



product focus

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We're publishing further issues of the optics.org **Product Focus** for **Optics+Photonics** and **Vision**. We will also have our own section within the Photonics West Show Daily at **Photonics West 2015**.

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

In this issue of the optics.org **Product Focus** we look additional funding for Gooch & Housego, the continued growth of the fiber laser giant IPG, and how electrically charged polymer are changing optical properties.

You can also review some of the latest product launches from both exhibitors and non-exhibitors alike. We have included booth numbers (*where available*) making it easy for you to check out the products for yourself.

SCHOTT N-FK58: New optical glass with extremely low dispersion and outstanding processing properties

Various glasses with low dispersion in refractive index level 0.5 now available.

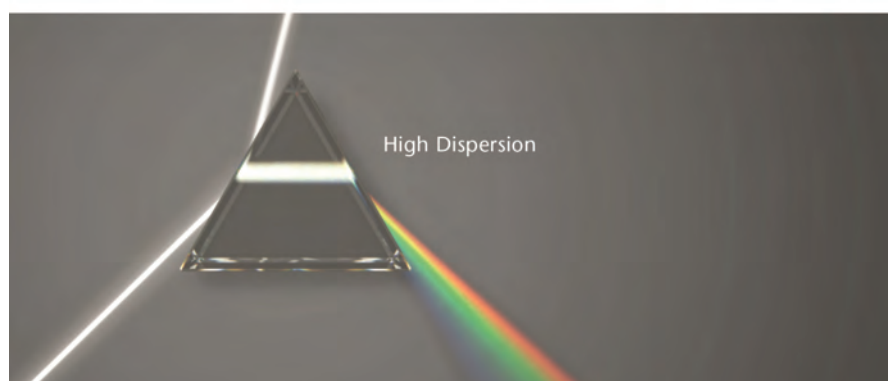
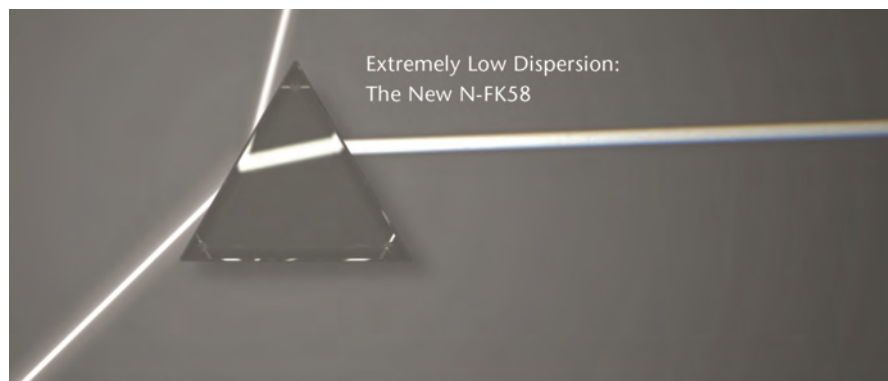
With its optical glass called N-FK58 XLD (XLD = extremely low dispersion), the international technology group SCHOTT has now launched a high-quality type of glass that offers extremely low dispersion and excellent processing characteristics. This glass is intended for use in the high-quality lenses of single-lens reflex cameras in which apochromatic color aberration correction is a mandatory feature. N-FK58 offers particularly high performance in combination with anomalous dispersion glasses such as the short flint glasses SCHOTT supplies. The company that specializes in specialty glass offers a wide variety of optical glasses with low dispersion in the refractive index level 0.5.

"Now that we've improved our skills in the area of glass melting, we were able to develop this glass that offers extremely low dispersion. It is also particularly worth mentioning that this new type of glass has excellent processing properties, better than comparable materials that are available on the market," explains Dr.-Ing. Ralf Jedamzik, Application Manager at SCHOTT Advanced Optics.

With N-FK58 XLD, SCHOTT has repositioned itself with respect to glasses that offer extremely low dispersion and enhanced its portfolio of glass types that offer low dispersion, such as N-PK52A and N-FK51A, for example. In fact, SCHOTT also offers a few of these types of low dispersion glasses in the tightest refractive index level available of 0.5.

New N-FK58 from SCHOTT expands its concerted portfolio of optical glass products for use in high-quality optical designs. This glass offers outstanding performance with respect to apochromatic color aberration correction; especially in combination with the short flint glasses SCHOTT offers, N-KZFS4, N-KZFS5, N-KZFS8 or N-KZFS11, for instance. Optimal correction of color aberrations allows for much sharper images, particularly with the high-quality telephoto lenses that are used in semi-professional and professional photography or cinema lenses.

