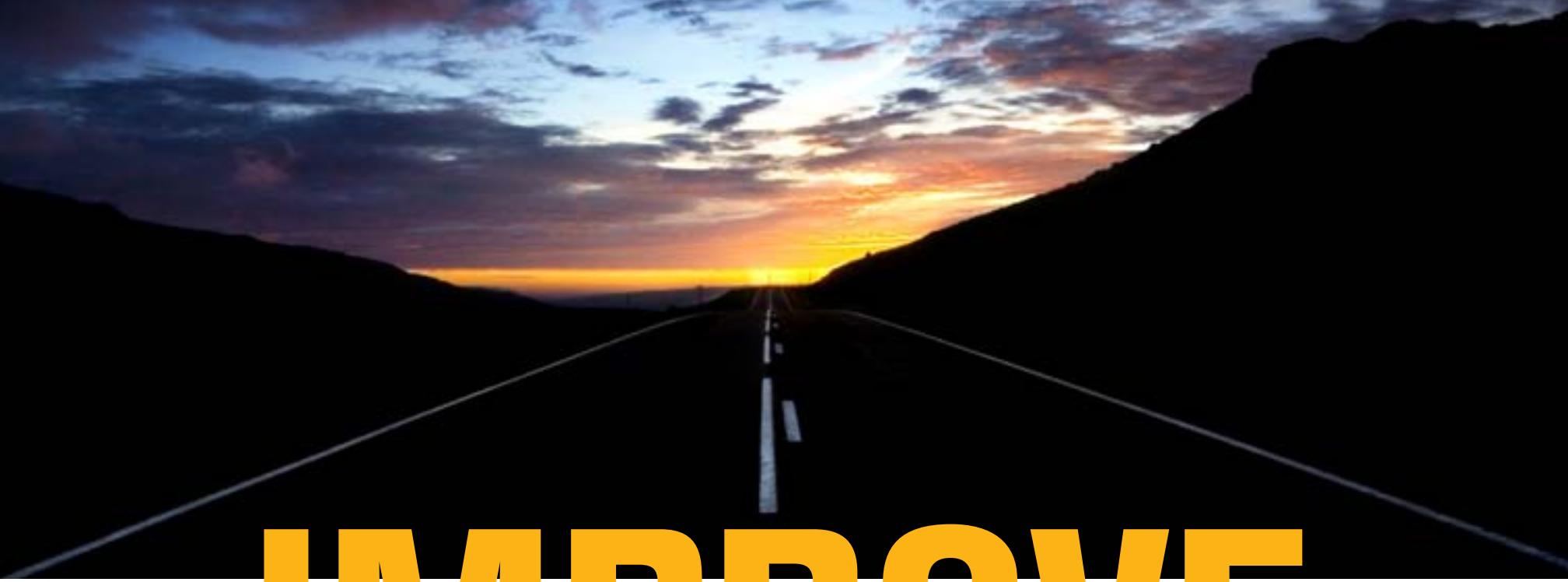
**JUNE:** King Willem-Alexander of the Netherlands visits Trumpf, accompanied by a 19-man trade delegation.

**JULY:** German Chancellor Angela Merkel becomes the latest VIP to visit the machine tool and laser specialist, on a trip to learn more about the family-owned "Mittelstadt" companies working in Germany's high-tech sector. During her visit Merkel saw carbon dioxide lasers and combined punch-laser machines being assembled.

**OCTOBER:** Trumpf buys a majority 72 percent stake in the Chinese company Jiangsu Jinfangyuan CNC Machine Company Ltd. (JFY). The firm, privatized in 1997 and based in Yangzhou (300 km west of Shanghai), is seen as increasingly important in the laser cutting machine sector.

**OCTOBER:** Coincident with the JFY announcement, Trumpf posted record annual sales of €2.34 billion for its financial year ending June 30. Sales of lasers grew by nearly 8 per cent to reach €684 million.

**DECEMBER:** A team of researchers from Trumpf, Bosch and the University of Jena wins the German Federal President's "Future Prize", for their development of ultrashort-pulse lasers for industrial applications. President Joachim Gauck awards the prize at an official ceremony in Berlin to Jens König from Bosch, Trumpf's Dirk Sutter and Stefan Nolte, a professor at the University of Jena Friedrich-Schiller.



# IMPROVE YOUR IMAGE

Don’t compromise image quality for aggressive size, weight and power requirements. Improve your image and choose DRS Technologies’ **Tamarisk**® LWIR and **Zafiro**® MWIR cores for superior thermal imaging performance and accuracy with uncompromised image quality. Learn more at **www.drsinfrared.com**.

## Tamarisk®

Tamarisk®640

Tamarisk®320

## LWIR

The Tamarisk® family of 17 µm Vanadium Oxide (VOx) uncooled thermal modules provide exceptional thermal imagery in a miniature package. Utilizing DRS' patented microbolometer Absorber Superstructure, Tamarisk® thermal imagers are designed for greater sensitivity and image quality at an affordable price. Tamarisk® is available in resolutions of 320 x 240 and 640 x 480 with multiple lens options for greater flexibility in integration. All Tamarisk® modules now tout DRS' proprietary Image Contrast Enhancement (ICE™) for superior edge enhancement, dynamic contrast thresholding and adaptive rescaling.

## Zafiro®

Zafiro®640


Zafiro®640 Micro

## MWIR

The Zafiro® family of cooled thermal modules employ DRS' advanced Mercury Cadmium Telluride (MCT) detector and patented Stirling cryogenic cooler to produce unparalleled MWIR imagery. The rugged, compact Zafiro® design and 12 µm pitch detector provide a long-range surveillance solution that is widely deployed on Unmanned Aerial Vehicles (UAV) and other demanding situational analysis requirements. Zafiro® modules are available in 640 x 480 resolutions and a 1280 x 720 High-Definition model.

## Visit DRS Technologies at Booth #2417.

**DRS Commercial Infrared Systems**
**www.drsinfrared.com**
**855.230.2372**

DRS Technologies
A Finmeccanica Company

# 2014 Photonics West: first-time exhibitors

## Start-ups, spin-outs and first-timers making the trip to San Francisco's Moscone Center this year.

With around 1300 companies from all corners of the world again making the trip to exhibit at Photonics West for the 2014 event, it can be difficult to pick out the newcomers. But there are dozens of debutants each year, all seeking to use the show as a launch pad for new products and services. Here's the Show Daily selection of 15 first-time exhibitors who will be looking to make a splash at the Moscone Center this week.

### Airoptic (Poland)

Focused on the development of gas monitors based on high-performance tunable diode laser spectroscopy, Poznan-based Airoptic was set up by Pawel/Kluczy´nski in 2010 and has customers across Europe and the US. Last year the firm won an award in Citibank's "Microentrepreneur of the Year" competition in Poland, and it is targeting applications in both industrial and medical markets.
*Contact: Pawel Kluczynski (pawel.kluczynski@airoptic.pl). Booth #5510.*

### Bright Photonics (Netherlands)

Maarssen-based Bright Photonics is a design house for photonic integrated circuits (PICs), and has taken part in the European Commission-funded "PARADIGM" and "PHOXTROT" research projects. Focused on applications in telecommunications, interferometric devices and sensing, the company offers photonic design, product prototyping and more.
*Contact: Ronald Broeke (ronald.broeke@brightphotonics.eu). Booth #5101.*

### Crystalline Mirror Solutions (Austria)

Vienna start-up Crystalline Mirror Solutions (CMS), founded just two years ago, manufactures low-noise reflective optics using a proprietary substrate-transfer coating technology. It says that monocrystalline multilayers fabricated with this technique exhibit a significant improvement in Brownian noise performance when compared with sputtered coatings, while maintaining excellent optical properties.

With prototypes constructed and successfully demonstrated via a collaborative effort with partners from the University of Vienna and JILA, the joint institute of the University of Colorado at Boulder and the National Institute of Standards and Technology (NIST), CMS began taking orders in late summer 2013.
*Contact: Garrett Cole (g.cole@crystallinemirrors.com). Booth #4014.*

### EPSRC Centre for Innovative Manufacturing in Photonics (UK)

Set up to develop new types of optical fiber and commercially viable ways of producing them, the UK's Centre for Innovative Manufacturing in Photonics is based at the internationally renowned Optoelectronics Research Centre in Southampton and is headed up by Sir David Payne. Key partners in the facility, which was supported by the Engineering and Physical Sciences Research Council, include the likes of BAE Systems, Selex Galileo and SPI Lasers, as well as AWE, the Atomic Weapons Establishment — home of the UK's nuclear warhead capability.
*Contact: Deanna Standen (d.standen@soton.ac.uk). Booth #5311 (co-located with the EPSRC Centre for Innovative Manufacturing in Ultra Precision).*

### FiveFocal (US)

Set up in 2009, Boulder, Colorado-based start-up FiveFocal specializes in the design and manufacture of novel imaging systems, including wafer-level optics and computational imaging for compact camera applications. Examples include miniature camera lenses, wide-field systems for applications in security, endoscopy and the automotive industry, zoom lenses and infrared objectives.

FiveFocal also showed off its wares at the giant Consumer Electronics Show in Las Vegas in early January, where it demonstrated compact thermal lens technology and stereo feature tracking and mapping hardware — developed with custom optics in collaboration with the US Army.
*Contact: Alan Baron (alan.baron@fivefocal.com). Booth #4215.*

### Helion (Germany)

A spin-off of the local Fraunhofer Institute for Microelectronic Circuits and Systems in Duisburg, Helion was founded in 2003. It specializes in image pre-processing and high dynamic range (HDR) image processing for applications across the automotive, medical, security and industrial markets. Engineering solutions include the company's "Vesta" modular platform that combines a video processing baseboard with an image sensor and an FPGA component from collaborating partner Lattice Semiconductor.
*Contact: Thorsten Heimann (sales@HelionVision.com). Booth #4136.*

### Knight Optical (UK)

A global supplier of custom optical solutions, Knight Optical has been around for more than 20 years but makes its first appearance at Photonics West this year. The company works collaboratively to provide precision optical components for customers targeting a wide range of applications, from thermal imaging systems for aircraft, to medical laser systems and consumer electronics. In November, the company launched a new range of stock and custom germanium windows, lenses and blanks aimed at CCTV and thermal imaging applications.
*Contact: Alison Wressell (alison.wressell@knightoptical.co.uk). Booth #5311 (UK pavilion).*

**Optical interference filters from the UK company Knight Optical. Exhibiting at Photonics West for the first time, Knight Optical is part of the UK pavilion at booth #5311.** Credit: Knight Optical.

## Michigan Photonics Cluster (US)

Although established as recently as April 2013, the "M-Light" Michigan cluster of photonics companies includes some of the best-known names in the industry. Founding members of the group include fiber laser giant IPG Photonics, Trumpf, Level 3 Communications and Fraunhofer USA.

Among the lesser-known firms that make up a group aiming to serve as a focal point for the industry in a state with a strong technical pedigree in ultrafast science thanks to the pioneering work at the Center for Ultrafast Optical Science in Ann Arbor are Contour, Laser Mechanisms and LumenFlow. In November, Aerotech became the organization's 25th member.

*Contact: Michelle Stock (Mi-Light Chair): +1 734-417-1079 (mlstock18@yahoo.com). Booth #6096.*

## MONTFORT Laser (Austria)

Daniel Kopf, previously CEO at High Q Laser — now part of the sprawling Newport collection of photonics brands — is now the primary mover behind another Austrian start-up specializing in novel solid-state lasers. Based on diode-pumped crystalline laser media ranging from Nd:YAG to vanadates, ytterbium-doped double tungstates, oxides and others beside, the company can produce very compact lasers with exceptional performance, including 100 millijoule pulses from palm-sized laboratory setups.

With Kopf's experience and prior success, a class-100 clean room area in its Goetzis headquarters and intellectual property covering its compact designs, Montfort could be one to watch for the future.

*Contact: Daniel Kopf (dk@montfortlaser.com). Booth #4937.*

## MicroSense (US)

Metrology firm MicroSense, previously known as ADE Technologies, was once a subsidiary of semiconductor industry giant KLA Tencor. A management buy-out from KLA in late 2009 and the arrival of CEO Jim Pelusi has since seen the company's revenues grow from $24 million to $130 million in just two years. The Lowell, Massachusetts, firm sells a range of metrology products including a system that uses the polar magneto-optical Kerr effect to characterize the magnetic properties of multi-layer wafers used in the development of perpendicular magnetic RAM.

Its other products include the "PV-6060" solar wafer measurement modules based on non-contact capacitive sensors.