Visit us in Hall 3.0/Booth #D12



Funding boost for Gooch and Housego

Photonics firm lands £0.8M in latest round of the UK government's Regional Growth Fund.

UK-headquartered Gooch and Housego (G&H) has won £0.8 million in government support via the UK's Regional Growth Fund (RGF).

The company, which says it will use the grant from the Department for Business, Innovation and Skills (BIS) to boost investment in its new systems technology business unit in Torbay, was one of 37 companies selected for RGF support in the fifth round of the competitive fund. In total, the RGF is expected to hand out £3.2 billion to UK businesses over seven years.

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"The objective is to build a multi-disciplinary team with expertise in mechanical, electronic and software design and to integrate these technologies with G&H's expertise in photonics and fiber-optics," announced the company.



Credit: G&H.

UK minister Vince Cable (third from left), on a visit to Gooch & Housego late last year to officially open the company's expanded Torquay operations.

mechanical, electronic and software design and to integrate these technologies with G&H's expertise in photonics and fiber-optics," announced the company.

"The systems technology group is accelerating G&H's move up the value chain by providing a strong pipeline UK-headquartered Gooch and Housego (G&H) has won £0.8 million in government support via the UK's Regional Growth Fund (RGF).

"The systems technology group is accelerating G&H's move up the value chain by providing a strong pipeline of component and sub-systems development, and offering customers a complete system design, development and manufacturing service."

Currently, the G&H systems unit is focused on new fiber-based optical coherence tomography systems for medical imaging and erbium doped fiber amplifiers aimed at future applications in satellite communications.

European leadership

Graham Catley from the firm said, "The RGF funding will mean G&H is able to further strengthen its expertise in a number of areas which are key to the strategic growth of both the company and also European leadership in this area. The resulting expansion of the R&D and production facilities at G&H (Torquay) will be a tremendous boost to both employment and the reputation of the Torbay area."

Other technology companies to receive RGF funding in the latest round included the microwave satellite communications company Avanti Communications and radiotherapy specialist Elekta, while luxury car firm Aston Martin Lagonda was also selected from a list of 133 applicants.

In order to gain support through the RGF, businesses have to explain how much money they need and what they will use it for, before the bids are considered by an expert panel that recommends to ministers which bids to support. Ministers then select the bids that they believe will give the best value for money to the UK taxpayer.

Business minister Michael Fallon said: "The Regional Growth Fund is about backing companies and sectors that have the vision and capability to create long-term growth, but need extra support to realize this potential.

"We have fine-tuned the fund - improving its governance and getting money into the hands of businesses more quickly - and I'd strongly encourage any firms that can generate significant private sector investment and sustainable jobs to bid for a share of the next round we're launching this summer."

The UK's coalition government says that the RGF, the latest round of which it believes will "unlock" some £1.9 billion additional private funding on top of the £300 million direct government injection, will help to rebalance the country's economy by boosting manufacturing and hi-technology enterprises.

Deputy Prime Minister Nick Clegg visited cooker manufacturer Glen Dimplex and electrical cable manufacturer Tratos, both based in the Liverpool area, to highlight the new funding.

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SCHOTT AG Visit us at Hall 3.0/Booth #D12

SCHOTT now offers a complete range of filters after expanding its coating expertise

The international technology group SCHOTT has significantly extended its coating expertise at its plant in Yverdon, Switzerland. As a result, the company that is an expert on specialty glass now offers a full range of interference filters that meet customer specifications. Its selection spans everything from sophisticated fluorescence and Raman filters for use in medical diagnostics to filters for astronomy. In fact, its product line also includes coatings for high-performance, high energy lasers.



Fluorescence filters from SCHOTT allow for exact separation of illumination and observation wavelengths. This produces images with rich contrast.

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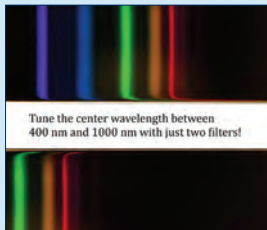


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Expanding IPG hails efficiency drive

Fiber laser giant buys two more buildings in Massachusetts; CEO says new IPG systems outperform direct-diode rivals on efficiency.

IPG Photonics has posted another sharp uptick in sales for the opening quarter of 2014, with CEO Valentin Gapontsev hailing a "remarkable" performance in what is traditionally the weakest period of the year for the fast-growing firm.

Gapontsev was referring to revenues of \$170.6 million, equivalent to a 20 per cent rise compared with the opening three months of 2013. For the first time in several years, the Q1 sales figure was also higher than the \$165.9 million recorded in the final quarter of the previous year.

Power performance

But in the high-power sector, responsible for by far the largest chunk of overall sales at IPG, the company continues to see rapid growth.

At exactly \$100 million, sales of high-power lasers accounted for 59 per cent of revenues in the quarter, and were up 33 per cent on the prior year. "In the quarter we installed a new record of 2.3 MW of combined optical power for more than 1,000 produced units," noted Gapontsev, adding that the figure was up 44 per cent on the opening quarter of 2013.

He also highlighted the efforts by IPG to increase the electrical efficiency of those lasers to a point where they can even exceed the claims of rival direct-diode systems.

Launched at the SPIE Photonics West exhibition in February, the "ECO" class of

ytterbium-doped fiber lasers is now said to offer an efficiency of 45 per cent. Gapontsev points out that the efficiency figure has improved from 25 per cent just five years ago.

"Please note there are no high power direct diode systems on the market with a similar efficiency," he told an investor conference call. "So, the claims the direct diode systems are more efficient are not correct."

Laser diversification

IPG is also working to diversify its product offering, with recent product introductions including ultrashort-pulsed lasers aimed at applications in cataract surgery, and nanosecond-pulsed lasers with an average power of up to 5 kilowatts.

"We are finishing qualification and [ready for] mass production of these families now," said Gapontsev. While some have already

been shipping since last year, fast-growing orders means that a significant contribution to IPG's sales should be evident in the second half of 2014.

Mass production of other new lasers, including holmium- and thulium-doped fiber sources and a 2.5 μm -emitting chromium-doped zinc selenide source launched at Photonics West, is also anticipated in the second half, although any meaningful sales will take longer to filter through.

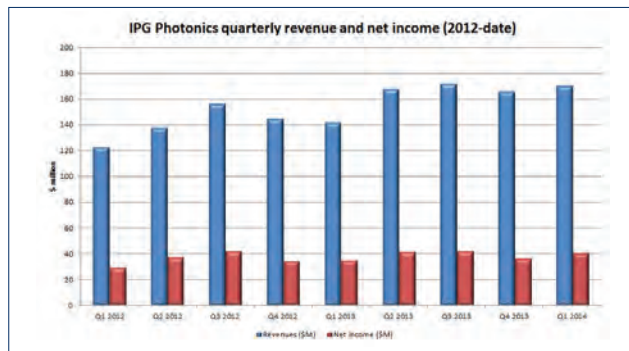
IPG adds that it is now seeing solid demand for its fiber laser workstations, known as "seam steppers" – a product line that has been perceived by some as a potential threat to relationships with its own system-building customers.

But Gapontsev has dismissed those concerns, and told investors that a number of major automotive manufacturers were testing and using the tool for welding of steel and other metals. IPG's systems are also finding demand from the smart phone industry, where laser cutting of sapphire and glass is becoming a key market.

Ukraine tension

The CEO also dismissed any concerns about the impact of economic sanctions imposed by the European Union and the US on Russia as a result of rising tensions in Ukraine, noting the global nature of IPG's internal supply chain.

Although the company does have three sites in Russia, including facilities for component and systems manufacturing,



IPG's quarterly sales and income (past nine quarters)

Despite that, a 15 per cent rise in net income to \$40.5 million and expectations of further growth in the current quarter, IPG's stock price took a tumble immediately after the results were announced and ended the day nearly 6 per cent down at \$64.35.

That was perhaps a reflection of profit margins that have been squeezed by competition to IPG's pulsed fiber lasers in China (at 52.3 per cent, gross margins were down a full percentage point year-on-year). Gapontsev said that sales of these products were down 13 per cent year-on-year to \$28.8 million, due to "increased competition from Chinese vendors as well as lower demand in some regions".

However, with IPG in the process of releasing new lower-cost versions and what the CEO described as some "very significant contracts" in China, the company is optimistic that it can fight back. Similarly, sales of IPG's quasi-CW fiber lasers are not growing quite as quickly as had been expected because of the very low price of legacy lamp-pumped Nd:YAG lasers in the market.



IPG's stock price (past 24 months)

IPG's management does not anticipate any serious impact on the business from such trading sanctions, and should be able to source many of the components made in Russia from its German sites instead.

Meanwhile, the company has just bought two buildings in Massachusetts that are set to be used for expanded laser systems production, diode laser crystal growth and research.

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Electrically controlled polymer changes optical properties

European “chiral breathing” development promises integrated polarisation filters, window glass with adjustable transparency, and chemical sensors.

Electrically-controlled glasses with continuously adjustable transparency, polarisation filters, and even chemosensors that detect single molecules of specific chemicals could be fabricated using a new polymer that combines optical and electrical properties.

A team of chemists from Italy, Germany, and Poland have developed the polymer which has unique optical and electric properties: components of this polymer change their spatial configuration depending on the electric potential applied. In turn, the polarisation of transmitted light is affected.