*Contact: Peter Bagley (peterbagley@microsense.net). Booth: #5605.*

## Nano-Optic Devices (Russia/US)

Founded by Vladimir Yankov in 2007, Nano-Optic Devices has developed its digital planar holography approach to realize complex photonic functions and devices on compact planar chips — which it says are compatible with modern microlithographic manufacturing processes.

With offices in Santa Clara, California, and Troitsk in Russia, the company offers a design service and is targeting applications in optical interconnects, wide-aperture laser diodes, nano-scale optics and component integration and assembly. Products include a high-performance on-chip spectrometer developed in collaboration with Germany-based RGB Laser Systems that is just the size of a memory stick but said to offer 0.15 nanometer resolution.

*Contact: Paul Murphy (murphy@nanoopticdevices.com). Booth #4031.*

## Stettler Sapphire (Switzerland)

With its roots in a Swiss jewelry workshop set up by Fritz Stettler back in 1881, Stettler Sapphire is probably the oldest company making its Photonics West debut this year — and surely the only one to operate a production facility in Mauritius employing 250 people. Following major changes in 2011, when the German private equity firm Equita and its own management team set up a new company structure, Stettler has invested in new production facilities for polishing special 3D sapphire forms. While largely focused on the production of jewels for use in watches, Stettler's products for technical applications include rods, prisms and flat windows.

*Contact: Jens Mueller (j.mueller@stettlersapphire.ch). Booth #4012.*

## UltraFast Innovations (Germany)

Aiming to exploit innovations in ultrafast technology across a large chunk (X-ultraviolet to infrared) of the electromagnetic spectrum, this spin-off from the Ludwig-Maximilians-Universität München and the Max-Planck-Institute of Quantum Optics has its roots in the pioneering work of Ferenc Krausz and Ulf Kleineberg.

Products include ultra-broadband and custom dispersive mirrors and a third-order autocorrelator for high-sensitivity laser pulse contrast diagnostics said to be capable of operating over a staggering eleven orders of magnitude.

*Contact: Hans Koop (info@ultrafast-innovations.com). Booth #4601.*

## UnikLasers (UK)

Located in one of the UK's hotspots for photonics technology development — Livingston in Scotland — UnikLasers was founded by Fedor Karpushko. The company's so-called "BRaMMS" technology is behind lasers operating across a huge spectral range with claimed low power consumption and therefore much-simplified thermal management. "BRaMMS" stands for Bragg Range Michelson Mode Selector, and is a setup designed to suppress all but one lasing longitudinal mode within the laser cavity. Potential applications include large-scale structural analysis, semiconductor wafer production and aerospace, the company says.

*Contact: Fedor Karpushko (fedor.karpushko@uniklasers.com). Booth #1023 (Scotland pavilion)*

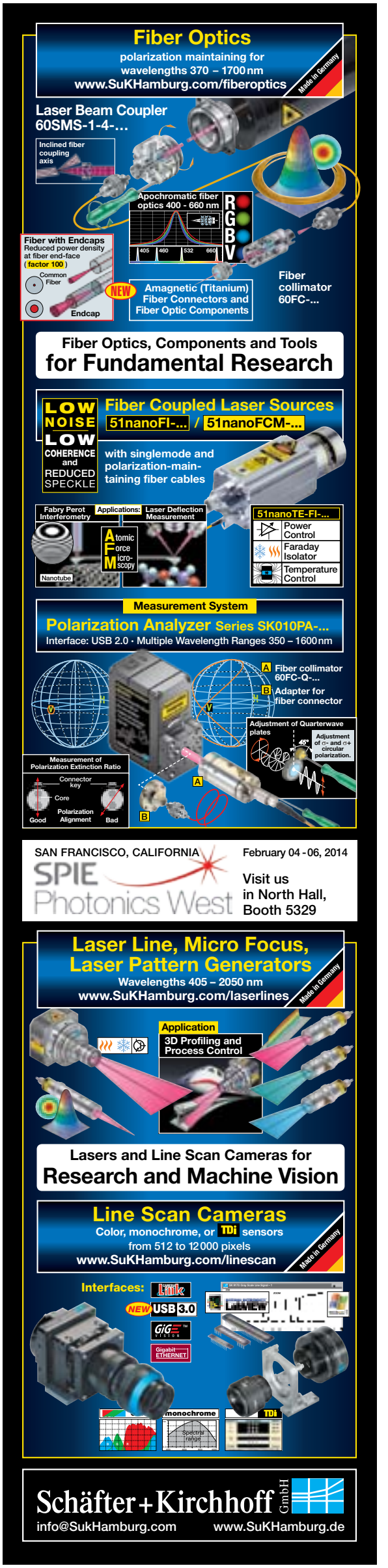
## Verisante Technology (Canada)

Winner of a coveted Prism Award last year for its "Aura" cancer-detecting imaging system, Verisante is aiming to bring Raman spectroscopy out of the analytical chemistry laboratory and into a truly clinical setting. Having started with skin cancer, Verisante has turned its attention to more technically demanding lung, colon and cervical cancers, and is awaiting regulatory approval for its "Core" system.

In October, the company raised $1 million through a placement on the Toronto Stock Exchange, and said it would use the proceeds to further develop Aura and help finance its manufacture.

*Contact Christine Trinh (ctrinh@verisante.com). Booth #5134.*





# European clusters look for international connections

This year, the Photonics West trade show features a number of new exhibitors representing cluster groups both domestic and international. More than 40 international cluster groups have arrived from all corners of the globe — more than half of them from Europe — while domestically the long-standing poles of excellence in locations like Arizona's Optics Valley, central Florida and Rochester have been complemented by a new Michigan cluster.

**Alastair Wilson, director of photonics at the UK's Electronics Sensors and Photonics Knowledge Transfer Network and also coordinator of ASPICE, Action to Support Photonic Innovation Clusters in Europe.** Credit: ESP KTN.

Alastair Wilson has been involved in photonics for more than 35 years, and in recent years has spent much of his time working on clusters. As head of optoelectronics at Scotland's principal economic development agency, Scottish Enterprise, he led the development of a five-year cluster strategy for Scottish photonics, and since 2010 has been director of photonics at the UK's Electronics Sensors and Photonics Knowledge Transfer Network (ESP KTN).

More recently, Wilson has co-ordinated the European Commission's "Action to Support Photonic Innovation Clusters in Europe (ASPICE)" effort, designed to promote cooperation and collaboration across Europe's myriad photonics clusters.

He told Show Daily, "The need for ongoing international cooperation among photonic clusters is pivotal in increasing their overall effectiveness in promoting research and innovation, strengthening the economy and addressing societal challenges. ASPICE aimed to develop a reference guide of good practices, and profile the value and supply chains in specific, highly innovative sectors. Particular emphasis was placed on two societal challenges where photonics technologies are already important; healthcare in an ageing society and safety and security for Europe's citizens."

The next phase for clusters would seem to be stimulating cross-border cooperation: "No cluster has a complete value chain in any of the key sectors within the photonics industries, so they will need to look for people elsewhere to achieve that," observed Wilson. "One output from ASPICE is that we would like to see a lot more collaboration and cooperation across the clusters in Europe. Such a development would make the whole continent a lot stronger. We would then have value chains that were more complete than they now are — even within national boundaries."

Another ASPICE result is a database tool available to all European clusters that will help them to populate their value chains, identify any gaps, and co-ordinate with other clusters to fill these gaps.

ASPICE was not just about connecting different groups. Other goals were to foster collaborations between different European clusters to increase levels of research and innovation. At a recent review meeting in Paris, Klaus Schindler of OptoNet in Germany described an interactive European cluster map generated to identify photonic technologies used in healthcare and security applications.

Anke Lohmann, representing the UK's ESP KTN, presented a report entitled "Value Chain Leverage in Photonics Healthcare in an Ageing Society", which aimed to explain how clusters could pick the relevant sectors in which to collaborate. Clarity was key, she said: "Be clear of the boundaries of the topic and be clear of the goals. People — potential collaborators, especially — need to understand what you want to achieve."

Healthcare topics relating to an ageing population range from cardiovascular disease and cancer to diabetes and poor vision. Lohmann lists technologies like multimodal and optical imaging, surgical lasers, laser-based manufacture of implants and therapeutics as the key areas where photonics can provide substantial benefits — and have the potential for significant market growth.

She adds that it is critically important to consider the commercial aspects of any collaboration as well as its technical objectives: "The photonics technologies need to be established within the value chain — encompassing basic materials, components, systems, products, final user products and applications," she said. This philosophy formed the basis of her ASPICE Cluster Value Chain visual model, which maps technology expertise across a number of clusters to highlight strengths and weaknesses.

"Cluster collaborations would establish cluster strengths and any gaps within the value chain," Lohmann suggests. "Identify the companies that are part of the value chain and, ideally, exclude companies that make certain products but sell them into different sectors — such as camera systems that are designed for machine vision applications and not healthcare. Then you need to find other clusters that fill any gaps you have."

Another ASPICE partner was the National University of Ireland at Galway, represented by Gerard O'Connor. He has been looking at how best to realize sustainable matchmaking processes for photonic innovation clusters, and reported:

"ASPICE's proposition is to empower cluster managers and members to propose innovative solutions to societal needs in key photonics markets sectors of ICT, health, energy, manufacturing, and consumer products, then use on-line tools to assess regions of specialization [into so-called "heat maps"]. The next stage is to employ face-to-face "matchmaking" [between appropriate clusters] to build relationships and value chains based on trust and understanding."

His suggestions for increasing collaboration between photonics and other multidisciplinary clusters include business roaming agreements, hot desk exchanges and trans-European innovation vouchers for SMEs.

MATTHEW PEACH

# the business of photonics
# optics.org
# product focus

2014 Photonics West®

**Welcome to the optics.org Product Focus which we have published specifically for Photonics West 2014 in partnership with SPIE and the Photonics West Show Daily.**

Here you will find an effective at-a-glance guide to some of the latest products available on the market with booth numbers if available making it easy for you to check out the products for yourself.

All this information and more can be found on the optics.org website. Simply go to **www.optics.org** for all the latest product and application news.

Alternatively, why not sign up to our **free weekly newsletter (www.optics.org/newsletter)** and get the information delivered direct.

## ID Quantique SA

Visit us at Booth #817

### ID120 series consists of compact and affordable single-photon detector modules


ID Quantique's ID120 series consists of compact and affordable single-photon detector modules, based on reliable silicon avalanche photodiodes that are sensitive in the visible spectral range.
Key advantages of the ID120 modules are high quantum efficiency up to 80% at 800nm *(60% at 650nm)*, a 500 microns large active area and adjustable settings like temperature, excess bias voltage and deadtime. Thus, the customer has a complete control on dark count rate, quantum efficiency and afterpulsing rate, through an USB connection *(Labview)*.

**Contact Details:** Michaël Désert, ID Quantique SA, Ch, de la Marbrerie, 3, 1227 Carouge/Geneva, Suisse/Switzerland
www.idquantique.com info@idquantique.com Tel: +41 22 301 83 71 Fax: +41 22 301 83 79

## Diverse Optics Inc.

Visit us at Booth #125

### Custom Precision Polymer Optics

When you're looking for precision polymer optics to reduce cost, trim weight, simplify design, and improve performance, come to Diverse Optics.
We specialize in diamond turning (SPDT) and precision injection molding of custom polymer optics.
Prototype to series production of spheres, aspheres, domes, convex/concave, plano/convex, bi-convex, free-forms, diffractives, Fresnels, prisms, light-pipes, cylinders, lens arrays, collimators, combiners, toroids, CPC's, TIR's, micro-optics, mirrors, parabolics, off-axis, ellipticals, cylinders, and more!
Whether it's diamond turned prototypes or thousands of molded optics, we'll show you how polymer optics are perfected.

**Contact Details:** Diverse Optics Inc., 10310 Regis Court, Rancho Cucamonga, CA 91730
www.diverseoptics.com info@diverseoptics.com Tel: +1 (909) 593-9330 Fax: +1 (909) 596-1452

## Logitech Limited

Visit us at Booth #5319

### Akribis-air: The Intelligent Sample Preparation System

Logitech is proud to launch Akribis-air. A highly automated lapping and polishing system, designed for the processing of materials used within photonics based applications.
Akribis-air delivers key benefits such as;
• The highest degree of geometric precision, flatness and parallelism. • Exceptional quality, accuracy and reliability of samples. • Real time data feedback. • Faster removal rates and higher throughput. • More efficient use of consumable products. • Minimal set-up and clean-up time. • Increased user safety.

**Contact Details:** Logitech Limited, Erskine Ferry Road, Old Kilpatrick, Glasgow G60 5EU Scotland
www.logitech.uk.com enquiries@logitech.uk.com Tel: +44 (0) 1389 875444

## Navitar

Visit us at Booth #502

### New Bi-Telecentric Lenses by Navitar

The MagniStar® bi-telecentric lens line includes six high-resolution, low distortion C-mount lenses with built-in adjustable iris; designed specifically for measurement and inspection applications that require extreme precision.
Magnifications include 0.128X, 0.528X, 0.05X, 0.243X, 1X and 2X.
The lenses offer high telecentricity, excellent MTF performance, no parallax error and less than 0.1% image distortion.
www.navitar.com/product/magnistar-bi-telecentric.aspx
Stop by Booth #502 for more information.

**Contact Details:** Navitar, Inc., 200 Commerce Drive, Rochester, New York 14623 USA
www.navitar.com info@navitar.com Tel: +1 (585) 359-4000 Toll-free: 800-828-6778

## ALTECHNA

Visit us at Booth #4319

### ULTRAFAST LASER MIRRORS

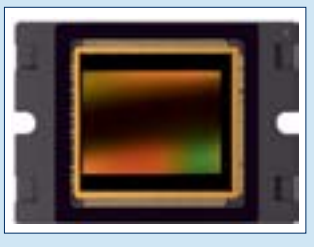
Ultrafast mirrors are designed for femtosecond applications to provide an optimized performance at certain wavelength and angle of incidence (AOI). This is achieved by careful selection of coating stacks to combine high reflectivity and low GDD value. Such coatings are used for external beam manipulation applications where pulse broadening effect is undesirable. Ultrafast mirrors are intended for Ti:Sapphire, Yb:KGW, Yb:KYW or other lasers working in femtosecond regime.
Characteristics:
• High reflectivity: R>99.8 % @ designed wavelengths • High damage threshold • Ultra-low group velocity dispersion

**Contact Details:** UAB ALTECHNA, Mokslininku st. 6A, 08412 Vilnius, Lithuania
www.altechna.com info@altechna.com Tel: +370 5 2725738 US Tel: +1 408 372 1513 Fax: +370 5 2723704

## CMOSIS

Visit us at Booth #109

### 12-Megapixel/300 fps CMOS image sensor CMV12000



CMOSIS, the leading European supplier of advanced CMOS image sensors, is demonstrating its 12-Megapixel/300 fps CMOS image sensor CMV12000, which is now available in sample quantities. High volume production will ramp up from June 2014 onwards.
The CMV12000 excels current market solutions with a combination of excellent global shuttering with a stunning 300 fps at full resolution serving a broad range of applications like broadcasting, intelligent traffic solutions, machine vision and motion capture.
At Photonics West 2014, CMOSIS exhibits at the Moscone Center, Booth 109.

**Contact Details:** CMOSIS, Coveliersstraat 15, Antwerp, Belgium
www.cmosis.com info@cmosis.com Tel: +32 3 260 17 30


## CILAS

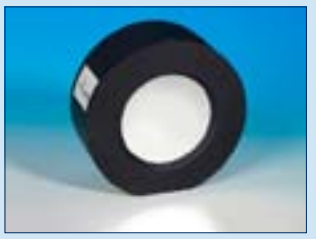
Visit us at Booth #1223 -A

### Deformable Mirrors for the largest telescopes in the world

CILAS has developed Deformable Mirrors for the largest telescopes in the world, and continually improved the Adaptive Optics technology to serve Astronomy, High Power Lasers and Space applications.

"Monomorph" mirrors allow the correction of the optical aberrations induced in a high power laser chain, while avoiding both "print through" effect and energy distribution modulations.

Standard Monomorph Mirrors are available for diameters from 30 to 85 mm and are supplied with their Electronic Driver. Larger diameters, as well as specific electrode patterns, are available upon request.



**Contact Details:** CILAS, 8 avenue Buffon, BP6319, 45063 Orléans Cedex 2 - France
www.cilas.com optics@cilas.com Tel: +33 (0)2 38 64 15 55

## ALPhANOV

Visit us at Booth #1223 -G

### ALPhANOV's Cool & Control Modules drive laser diodes to new heights

With the new Cool & Control (CC) diode driver modules from ALPhANOV, single-mode and multimode diodes can now be reliably and securely driven with compact devices.

**The single-mode CC Module** (CC-S) drives and cools external standard butterfly laser diodes.

Its nsec pulses are generated internally or on-demand from a TTL signal.

**The multimode CC Module** (CC-M) drives and cools external single or multiple elements laser diodes up to 80W.

**Contact Details:** Ludovic LESCIEUX, ALPhANOV, Rue François Mitterrand, 33400 Talence, France
www.alphanov.com ludovic.lescieux@aphanov.com Tel: +33 (0)5 24 54 52 00

## Ibsen Photonics

Visit us at Booth #743

### Pulse Compression Gratings 120 mm long

As femtosecond laser systems advance to ever-increasing energy levels, demands to the energy/power handling capabilities of pulse compression gratings increase.

Ibsen manufactures 100% fused silica, transmission, Pulse Compression Gratings that offer unbeatable energy/power handling capacity, combined with high-efficiency, low wavefront distortion performance.

Now, production advances allow Ibsen to supply pulse compression gratings up to 120 mm in length.

Come visit us at booth #743 to tell us about your requirements.

**Contact Details:** Ibsen Photonics, Ryttermarken 15-21, DK-3520 Farum, Denmark
www.ibsenphotonics.com inquiry@ibsen.dk Tel: +45 44 34 70 00 Fax: +45 44 34 70 01

## Ibsen Photonics

Visit us at Booth #743

### FREEDOM UV-NIR 190 -1100 nm

This new spectrometer for integrators of analytical instruments offers high efficiency across the complete 190 – 1100 nm range, ultra-compact size (50 x 50 x 15 mm), robust and athermal performance, and flexibility in choice of detector and electronics.

It is ideal for process control in out-of-the-lab environments as well as handheld and portable instruments. The high broadband efficiency is obtained with a new innovative transmission grating from Ibsen.

Contrary to typical blazed gratings, this new grating provides nearly constant diffraction efficiency over the 190 – 1100 nm range for both polarizations.


**Contact Details:** Ibsen Photonics, Ryttermarken 15-21, DK-3520 Farum, Denmark
www.ibsenphotonics.com inquiry@ibsen.dk Tel: +45 44 34 70 00 Fax: +45 44 34 70 01

## MÖLLER-WEDEL OPTICAL GmbH

Visit us at Booth #233

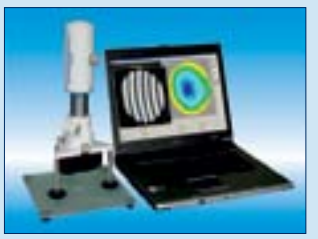
### Interferometer VI

The Interferometer VI direct family is mainly intended for use in optical workshops. It is specifically designed for the following measurement tasks:

• Measurement of flatness/sphericity of optical surfaces • Radius measurement • Measurement of wavefront deformation

The main features are:

• Fizeau-type interferometer, modular design • Usable in vertical, horizontal or under oblique directions • Use of high resolution USB-based digital camera • Connection to computer via USB 2.0 port • Upgradeable with phase shifting unit and evaluation software • Easy service and handling • Cost effective alternative to conventional interferometers



**Contact Details:** MOELLER-WEDEL OPTICAL GmbH Rosengarten 10, 22880 Wedel, Germany
www.moeller-wedel-optical.com info@moeller-wedel-optical.com Tel: +49 4103 937 7617

## PI (Physik Instrumente) LP

Visit us at Booth #4801/4901

### Fiber Optic Alignment Engines: 3 & 6 Axis

PI provides leading edge photonics alignment engines. For rapid XYZ alignment, the compact F-131 CyberAligner system is the gold standard when it comes to speed and versatility. It combines a piezo scanner (100µm, 1nm resolution, millisecond response) for quick device characterization and precise tracking with motorized long-range positioning stages.

Hexapod-based, 6-axis alignment engines are available for complex fiber-optic components. The H-206, for example, is a unique, parallel-kinematics system including a specialized controller running a variety of user-selectable alignment routines. Get the whitepaper at www.pi-usa.us/products/Photonics_Alignment_Solutions.


**Contact Details:** PI (Physik Instrumente) LP USA: 16 Albert St, Auburn, MA
www.pi-usa.us info@pi-usa.us Tel: +1 508 832 3456 Fax: +1 508 832 0506

## AdlOptica GmbH

Visit us at Booth #6028

### Focal-πShaper 9_532q for square flattop laser spots

**New Focal-πShaper 9_532q** transforms *round* Gaussian 532 nm laser radiation to square shaped *flat-top* focused spot of several microns or tens of microns size with nearly 100% efficiency.

Versions for near-IR, visible, UV spectrum and CO2 lasers are available as well.

Increased quality and productivity of material processing, compactness, easy adjustability and simplicity of integration in already existing equipment, capability to work with scanning heads and F-theta lenses make the **Focal-πShaper** an indispensable tool in various micromachining applications.

**Contact Details:** AdlOptica GmbH, Rudower Chaussee 29, 12489 Berlin, Germany
www.adloptica.com; www.pishaper.com info@adloptica.com Tel: +49 (30) 56 59 08 880

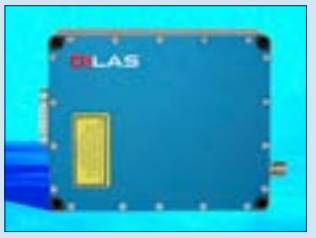
## DILAS Diodenlaser GmbH

Visit us at Booth #4737

### Blue Fiber-Coupled, Multi-Single Emitter Module

DILAS displays its blue multi-single emitter based, fiber-coupled module, nominated as a finalist for the 2014 Prism Awards for Photonics Innovation. This module is capable of delivering high output power and brightness in the 450nm spectral range and, due to its scalable approach, allows for powers from 10W to 100W, with 10W and 25W currently released as a product.

The product can be used for displacing arc lamps in display applications like cinema or large venue projectors by lasers and extends the current capabilities of blue light therapy and photodynamic therapy (PDT). **Product Page Link:** http://www.dilas.com/pages/products.php?category=9&series=66




**Contact Details:** DILAS Diodenlaser GmbH, Galileo-Galilei-Straße 10, 55129 Mainz-Hechtsheim, Germany
www.DILAS.com sales@DILAS.de Tel: +49 (0) 6131-9226-0 Fax: +49 (0) 6131-9226-257

## MÖLLER-WEDEL OPTICAL GmbH

Visit us at Booth #233

### GONIOMAT A series

The GONIOMAT A is a high accurate fully automatic goniometer with electronic image evaluation that is essential for measurement and testing of angles of optical components, such as prisms, polygons and wedges. Furthermore it can be used for measuring of angle gauges.

Advantages of the GONIOMAT A series: • High accuracy, even when measuring micro-prisms • Short measurement times • Elimination of the subjective error by electronic image evaluation • Logging of measurement results

Two levels of accuracy: • GONIOMAT A class: 0.7 arcsec • GONIOMAT A HR class: 0.4 arcsec


**Contact Details:** MOELLER-WEDEL OPTICAL GmbH, Rosengarten 10, 22880 Wedel, Germany
www.moeller-wedel-optical.com info@moeller-wedel-optical.com Tel: +49 4103 937 7617

## DRS Technologies, Inc.

Visit us at Booth #2417

### ADVANCED THERMAL IMAGERS FROM DRS TECHNOLOGIES

DRS Technologies provides high-performance thermal camera modules and detectors with flexible configurations to meet a broad range of application requirements.

Leveraging decades of infrared detector development, DRS' Tamarisk® (LWIR) and Zafiro® (MWIR) lines of advanced thermal imagers provide the ideal balance of size, weight, power and performance.


**Contact Details:** DRS Technologies, Inc., Commercial Infrared Systems, 100 N. Babcock St., Melbourne, FL 32935
www.drsinfrared.com sales@drs-rsta.com Tel: +1 (855) 230 2372

## Diamond SA

Visit us at Booth #4240

### DiaLink F.O. Connector for OCT applications

DIAMOND's revolutionary Fiber Optic DiaLink connector is a small coupling device based on a 1.25mm ferrule. Thanks to its very small diameter and a balanced design, this connector is an ideal solution for applications requiring high speed rotation, *(e.g. medical OCT)* or any other application where footprint is critical. The push-pull design allows easy mating and de-mating while both fiber end-faces remain protected to minimize damage and to protect against contamination.