The material can be used, for instance, in polarisation filters and window glasses with continuously adjustable transparency. Due to its mechanical properties, the polymer is also suitable for fabrication of chemical sensors for selective detection and determination of optically active (chiral) forms of an analyte.

The research findings of the international team headed by Prof. Francesco Sannicolo from the Università degli Studi di Milano were recently published in *Angewandte Chemie International Edition*.

Prof. Włodzimierz Kutner from the Institute of Physical Chemistry of the Polish Academy of Sciences, Warsaw, one of the initiators of the research, added, “Until now, to give polymers chiral properties, chiral pendants were attached to the polymer backbone. In such designs the polymer was used as a scaffold only. Our new polymer is exceptional, with chirality inherent to it, and with no pending groups. The polymer is both a scaffold and an optically active chiral structure. Moreover, the polymer conducts electricity.”

The polymer presented by Prof. Sannicolo’s team was developed on the basis of thiophene, an organic compound composed of a five-member aromatic ring containing a sulfur atom. Thiophene

polymerisation gives rise to a chemically stable polymer of high conductivity. The basic component of the new polymer – its monomer – is made of a dimer with two

protein content in milk and dairy products produced in China.

Spectroelectrochemical studies on the new polymer were carried out by



Photo: IPC PAS, Grzegorz

Halves of a new polymer are connected at a single point and can be rotated with respect to each other by applying electric potential. Depending on the orientation of the halves, the new polymer either assumes or loses chirality. This polymer model is presented by Prof. Włodzimierz Kutner from the Institute of Physical Chemistry of the Polish Academy of Sciences in Warsaw.

halves each made of two thiophene rings and one thianaphthene unit (see photo above).

Electric effect

The two halves are connected at a single point and can partially be rotated with respect to each other by applying electric potential. Depending on the orientation of the halves, the new polymer either assumes or loses chirality. This behaviour is fully reversible and resembles a breathing system, whereas the “chiral breathing” is controlled by an external electric potential.

The development of the polymer was initiated thanks to the research on molecular imprinting pursued at the Institute of Physical Chemistry of the Polish Academy of Sciences. The research resulted, for instance, in the development of polymers used as recognizing units (receptors) in chemosensors, capable of selective capturing of molecules of various analytes, for instance nicotine, and also melamine, a chemical that is detrimental to human health, which has been mis-used as an additive to falsify

researchers from the Leibniz Institute of Solid State and Materials Research (IFW) in Dresden.

NOBLESSE project

The use and control of nano-structured materials is of great importance for the development of new environmentally friendly materials, more efficient energy sources and biosensors for medical analysis. The European Noblesse project is boosting Polish Academy of Sciences’s capabilities to research these developments.

Nanotechnology is helping to considerably improve, even revolutionise, many technology and industry sectors. Such is the scope for the development and application of nanotechnology that nano-structured materials are in high demand. To meet this demand, nano-science institutes need to rise to the challenges that modern society presents.

About the Author

Matthew Peach is a contributing editor to optics.org.

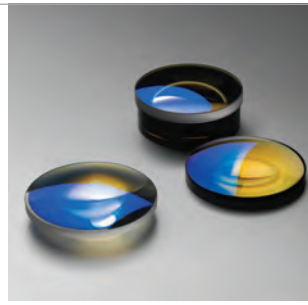
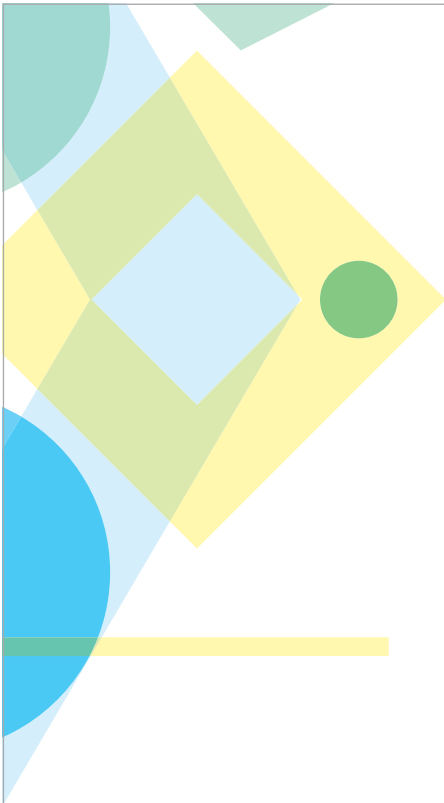
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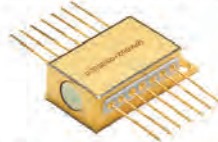
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