The DiaLink is also an excellent alternative to fusion and mechanical splices. The DiaLink is available for all MM and SM fibers, and for cables up to 2.1mm OD. *(Customized solutions upon request.)*

**Contact Details:** Diamond SA, Via dei Patrizi 5, CH-6616 Losone, Switzerland
www.diamond-fo.com Tel: +41 91 785 45 45 Fax: +41 91 785 45 00

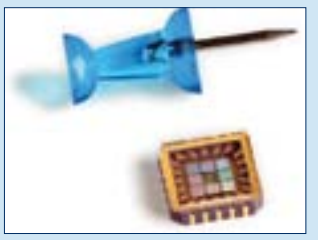
## Pixelteq

Visit us at Booth #1723

### NEW Spectral Sensors | 8-band Spectroscopy

PixelSensor multispectral sensors use exclusive on-chip filtering to pack up to eight wavelength-selective photodiodes into a compact array < 1 cm2 for simpler and smaller optical devices. One PixelSensor replaces several components, delivering more signal and shrinking multispectral instruments from portable spectroscopy to fluorescence detection.

PixelSensor VIS splits the visible spectrum into eight discrete color bands. Customized OEM versions are available with user-defined spectral bands. PixelSensor's unique wafer-level optical filters suppress background light and enhance passband transmission. Find out how PixelSensor can support your application. Destination URL: http://www.pixelteq.com/product/pixelsensor/



**Contact Details:** www.pixelteq.com info@pixelteq.com Tel: +1 727 545 0741

## Iridian Spectral Technologies

Visit us at Booth #5504

### Global leader in custom optical filter and coating solutions

Iridian is the global leader in custom optical filter and coating solutions addressing needs in markets including telecom *(GFF, dual-band, dispersion compensation filters)*, bio-analytical *(Raman spectroscopy, fluorescence microscopy, flow cytometry filters)*, consumer optics *(3D glasses and projector wheels, surface enhancement display coatings)*, space and satellite *(multi-spectral, multi-band, multi-zone filters)*, among others.

Our durable optical coatings address needs from the UV to LWIR.

Iridian partners with our customers from design and prototypes through to high-volume production providing filters optimized to meet both technical and commercial requirements.

**Contact Details:** Iridian Spectral Technologies, 2700 Swansea Cres., Ottawa, Ontario, Canada K1G 6R8
www.iridian.ca inquiries@iridian.ca Tel: +1 (613) 741 4513 Fax: +1 (613) 741 9986

## Varioptic

Visit us at Booth #5419

### Caspian C-39N0-16

The Caspian C-39N0-16 is an electronically focus controllable C-Mount lens, based on Varioptic's breakthrough liquid lens technology, which incorporates all necessary electronic components to drive the liquid lens.

It just needs a DC power supply, and focus can be controlled through either an RS232, I2C, Analog or SPI input. With a 16 mm effective focal length, and 2/3" sensor compatibility, it is specifically designed for machine vision applications, enabling fast focusing from 10 cm to infinity with no moving parts.

**Contact Details:** Varioptic - a BU of Parrot SA, 24B rue Jean Baldassini, 69007 Lyon, France
www.varioptic.com sales.varioptic@parrot.com Tel: +33 (0) 4 37 65 35 31

## Telops Inc.

Visit us at Booth #5602

### TS-IR: A Rugged and Versatile Scientific Infrared Camera

The TS-IR is a versatile high performance thermal infrared camera. Its outstanding temperature accuracy and sensitivity enables it to distinguish temperature variations as subtle as 0.02°C.

This advanced infrared camera features:

- Rugged IP67 sealed enclosure
- Multispectral capabilities
- High speed internal memory

An optional thermography package including Wi-Fi data transfer, internal storage and more, enhances its ease of use.

**Contact Details:** Telops Inc., 100-2600 ave. St-Jean Baptiste, Québec, QC G2E 6J5
www.telops.com contact@telops.com Tel: + 1 (418) 864 7808 Fax: +1 (418) 864 7843

## Voltage Multipliers Inc.

Visit us at Booth #5406

### Optocouplers Just Got Better!

The OC100/150 series of high voltage optocouplers feature high gain, long-term gain stability, and high isolation voltage. The optocouplers will run at their maximum Vrwm of 10kV and 15kV or lower.

Optocouplers are useful in preventing ground loops, especially in noisy environments where instruments are used. Because the output leakage current is linear over the operating range, they can be used as part of a control circuit or feedback loop.

Other applications include high voltage switches, or as a high voltage op amp.

**Contact Details:** Voltage Multipliers, Inc., Karen Spano, Sales Administration Manager
www.voltagemultipliers.com kspano@voltagemultipliers.com Tel: +1 (559) 651 1402

## Xenics Infrared Solutions

Visit us at Booth #424

### Bobcat-640: Smallest GigE Vision/CameraLink SWIR Camera with Low Noise

The advanced Bobcat-640 meets high sensitivity in the SWIR range for specialized research & development and high temperature process control. You get excellent image quality with on-board image processing and Thermo Electric (TE) stabilization for low dark current and optimized noise performance. We offer full flexibility in terms of Xenics SDK, multiple interfaces, Power over Ethernet and variable integration times.

• 640 x 512 image resolution • VisNIR option • Small 20 µm pixel pitch • 100 Hz frame rate or higher in windowing mode • Operating temperature range from -400C up to 700C

**Contact Details:** Xenics nv, Ambachtenlaan 44, BE-3001 Leuven, Belgium
www.xenics.com sales@xenics.com Tel: +32 16 38 99 00

To announce your new product or to ensure your existing products get the visibility they deserve and are put in front of the industry's key decision makers, make sure you are in the next issue of optics.org product focus.

Contact one of our sales team on
**+44 (0)117 905 5330**

**email sales@optics.org**

or visit us online to download the latest product focus media pack

**optics.org/advertise**

PI

Piezo? Servo? Stepper?

ZERO-COMPROMISE MOTION CONTROL


PI (Physik Instrumente) LP · Auburn, MA info@pi-usa.us · www.pi-usa.us · 508-832-3456

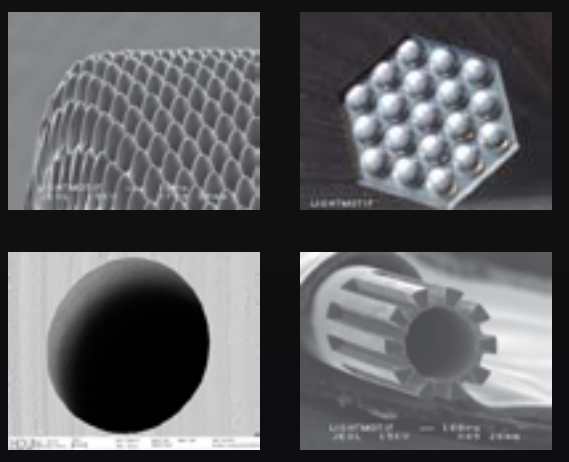
Booth 4801/4901

PI: The Broadest and Deepest Portfolio of Precision Motion Technologies

Time-Bandwidth
Products

PicoBlade™

LIVE
DEMONSTRATION
HELD DAILY
BOOTH 623
11:00am & 15:00pm



Micromachining

Processing hard materials

Thin-film ablation

Semiconductor drilling

www.time-bandwidth.com



SENSOFAR®


S neox

3D optical profiler

3in1 Technologies

CONFOCAL
INTERFEROMETRY
FOCUS VARIATION NEW

The new S line
for non-contact optical 3D profiling.

The line that opens
the gate to a new 3D experience.

FIND US North Hall D | Booth #5308

www.sensofar.com/sneox

# Jenoptik's Mertin juggles multiple roles

At the end of his first year as president of Photonics21, Jenoptik CEO Michael Mertin spoke to *Show Daily* about the implications of Europe's new Horizon 2020 innovation program, market trends and his new advisory role in Germany.

**Show Daily: How was your first year with Photonics21?**

*Michael Mertin:* It has been quite a busy but also an exciting year. We developed a multi-annual strategic roadmap for the further development of photonics in Europe over the next seven years. This roadmap includes both research and innovation activities, and builds the core of our further co-operation with the European Commission (EC) within the Horizon 2020 funding program.

The basis of this co-operation is a Public Private Partnership (PPP) between the European Commission and the photonics industry, where the private side commits to leverage the public funds by a factor of four.

In the course of preparing for the PPP we gave our governance structure a lot of thought to guarantee a fully inclusive and transparent process of how research and innovation topics are derived and prioritized. This new process enabled us to make tough choices on the topics to be funded under the PPP, and to focus the available funds in areas where Europe has most to gain.

As you can imagine, this process required quite some effort, but it showed that the European photonics community is highly committed to our goals — and the contributions were often going well beyond individual research interests.

**What are the implications of Horizon 2020?**

In the last European Commission Framework Program, FP7, the focus was mainly on scientific excellence. As the Commission already announced, this will change with the upcoming program. The "industrial leadership" pillar of Horizon 2020 — where the photonics PPP is located — aims to support innovation, increasing market uptake, stimulating private investment in research and innovation, and strengthening the participation of innovative small to medium enterprises (SMEs). Research will remain a very important part of this pillar, but activities will go well beyond research.

It acknowledges the fact that photonics innovation in Europe tends to fall through in the stage between successful science and pilot-scale industrial deployments, the latter being the stage at which jobs can start being created. Horizon 2020 aims to bridge this gap.

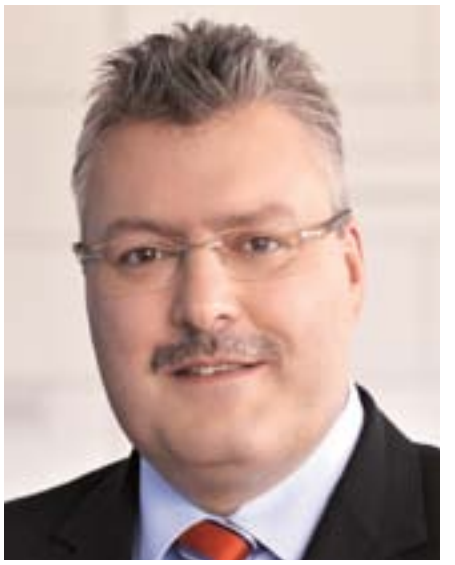
**What does the budget for the photonics PPP look like?**

The expected [EC] funding for the PPP will likely be in the area of €700 million for the whole duration of seven years. Although this is more than it was in the past, we were expecting an even bolder commitment for photonics from the EC due to the importance of photonics for European industry and therefore the European economy.

What you can now see, however, is that our partners in the EC and also in the member states see the value of manufacturing for Europe again. For many years [the] services [industries] were in the focus of politics. There is a change of mindset now — something you can also see in the fact that Horizon 2020 has a strong focus on innovation activities. However, this policy shift has to go hand-in-hand with further reforms and deregulations in European labor markets and social systems to make Europe a more attractive location for the manufacturing industry.

**What is the current status of the Photonics PPP?**

We are now in the final stage of establishing the PPP. On December 17, the PPP contract was signed by the European Commissioner Neelie Kroes and the Photonics21 Association. The PPP is effective as from the start of Horizon 2020, January 1st, 2014. [Overall, the agreement will see €3.5 billion funneled into the near-market development of photonics technology. The deal represents the culmination of nearly three years of negotiations between Europe's photonics industry representatives and the Brussels bureaucracy].



**Michael Mertin: juggling multiple high-profile roles in European photonics.** Credit: Jenoptik.

**What can we expect at the upcoming Photonics21 annual meeting?**

The next Photonics21 annual meeting will be the first one under Horizon 2020 — and the first time we meet under the new PPP structure. So there will be certainly a lot to celebrate, as this is really an achievement of the whole photonics community and the EC. We expect Neelie Kroes to join us once again as a keynote speaker and we will most likely have a panel discussion which should deal with issues like how to enable the photonics PPP strategy implementation not only at the European level, but at national and regional levels.

Finally, we will kick-start the process for defining the PPP call topics for 2016/17 on the basis of the PPP multi-annual roadmap. So the annual meeting will be the place to be if you want to contribute to this process.

**continued on p.20**

**High Performance Cooled CCD Cameras for OEM**

Spectral Instruments has a demonstrated history with OEM partnership and design of custom cameras tailored to your demanding application.

*Unmatched capabilities*
*Flexible Design*
*Excellent support*
*Cost effective*

***Contact us today to learn how we can provide the solution for your OEM camera needs.***

***520-884-8821 or info@specinst.com***

***Meet us and learn more at Photonics West, Booth 2301***

Spectral Instruments Inc.
20th Anniversary
1993–2013

420 North Bonita Avenue | Tucson, Arizona 85745
520.884.8821 | info@specinst.com | specinst.com

Photonics21 representative Giorgio Anania (center) co-signs the photonics PPP contract with European Commissioner Neelie Kroes (right). Credit: EC/Photonics21.

## Michael Mertin

continued from p.19

### Regarding the Jenoptik business, what is your outlook for 2014?

We have seen solid business development so far with an upwards trend towards the end of 2013. We're on track and that is the result of our clear strategic focus on international expansion, improvement of internal cost structures and processes, and on projects with key customers.

Regarding regions, we particularly focus on North America and Asia/Pacific, where we made special efforts to expand our sales and service structures. And following the acquisition of a long-time Australian sales partner at the beginning of 2013, we incorporated the subsidiary into the group structure and are now strengthening the team for a major traffic-safety order, which we received this year from Australian authorities.

[While] the company's metrology segment remained our growth driver [in 2013], the lasers and optical systems segment benefited from a changed product mix, with new key accounts in the life sciences and health care business, and growing system competence. The semiconductor industry has shown signs of recovery lately, which will surely impact our business in the coming months. Other major trends that we see include laser materials processing of 3D metal parts and fiber laser development. These are the major issues that will determine our R&D and sales activities in 2014, in line with our strategy to further internationalize Jenoptik.

### You were appointed to the German Corporate Governance Commission in September 2013. What are your activities there?

First of all, I feel honored to have been appointed to the commission, because it means that experience and opinions from the industry are highly appreciated for further developing these guidelines.

I think that the principles for responsible and value-oriented corporate management are a decisive factor for the sustainable success of a company. That is why the policies at Jenoptik have long been structured to adhere to such recognized standards of good corporate governance, and we support the recommendations of the German Corporate Governance Code.

From a personal point of view, I would like to continue the dialog between politics and society, and contribute to the commission based on my experiences as CEO of Jenoptik, an international but medium-sized photonics company. So far, the corporate-governance principles have basically been devised for publicly listed big companies — a small fraction of Germany's corporate landscape. That results in the fact that the code does not apply for many non-listed companies of large size, but at the same time it does apply to many small and medium-sized listed companies, which are overwhelmed with new regulations and principles they can barely cope with.

What I would also like to point out is that we see a steadily increasing number of regulations of listed companies whereas capital markets are still deregulated to a large extent. Just to remember: the economic and monetary crisis in Europe was caused by the financial sector and even more by the continuous deficit-spending of our governments. As a representative of [the] industrial [sector], I would appreciate it if regulations were more balanced and also applied to decision-makers in the financial and public sector.

### Michael Mertin

Since July 2007, Michael Mertin has been President and CEO of JENOPTIK AG, based in Jena, Germany. Since November 2012, he has been president of Photonics21, and in June 2013 he was elected vice-president of the Economic Council to the CDU. In addition, he is a member of the board of Spectaris, the German Hightech Industry Association, and of the University Council of the Illmenau University of Technology. He also holds the position of Chairman of the Board of Trustees for the Fraunhofer Institute for Applied Optics and Precision Engineering in Jena.

As if all that were not enough, in September 2013 Mertin was appointed to the German Government's Commission on Corporate Governance Code. At the time of his appointment, he commented: "The basic principles of responsible and value-oriented corporate management are essential to build a foundation for long-term sustainable success of the company. Good corporate governance helps strengthen the trust of shareholders, customers, employees, and also makes it possible to manage risks appropriately."

# FROM BIOS, BOOTH 8232, TO PHOTONICS WEST, BOOTHS 1223-E, 1223-I.

> FOLLOW THE ROUTE DES LASERS™

- Lasers
- Biophotonics
- Fluorescence Microscopy
- Optical components
- Optical Fibers
- Ophtalmology
- Micro Machining
- International Partnering Convention
- Technology Transfert
- Terahertz
- Laser Diodes
- Research
- Industrial Real Estate


Institut d'Optique d'Aquitaine

© D.R.

www.bsmeola.fr 33710 SAMONAC RCS : LIBOURNE 538 382 970

BORDEAUX
Route des Lasers
THE PLACE TO BE

www.routedeslasers.com
contact@routedeslasers.com

RÉGION AQUITAINE

Liberté • Égalité • Fraternité
RÉPUBLIQUE FRANÇAISE
MINISTÈRE DE LA DÉFENSE

ALPhA

Aquitaine développement innovation

LES PÔLES DE COMPÉTITIVITÉ

# Accuracy. Reliability. Confidence.

Bristol Instruments is leading the way in optical interferometer-based precision instruments.

## in Laser Spectral Characterization

The most complete laser wavelength and spectral analysis from the visible to the mid-IR.

## in Spectroscopy

Near-infrared spectrometers for the most precise and reliable spectroscopic analysis.

## in WDM Wavelength Testing

Optical wavelength meters to test your WDM signals with the confidence that results from reliable accuracy.

## in Non-Contact Thickness Measurement

The most reliable thickness measurement of specialty plastic films, medical membranes, and ophthalmic products.

www.bristol-inst.com

585-924-2620

Bristol Instruments

The Power of Precision

We're in booth # 510.

ALIO 6-D

Find us at Booth# 1941


DOP 6

- ✓ 10X Precision
- ✓ 100X Stiffness
- ✓ Six Degrees of Precision
- ✓ Scalable to Your Application

**ALIO Industries Inc.**
**11919 I-70 Frontage Road N #119**
**Wheat Ridge, CO 80033**
**Phone: 303-339-7500**
**email: sales@alioindustries.com**


## ALIO's Hybrid Hexapod

ALIO Industries proudly announces their latest 6-DOP (6 degrees of precision) product line, the patent pending Hybrid Hexapod®. This new type of motion solution eliminates the weaknesses of the conventional hexapod with two orders of magnitude more accuracy while providing a much more robust solution for applications requiring high lateral loading.

This product will change the way you think about hexapod applications. Application examples include laser machining, cutting, drilling that allows for smooth cut "zero kerf" features. Ideal for applications such as medical devices (stent cutting), 3D printer movement from 3D to "6D" printing to enable higher throughput and higher accuracy of printed prototype parts. Laser drilling applications can provide a more perfectly round hole without kerf for such applications as fuel injectors.

ALIO Industries was founded in 2001 with the focus of building precision products with unmatched quality and reliability by implementing unique designs for precision manufacturing. This in-depth focus on current and future industry needs of nano-precision has led to the development of another ALIO innovation; the Hybrid Hexapod®

DELTA

# Unrivaled Linear Variable Filters

SEE OUR NEW
**Linear Variable NIR Bandpass Filter**

BiOS Expo booth 8218
SPIE Photonics West booth 218

*We help ideas meet the real world* / **FILTERS.MADEBYDELTA.COM**

# Optics veteran looks beyond traditional base

## In Tucson's Optics Valley, Breault Research Organization (BRO) innovates with both hardware and software.

The snow-capped Catalina Mountains top out 17 miles north of BRO's Tucson, Arizona headquarters. At that distance, and more, you could spot a person with one of the portable, multi-functional telescopes that the company's optical engineering team, BRO Engineering Services, fabricates onsite.

Precision products like this telescope -- more powerful than comparable spotting scopes and with more features and clearer images -- have made BRO a pioneer of Tucson's "Optics Valley" technology cluster. A veteran whose career as engineer and scientist spans 35 years in the optics industry, Robert P. Breault, 72, remains a leading figure in optical design, engineering and training.

He started BRO in 1979 with skills he polished as a Ph.D. student in the University of Arizona's much-vaunted optical sciences program. Today, his 17,000-square-foot site houses 28 optical and mechanical engineers, designers, researchers, fabrication technicians, and software experts, plus sales and support staff. The sophisticated laboratory produces optical components for aircraft, spacecraft, telescopes and more, with customers in nearly 40 countries. More than 70 percent of Breault's business comes from products and software sent overseas.

The company, formally known as Breault Research Organization, performs engineering design and production work for government labs, the US military and Fortune 500 companies. Breault also chairs the Arizona Optics Industry Association (AOIA), now with more than 300 members. The AOIA has spurred the creation of more than 35 similar groups in the US and abroad, and he is often on hand to help get them started.

*"We are where the light is. We go wherever the research and development is being done."*

Breault and his CEO Wayne Hall told *Show Daily* about three of their products that will be getting priority attention at both Photonics West and the forthcoming San Diego SolidWorks World 2014 conference. Two, APEX and ASAP, are software solutions and the third — that multi-functional telescope — is one of many products illustrating the hardware side of BRO.

### Optical design meets CAD

The APEX optics add-in for SolidWorks, on the market since 2010, is described as an easy-to-use optical design and analysis tool for illumination and opto-mechanical engineering. BRO recently announced its APEX 2013 V2R1 release, which plugs into the industry-standard SolidWorks 3D CAD package.

APEX provides an optical design workflow as an intuitive extension of the SolidWorks user experience. Users of the software define the optical properties and sources in a system, perform a ray trace, and then analyze, improve and optimize optical performance based on the results.

APEX can, for example, help engineers create new automotive lighting solutions to give headlights and taillights stylish, distinctive shapes, while ensuring that optical performance meets standards. That is, it can make attractive automotive lighting solutions that still deliver the right amount of light to the right part of the road.

"Back in our day, headlights were for illumination," Breault said. "Chrome was for style. Today, designers use LED lights as style features in powerful yet aesthetic LED-based lighting systems. Go to your Jaguar dealer and you'll see tail lights that look like cat's paws. That distinguishes the latest model from others and helps sell cars."

APEX enables the design and analysis of demanding optical systems without a steep learning curve, and can use ordinary computing devices such as laptop computers. The intuitive, visual process makes optical design approachable from other disciplines of engineering. "Using the easy-to-follow workflow in APEX, a mechanical engineer experienced with CAD programs will be able to test the optical performance of a system without needing an optical engineering degree as background," Breault said.

**Optics industry veteran Bob Breault, once a University of Arizona graduate student and now chair of the 300-strong Arizona Optics Industry Association.** Credit: BRO.

### Optical modeling

BRO's pro tool for engineers is ASAP, short for Advanced Systems Analysis Program, which has been commercially available and under continuous development for more than 20 years. Over this time, the core ray-tracing and simulation capabilities behind the software have grown to include the capacity for modeling virtually any optical system.

"It's the most comprehensive and sound optical analysis tool on the market," says CEO Hall. "We are now making it easier to use, and making it possible to harness even more processing power."

With ASAP, most imaginable optical systems can be analyzed, Hall says: "From something as big as a satellite down to micro- and nano-optical technologies, it gives engineers a powerful toolset to predict the real-world performance of an optical system — the most comprehensive simulation and analysis possible today."

The CEO added that customers make use of it in industries ranging from aerospace to automotive displays, bio-optical simulations to medical instruments, and clean energy solutions to consumer electronics devices.

### Up close; far away

But it isn't all about software: BRO Engineering Services has designed, prototyped and tested an off-axis aspheric telescope that incorporates multiple optical sub-systems sharing a common optical path. Conceptual development through assembly was completed onsite at BRO and units are now available for customers in military, surveillance, law enforcement and border patrol organizations.

"They're for close observation of any distant environment," Breault said. "There's no need to bring out a telescope, carried by two people, in a truck loaded with equipment to go out and find the bad guys. This is what is making the world different today." The images can be coupled to an electronic detector and displayed on multiple screens, including screens in remote locations.

The telescope — designed for the military — can be set up simply by inserting a stake in ground. Then you get far away from it, and watch. "That's a safer scenario than being on the ground looking into the eyepiece while they're shooting at you," Breault said.

### Industry outlook

For 2014, CEO Hall is optimistic about the world market for BRO's products. "The R&D markets are growing as they come out of the recession," he said, adding that BRO is moving into sales areas beyond its traditional bases in Asia and Europe, covering emerging markets in Central Europe, South America and parts of the Middle East.

"What's specific for us is that APEX has been designed to penetrate the ever-increasing need for optical design tools that can be used by anyone," remarks the CEO. "Previous optical software solutions were designed only for classically trained optical engineers. APEX changed the paradigm three years ago."

Breault added: "We are where light is. We go wherever the R&D is being done. We offer them our products, and we train people to use them. We provide technical support along the way, engineering and manufacturing assistance, and are here to work in any capacity to help bring new optical product innovations to market."

FORD BURKHART

# CDA – We inspire and manufacture value!

## Optoelectronic components and microfunctional optofluidic devices in plastic

CDA GmbH (Suhl, Germany) is an established manufacturer of custom components and solutions in plastic. CDA's technology portfolio includes polymer optical elements and arrays for use in optoelectronics, automotive and other high-tech fields, as well as additional high-end microfabrication technologies such as printed electronics components and microfluidic structures. All of these can be flexibly and individually combined in order to realize complex miniature devices for clinical point-of-care, diagnostics, environmental monitoring and biochemical/forensic screening applications.

*A multifunctional optofluidic demonstrator chip. Blue fluid is pulled left by pillars in a channel on-chip to complete a circuit (electrodes, left) with an external light source, thus illuminating a DOE (green spot right) and projecting an image. The additional fabrication features necessary included printed electronics and component bonding.*

**Optical elements**

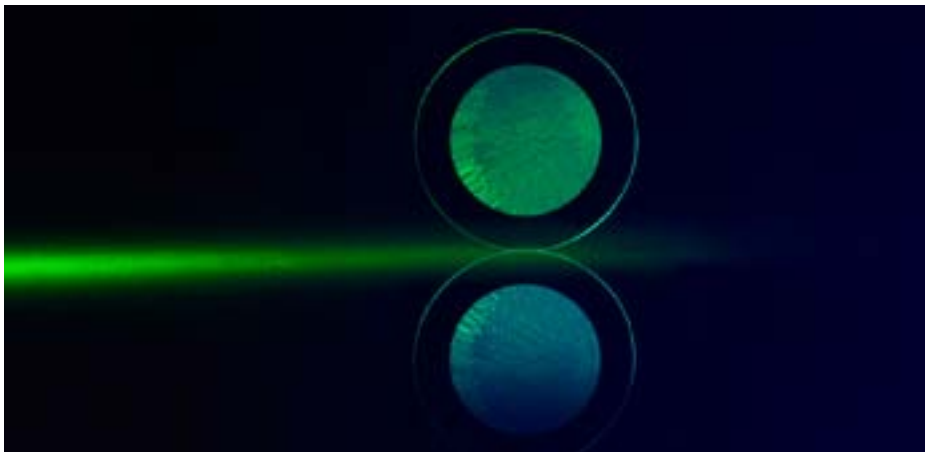
Individual elements can comprise diffraction-limited refractive structures or diffractive structures optimized to provide the best efficiency for the intended application. Current products include:

- DOEs (binary and multilevel, see photo)
- gratings, line generators, etc.
- collimators, Fresnel lenses, custom lens arrays
- diffusors and mirrors
- optical encoders

A recent development is the ability to stack multiple optical layers in order to further customize performance.

**Microfluidic structures for ›lab-on-a-chip‹**

CDA additionally provides the integration of high-tech microfluidic structures into sophisticated, compact and sensitive devices, (›lab-on-a-chip‹). Such devices are becoming increasingly important where physical chemistry, electrical and/or optical properties need to be tested on a small scale. Tried and tested structures and options include:



*A polymer DOE lens*

- channels for separation and mixing
- hydrophobic and hydrophilic surfaces
- combining these with microoptics and printed electronics (see photo)

Appropriate devices lend themselves well to high levels of parallelization, thus reducing costs, but their manufacture does require a fully integrated process chain and command of several cutting-edge microfabrication technologies.

**Manufacturing services**

According to Pia Harju, Business Development Manager at CDA, "The opportunities for both microoptical elements and for integrated devices are truly global. Our manufacturing services – prototyping, assembly and volume mass production – are designed to benefit our customers' global strategy."

**Contact**
Pia Harju,
Business Development Manager
CDA GmbH, Am Mittelrain 11,
98529 Suhl, Germany
Booth: North Hall 5221
Tel: +49 3681 387-390
eMail: pia.harju@cda.de
Web: www.cda-microworld.com

CDA µFunctional Solutions


# Advancement to the Core

**DRS Technologies provides high-performance thermal camera modules and detectors for a broad range of applications. With a wide assortment of pixel pitch options, resolutions, and fields of view, DRS has flexible modules and detectors that provide superior detection for the most vital requirements.**

The **Tamarisk®** family of 17µm Vanadium Oxide (VOx) uncooled thermal modules provide exceptional thermal imagery in a miniature package while maintaining industry low power consumption rates. Utilizing DRS' patented microbolometer Absorber Superstructure, Tamarisk® thermal imagers are designed for greater sensitivity and image quality at an affordable price. Ideal for applications constrained by aggressive size, weight and power requirements, Tamarisk® is offered in modules weighing as little as 33 grams and drawing as little as 850 mW. Tamarisk® is available in resolutions of 320x240 and 640x480 with multiple lens options for greater flexibility in integration. All Tamarisk® modules now tout DRS' proprietary Image Contrast Enhancement (ICE™) for superior edge enhancement, dynamic contrast thresholding and adaptive rescaling.

The **Zafiro®** family of cooled thermal modules employ DRS' advanced Mercury Cadmium Telluride (MCT) detector and patented Stirling cryogenic cooler to produce unparalleled infrared imagery operating in the mid-wave infrared (MWIR) spectrum. The rugged, compact Zafiro® design and 12 µm pixel pitch detector provide a long-range surveillance solution that is widely deployed on Unmanned Aerial Vehicles (UAV) and other demanding situational analysis requirements. Zafiro® modules are available in 640x480 resolutions and a 1280x720 High-Definition model.

**Continuous Innovation**

DRS Technologies has been a leader in the evolution of the next generation of low power, compact sized, high reliability and high performance thermal imaging components and sensor systems. With nearly half a century of infrared innovation, DRS Technologies is exceptionally well-positioned to meet the needs of rapidly growing thermal imaging applications world-wide.

Expansion into high-volume, low-cost manufacturing and ground-breaking technological advances have allowed for the development of powerful, yet affordable infrared imaging modules and camera systems to address emerging infrared imaging and detection markets. Underlying these advances is DRS' commitment to collaborate, both internally and externally, to develop the best possible solutions; to help Customers achieve operational advantages; and to transform military and commercial capabilities through superior product offerings.

**DRS Technologies, Inc.**

DRS Technologies is a leading supplier of integrated products, services and support to military forces, intelligence agencies, commercial partners and prime contractors worldwide. The company is a wholly owned subsidiary of Finmeccanica SpA (FNC.MI), which employs approximately 70,000 people worldwide. DRS is proud to produce the Commercial Infrared Systems (CIS) line of advanced electro-optical sensor systems to include thermal surveillance systems, cooled and uncooled infrared camera modules, and thermal detectors.

Visit DRS Technologies at Booth #2417 or online at **www.drsinfrared.com**.

# Logitech's highly automated sample preparation system delivers new levels of performance in material processing capabilities.

**Material processing is a time consuming task and takes many years to develop the knowledge and skill required to achieve repeatable results. With over 50 years of experience in material processing, system design and knowledge transfer the team at Logitech fully understand how to achieve the accuracy and repeatability required for a wide range of applications, such as; Silicon, Silicon Carbide, Gallium Arsenide, Gallium Nitride, Sapphire, Diamond, Germanium and Indium Phosphide.**

Driven by client demand to reduce the level of user expertise , guesswork and time spent on their application processes, whilst maximising surface finish and repeatability. Logitech created a working group to consider how we incorporate solutions to these issues within our systems. The outcome from this was a number of key technology changes, increased controllability and software driven automation. These features are showcased in Logitech's new lapping and polishing machine, Akibis-air: Intelligent Sample Preparation System.

### Basic Lapping and Polishing Concepts

To ensure these new features did not compromise the high level of surface finishing expected from a Logitech system. the team setup a process matrix to establish the stability and repeatability of a number of processes, to guarantee conformance with Preston's Law. The basic formula for predicting the amount of material that will be removed in a given time in both a Lapping and Polishing Process is:

### PRESTON'S LAW

| M = α * p * v * t + C (y = mx + c) | | | |
|---|---|---|---|
| Material = Constant * Processing * Plate * Processing + Constant | | | |
| **Removed** | Pressure | Speed | Time |
| **(um)** | (g/cm2) | (rpm) | (mins) |

We can analyse the Prestonian behaviour of removal rate in a process to confirm process stability.

Preston's equation states that the removal rate is proportional to the product of the processing pressure and plate speed.

The results achieved from these trials confirm that Akribis-air offers the accuracy, repeatability and control to confidently deliver the optimum in surface finish to precise geometric tolerances.

However this was only one stage in the development process as Logitech endevoured to remove the "black magic" from application processing and decrease the processing time.

### Removing the black magic from sample preparation

It is a very skilled job to achieve the accuracy and surface finish that many of these demanding applications require, particularly due to the high levels of manual set-up and control. The increasing cost of materials and lose of expert staff adds additional pressure to these departments.


With this in mind the design team at Logitech developed a software platform and a number of automated controls that significantly reduces the amount of manual input required during set-up, processing and clean-up operations. These new features have been so successful that they can reduce processing time by as much as 40%. Features include:

- Automatic wafer thickness control for the highest degree of geometric precision, flatness and parallelism.
- Software driven set-up for faster processing times and more reliable results.
- Extensive parameter control for the processing of highly complex and fragile materials or devices.
- Increased plate speed for faster removal rates and higher throughput.
- Plate flatness control for higher quality and accurate of the samples.
- Metered abrasive feed supply for optimal processing and reduced consumable waste.
- Auto-wash feature for minimal clean-up time and increased user safety.

### Air Jig Technology

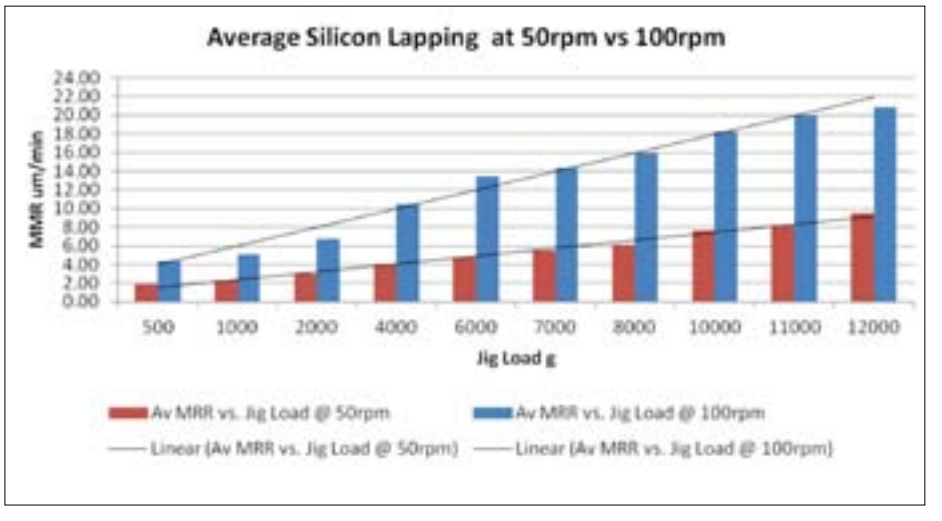
A key aspect of the system success is the introduction of an air driven jig. The jig ensures that the sample or substrate is held in place during the lapping and polishing processes. Key advances in this jig includes;

- Dynamic load control for faster, more responsive processing across single and multi stage processes.
- Bluetooth connectivity for real time data and higher levels of control.
- Increased load range for higher Material Removal Rates (MRR) while maintaining low Total Thickness Value (TTV).
- Integrated jig cleaning station for minimum handling, safety and time saving.

### Superior results

The exceptional results achieveable with all Logitech equipment is respected across the world. With the introduction of easier, faster and more reliable results, Logitech is ever increasing the competitive gap and client confidence.

Lapping trials using a silicon substrate with an Akribis-air system and a standard Logitech lapping and polishing machine can be seen below.




This shows a material removal rate of 18-22 microns per minute with the Akribis-air compared to 7-9 microns per minute with a standard system. When added to the substantial time savings and accuracy provided with the automated set-up and control platform and the internal clean up facility, it is easy to see why the Akribis-air offers time savings of up to 40%.

You will find Akribis-air and our team in the North Hall, Booth #5319.

### About Logitech

Logitech are recognised as world leaders in many aspects of materials processing, shaping and surface finishing technology.

This position has been reached through many years expertise in materials processing and in the design and manufacturing of precision equipment.

Application areas where Logitech provide solutions and advance processing technologies include:

✓ Semiconductor materials processing

✓ Opto-electronics surface finishing

✓ Optical materials processing

✓ Geological science thin section preparation

✓ Test & measurement of materials

✓ Materials processing consumables

*Cutting Edge Materials Processing Solutions*

Logitech's core business is in the design and manufacture of precision sawing, lapping, polishing and CMP equipment. This equipment is aimed at research based applications with the need for high specification surface finishes, prepared with precise geometric accuracy.

For further information please go to **www.logitech.uk.com**

LOGITECH
Materials Technologists & Engineers

Sponsored Editorial

# NKT Photonics introduces the World's most affordable supercontinuum fiber laser

*SuperK COMPACT*

**NKT Photonics has just released their new SuperK COMPACT – the World's most affordable supercontinuum fiber laser. The laser provides single mode, fiber delivered light in the entire 450-2400nm range and, unlike most supercontinuum sources on the market, the COMPACT can be triggered externally and synced with low jitter from single shot up to 20 kHz.**

The previous generation COMPACT can be found in laboratories around the World where it is the daily driver within applications such as component characterization, test & measurement and spectroscopy, or simply as a general purpose white light source. However, the extremely low price point and the external trigger function of the new model bring supercontinuum sources into volume applications that were previously dominated by single-line lasers, lamps and SLEDs. Now you can replace several of these sources with only one SuperK COMPACT and significantly reduce system complexity and cost. Add to that a maintenance-free lifetime of thousands of hours and the cost of ownership for this broadband system is the lowest we have seen in the industry.

The SuperK COMPACT is powered by NKT Photonics patented photonic crystal fiber technology pioneered more than a decade ago and which have since then been licensed to several partners. Constructed on the same platform as the popular SuperK EXTREME sources, the COMPACT is compatible with the existing range of plug & play supercontinuum accessories from NKT Photonics.

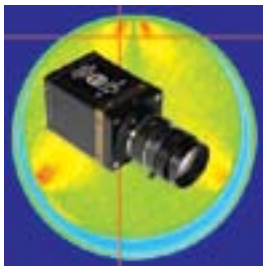
You can see the new SuperK COMPACT running live at NKT Photonics booth #711.

NKT Photonics
the power of light

4D 4D Technology

# SEE
## what you've been missing.

**Dynamic Laser Interferometers**



**Dynamic Polarization Cameras**

**Dynamic Surface Profilers**

***See the New AccuFiz 6MP® High Resolution Interferometer at Photonics West, South Hall, Booth 601.***

## BUY NOW and receive FREE RECALIBRATION!

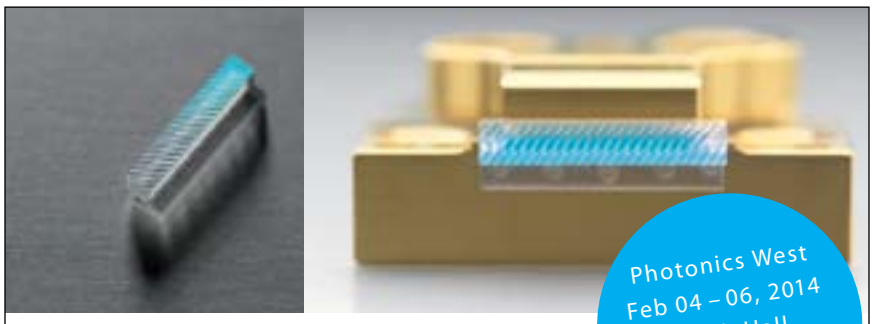
### Spectralon® Diffuse Reflectance Standards & Targets

Enjoy huge savings with this limited time offer. Order a select Labsphere Spectralon® Diffuse Reflectance Standard or Target before February 28, 2014. Send that same standard or target back to Labsphere for initial annual recalibration and we will waive the setup fee and price of the "As Left" recalibration.

35 YEARS OF INNOVATION
labsphere
A HALMA COMPANY

**For more details go to www.labsphere.com or contact Doug Baxter at 603-927-1031 / 603-738-4737 / dbaxter@labsphere.com**

Some restrictions apply.



Photonics West
Feb 04 – 06, 2014
South Hall
Stand 2137

## FISBA Beam Twister™

Innovative technology and high performance

Generating an almost symmetrical beam profile

Suitable with a variety of different laser diodes in regard to emitter width and pitch

Specifically tailored to your application

FISBA OPTIK
FISBA OPTIK AG
CH-9016 St.Gallen
www.fisba.com
info@fisba.com

PRESENTED BY
SPIE & PHOTONICS MEDIA

PHOTONICS MEDIA | SPIE

# PRISM AWARDS 2014 WINNERS

## Congratulations to the 2014 Prism Awards Winners

AccuVein

Compass-EOS

HÜBNER

Nanoscribe

NECSEL

V-Gen

Si-Ware Systems

Tornado Spectral Systems

SPIE. PHOTONICS WEST

# PHOTONICS WEST 2015.

## Call for Papers.
## Submit Abstracts by July 2014

www.spie.org/pwcall

The Moscone Center
San Francisco, California, USA

Conferences & Courses: 7–12 February
BiOS Expo: 7–8 February
Photonics West Expo: 10–12 February

- BiOS–Biomedical Optics
- Translational Research
- OPTO–Integrated Optoelectronics
- LASE–Lasers and Applications
- MOEMS-MEMS–Micro and Nanofabrication
- Green Photonics

FIBERCORE

SPIE Photonics West

## Visit Fibercore
## at Photonics West 2014 - booth #2236

**New Products include;**

- **AstroGain™ - AG980H & AG980L**
  Space grade Erbium Doped Fibers
- **Zing™ - HB1550Z(11/125)**
  'Bow-Tie' Single Polarization Fiber for All-Fiber Polarizers
- **Pure Silica Core PM Fiber - HB450-SC**
  Photodarkening resistant PM Fiber for UV and blue wavelengths

To make an appointment email sales@fibercore.com or call +44 (0)23 8076 9893
New Brochure available either at the show or from our website www.fibercore.com

# Jenoptik targets auto with 3kW fiber

Startup Challenge founding sponsor Jenoptik is showcasing a new 3 kW fiber laser designed for industrial manufacturing at its booth, along with a 10 Watt femtosecond laser based on disk laser technology, which doubles the output power from its previous limit of 5 Watts, an improved QCW diode laser stack with twice the power of the existing JenLas D2.mini 8 Watts, for various medical applications, including ophthalmology, and laser entertainment systems.

The JenLas 3kW takes Jenoptik's fiber laser output to its highest level so far. Mathias Wolpiansky from the Jena, Germany firm says this is "a better" me-too fiber laser that will be able to challenge in the growing multi-kilowatt laser sector due to Jenoptik's economy of scale and in-house production of key components like high-power laser diodes.

Also on show, in the form of a video, is the company's new take on robot laser manufacturing. Working in partnership with an unspecified developer, Jenoptik has designed the multi-kilowatt laser beam to be carried inside the robot's arms using free-space optics. That enables full six-axis movement and reduces the geometric limitations of fiber transmission, as well as shrinking the overall size of the robot.

Wolpiansky believes that the robot designs and 3kW fiber laser will challenge rival fiber laser and robot system manufacturers in the automotive sector.

Meanwhile, Jenoptik's optical systems division is presenting its new F-Theta Silverline lenses with broadband-anti-reflection-coatings to suit high-power near-infrared diode laser applications. There is also a new glueless lens mount design for deep-UV optics used in semiconductor production, as well as a new point-source LED for infrared and UV.

MATTHEW PEACH

Mathias Wolpiansky with Jenoptik's new 3 kW fiber laser at the Moscone Center. Credit: Matthew Peach/SPIE.

# Fruity ultrafast lasers get a power upgrade

Amplitude Systèmes, based in Bordeaux, France, is presenting its range of ultrafast lasers, including the brand new Tangor. Amplitude's diode-pumped solid-state lasers, designed for scientific and industrial applications, have propelled the company to a consistent 30 percent year-on-year growth over the past decade.

The Tangor offers pulses below 400 fs in duration and an average power of 30 Watts, giving users a combination of high processing quality and throughput. One intended application is in the cutting of delicate, brittle materials such as the glass screens of mobile devices. Others could be in sapphire cutting, deep drilling of automotive engine nozzles and general metal micromachining.

Vincent Rouffiange, VP of sales, explained to *Show Daily,* "While ultrafast fiber lasers are typically limited to 100 microjoules of energy per pulse and picosecond solid-state lasers may not offer the processing quality required, our Tangor amplifier overcomes these limitations." The laser, which is available in infrared, green and UV wavelengths, will be upgraded to offer up to 50 Watts power later this year, he added.

Shortly before Photonics West opened its doors in San Francisco, Amplitude launched a new service center in the city. Located in the Hubtech Technology Center, and led by Bruno Courtinade, the US office complements existing facilities in Boston, Germany and South Korea.

Rouffiange added, "Our international sales are roughly split 40:40:20 between the US, Europe and Asia, with the US currently a strong growth market.

See Amplitude at booth #1232

MATTHEW PEACH

**Man-sized laser: IMRA America's new MUSASHI laser processing workstation, introduced at this year's Photonics West exhibition. IMRA also announced a develoment agreement with Trumpf and a patent deal with Rofin-Sinar at the show.** Credit: Joey Cobbs/SPIE.

# Adaptive optics meets retinal imaging

A large screen shows images, recorded live, of a patient's retina, with individual red blood cells moving through capillaries. Vessel walls, cones and rods are clearly seen. Dark field imaging, a new way for viewing microvascular structures in the eye, lets a clinic create such images.

The instrument in question is the CAORI, short for compact adaptive optics retinal imager, shown on the BiOS expo show floor by Physical Sciences Inc. (PSI) of Andover, Massachusetts.

PSI's system provides the only quasi-confocal device (a line-by-line image) on the market, enabling ophthalmologists to watch AO-corrected cross-sectional images of a patient's retina in real time.

# Deformable mirror gets planet-hunting

A deformable MEMS mirror from Boston Micromachines (BMC) is currently installed inside the exoplanet-hunting Gemini Planet Imager (GPI), announced the company. Said to be the most advanced instrument deployed on the 8-meter Gemini South telescope in the Andes, GPI achieved first light in early January, its first image showing *Beta Pictoris b* — a planet orbiting the star *Beta Pictoris,* located around 63 light years from the Sun.

Custom-built for GPI, BMC's 4K-DM mirror features no fewer than 4092 actuators over a 25 mm aperture, designed to iron out the image distortion generated in the Earth's atmosphere. Used as a high spatial-resolution wavefront corrector, the optical component allows direct images of extra-solar planets — usually obscured by light from their parent stars — to be taken.

"The Boston Micromachines MEMS deformable mirror is a key component of GPI," said Bruce Macintosh, principal investigator of the GPI project at Lawrence Livermore National Laboratory. "Because the MEMS mirror is compact, we can fit an adaptive optics system with almost two thousand degrees of freedom into the confined volume on the back of the telescope, an important aspect for the instrument".

Paul Bierden, CEO of BMC, said he was "thrilled" by the recent developments, and the way in which the mirror is assisting the astronomical community.

Until GPI, astronomers have mostly inferred the presence of exoplanets using indirect methods, for example looking at tiny dips in the brightness of a star when a planet comes between it and Earth. But GPI is able to detect directly the infrared radiation from young Jupiter-like planets in wide orbits around other stars — thought to be similar to the giant planets during the early stages of our own Solar System.

"Most planets that we know about to date are only known because of indirect methods that tell us a planet is there, a bit about its orbit and mass, but not much else," says Macintosh. "With GPI we directly image planets around stars – it's a bit like being able to dissect the system and really dive into the planet's atmospheric make-up and characteristics."

See Boston Micromachines at booth #2432

# Navigating the patent process

## Experts at Accelerator Forum offer advice for startups

When it comes to starting a tech-based business, taking the proper steps to protect your intellectual property (IP) from the beginning can alleviate future headaches.

A panel of legal and financial experts at Monday's Accelerator Forum gave would-be entrepreneurs advice on patent protection, non-disclosure agreements (NDAs), and other IP- and startup-related topics to help the scientific community better bridge the gap between basic research and commercial product development.

The panel was moderated by Andrea Belz, CEO of Belz Consulting, and included James Schaefer, an accountant at Mark Schaefer Associates; IP lawyer/consultant Liz Nevis of Intermolecular; Ken Itrato, a lawyer with Faber Group; and Ellen McGuirk, CEO and marketing strategist with Masterplan Consulting.

"When patenting an idea, the earlier you can file the better," Nevis said. "If you sit on it too long or disclose too soon, you could lose some rights. The US gives you a year to file for a patent after public disclosure, but other countries don't. So if you are considering participating in the world market, you need to keep this in mind."

The goal for IP is to protect your idea, your company and its equity, Itrato said. Talk with lawyers and other professionals to put together a patent filing team, he added, but be sure to have some sort of agreement with anyone you discuss your technology idea with.

The panelists agreed that most professionals and potential investors these days are hesitant to sign a non-disclosure agreement (NDA). There are several reasons for this trend, and for the most part they make sense.

"In our business, we see so many deals throughout the years that it is hard to remember where you heard about something or from whom," said Schaefer, whose accounting firm works with a number of tech-based startups. "You need to be able to have your head clear that you haven't signed some NDA with someone." Schaefer said his company doesn't like NDAs because "we don't want to have to be worried about being sued down the road due to inadvertently discussing something."

Filing a provisional patent with the US Patent and Trademark Office — which establishes an early filing date but doesn't mature into an issued patent unless the applicant files a regular, non-provisional patent application within one year — can help sidestep the need for an NDA.

*"The reason IP is there is because innovation is expensive and copying is cheap."*

The cost for IP protection varies, according to Nevis. "If you have to have it overnight, you send whatever you've got [to the patent office] and it will cost probably a few hundred dollars," she said. A more comprehensive filing with specs and at least one claim will cost several thousand dollars, depending on how complex the technology is, Nevis added. Filing a non-provisional patent can cost another couple of thousand dollars on top of that.

If you are looking to file internationally, the Patent Cooperation Treaty (PCT) is a good starting point, although PCT filings will cost "another few grand," according to Nevis. It becomes much more expensive when you start filing for patent claims country by country.

"If you go national in a few countries, that's when it's going to cost you," she said. "So before you go into international waters, do your homework. Use the 20-30 months the PCT filing gets you to see if you can line up distributors/manufacturers and get them to pay the costs."

In the long run, while protecting your IP is important and paying attention to what your competitors are doing can help, "most reputable companies don't want anything to do with a lawsuit," Itrato said. In fact, the bulk of patent-infringement lawsuits are settled out of court, the panelists noted.

"The reason IP is there is because innovation is expensive and copying is cheap," Nevis said. "It is there to encourage innovators to create new things, but they are going to create anyway.

"What IP really helps with is when you go and try to get money. It alleviates the need for an NDA, and the phrase 'patent pending' shows that this is more than a just a dream, that you've put some time into this."

KATHY KINCADE

**Attendees and suppliers had plenty to discuss at the exhibition, which closes today at 4pm.** Credit: Joey Cobbs/SPIE.

**Photonics West® Show Daily**

**PUBLISHED BY:**
SPIE, 1000 20th Street
Bellingham, WA 98225 USA
Tel: +1 360 676 3290
www.spie.org

**EDITORIAL:**
SPIE and
Original Content Ltd.
Tel: +44 (0) 117 939 4887

**ADVERTISING SALES:**
Lucent Media
Tel: +44 (0) 117 905 5330

**PRODUCTION AND PRINTING:**
Tradeshow Media Partners
81 Lansing Street, Suite 206
San Francisco, CA 94105 USA
Tel: +1 415 371 1525

SPIE optics.org

# Brazil's unique biophotonics opportunities

Biophotonics researchers and postdocs looking for a warm and welcoming environment in which to begin their next project might want to consider São Paolo, Brazil.

"São Paulo accounts for about half of the science that occurs in Brazil and publishes more scientific articles than any country in Latin America," according to Carlos H. de Brito Cruz, science director for the Foundation for the Support of Research in the State of São Paulo (FAPESP), during a Tuesday evening special event promoting "Biophotonics in Brazil."

With a taxpayer-supported 2012 budget of about R$1.035 billion (about US$500 million), FAPESP offers grants ranging from R$200,000 to R$3 million for a broad spectrum of scientific research projects, including optics and photonics, de Brito Cruz said. There are currently 100 optics/photonics grants in process, he noted.

"We spend money mostly on R&D in the health sciences," de Brito Cruz said. In addition to funding Brazilian researchers, FAPESP brings scientists from all over the world to work in São Paulo for two weeks to a year through young investigator awards and postdoc fellowships.

Optics research hubs include the Center for Photonics in Life Sciences at the University of Campinas and the National Institute for Quantum Information at the University of Campinas and the University of Rio de Janeiro. "But there are hundreds of other groups funded by the FAPESP to do research in optics and photonics," he said.

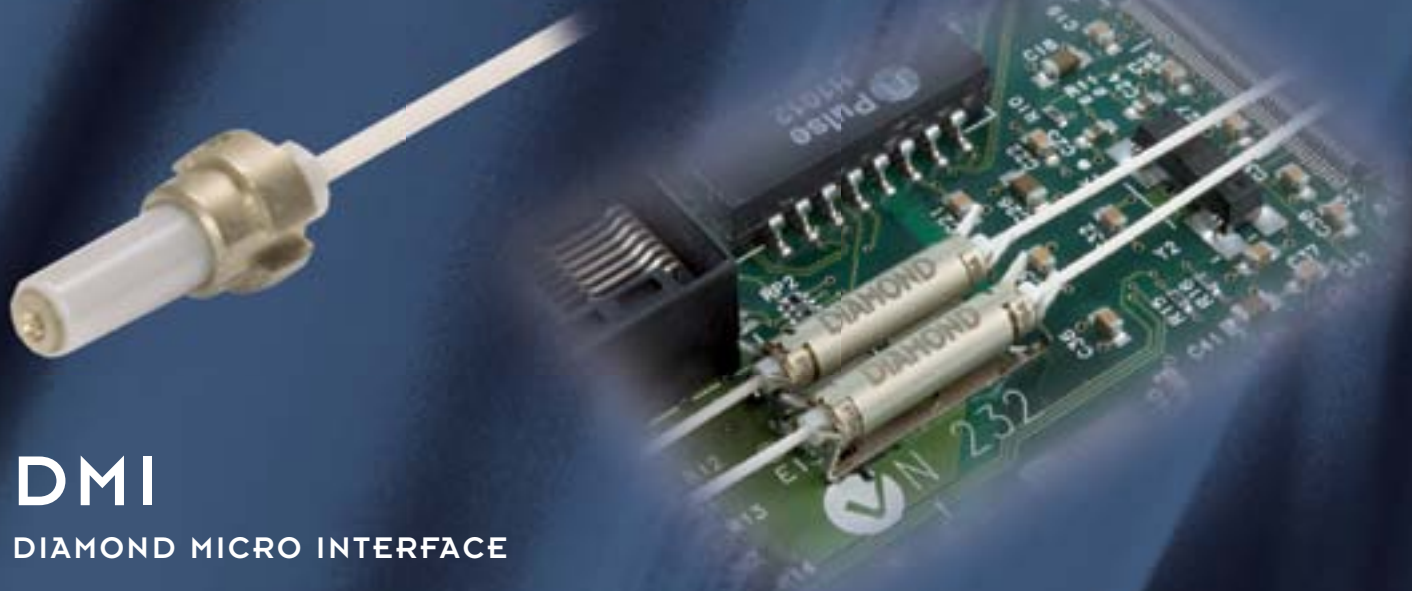
Two examples of these projects:

- A multimodal photonic platform that can be used to manipulate and acquire spatial and time-resolved biochemical and biomechanical information from single live cells, developed by Carlos Lenz Cesar's group at University of Campinas.
- A project under the direction of Helena Nader at University of São Paulo that is using biophotonics to better understand the mode of action of the anti-thrombotic drug Heparin.

"Our agency funds mostly basic science," de Brito Cruz said. "We like research that will help cure disease and help poor people get richer and make mankind wiser."

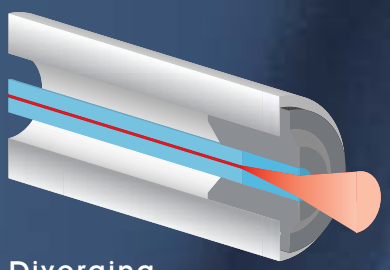
KATHY KINCADE

# THE LEADER IN FIBER OPTIC CONNECTOR TECHNOLOGY

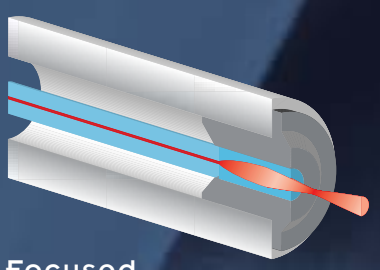



## DMI

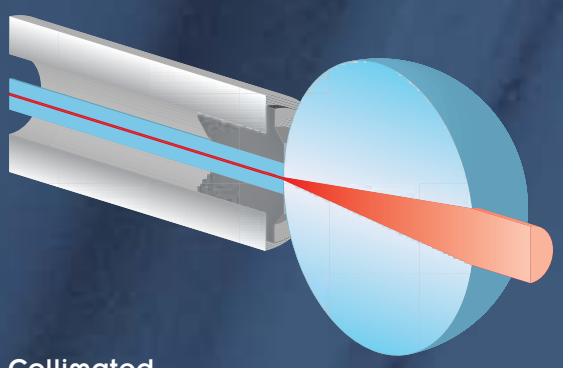
DIAMOND MICRO INTERFACE



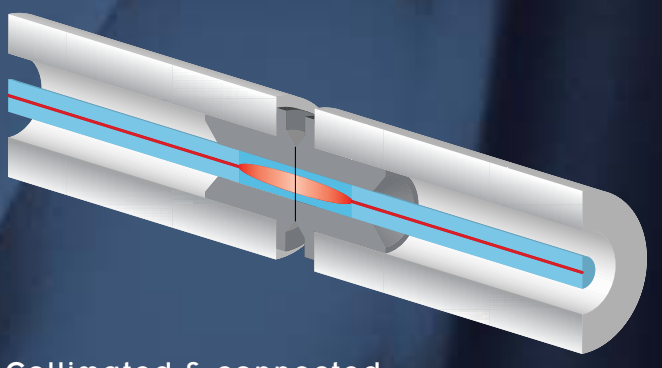
Diverging



Focused



Collimated



Collimated & connected

FOR OVER 30 YEARS, DIAMOND HAS BEEN AT THE FOREFRONT OF INNOVATION IN FIBER OPTIC CONNECTOR TECHNOLOGY

Visit us at Photonics West, booth #4240

www.diamond-fo.com

Headquarter Switzerland: DIAMOND SA, via dei Patrizi 5, CH-6616 Losone, tel. +41 91 785 45 45

DIAMOND
the fiber meeting

Gooch & Housego

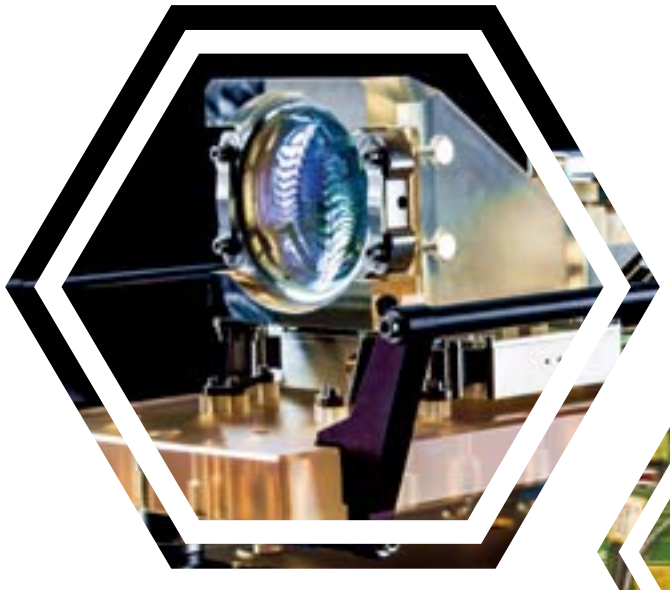
ENABLING PHOTONIC TECHNOLOGIES

# WORLD LEADING EXPERTISE ACROSS PHOTONIC TECHNOLOGIES

We push the boundaries of technology and manufacturing and pass the benefits on to our customers in terms of more cost-effective, capable and durable assemblies and components. We exploit our expertise in optical science, design, engineering and manufacturing to meet the most demanding specifications – adding value to everything we produce.

We are experts in the science behind the technology, its application and commercial development.

**We are Gooch & Housego.**



## VISIT US TODAY ON **BOOTH 1530**

Or find out more at **goochandhousego.com**