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VISION focus

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VISION

Don't miss the world's leading trade fair in Stuttgart

Next year in November the machine vision industry meets in Stuttgart, Germany once more. New developments in the area of machine vision components and systems such as cameras, image sensors, processing units, framegrabbers, software tools, lightning systems, lenses, cables and accessories, as well as complete solutions are showcased on the world's leading trade fair for machine vision.

There are plenty of industries today, which are willing to invest in machine vision components in the future – and their numbers are still increasing. Therefore, the world's leading trade fair in Stuttgart – VISION – has a great chance to attract even more exhibitors from all over the world, who are keen to present their innovations to a broad international audience. It is also likely, that VISION will bring more visitors to Germany in the coming years, who are curious about the developments in the markets and willing to learn more about the technologies.

VISION 2014: Double record

The last show in November 2014 was a huge success and closed with a double record. The number of exhibitors grew to 432, the number of visitors increased by 23 percent and a new international standard was set: the over 8.600 visitors came from 59 countries all over the world. Above them were highly qualified experts from the automotive industry, electrotechnical and electronics industries, machine building and many more important industrial branches. The international importance of the trade fair was also clearly visible in the exhibitor structure: the proportion of foreign exhibitors climbed to 53 percent.

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VISION:

Don't miss the world's leading trade fair in Stuttgart

Greater magnitude, attractiveness and significance

The switch to a two-year cycle meant that, as compared to the previous annual event, VISION gained greater magnitude, attractiveness and significance. At the world's leading machine vision trade fair, all key players in the industry as well as many small, highly specialised companies showcased even more of their latest products and innovations. VISION will therefore appeal to even more higher-qualified visitors from throughout the world who want to invest in machine vision technology.

OEMs, mechanical engineering companies and system houses at VISION learn about the latest innovation from the world of machine vision components and initiate their investments. At the same time this international platform is where end users are searching for specific machine vision solutions meet numerous system integrators. The trade fair in Stuttgart is the only place worldwide where the complete spectrum of the machine vision technology is staged in this way.

Incomparable range of products and services

The who's who in the machine vision will meet again in 2016 in one place and present a worldwide incomparable range of products and services. From sensors to processors, from cables to cameras, from software to illumination systems. Complete machine vision systems and very specific applications for many different industries are expected in the trade fair in Stuttgart – from mechanical engineering and the automotive industry through to the medical technology industry and many, many more industries besides.

This way and through special event modules such as the Integration Area and the Industrial VISION days forum the organisers ensure, that the diverse interests of visitors are satisfied. The Industrial VISION Days, organised by the trade fair's partner VDMA Machine Vision, for instance enable the visitors to experience the world's largest, high-calibre talk forum for machine vision. Every single facet of machine vision will be presented in exciting talks. Also the other parts of the broad accompanying programme for VISION offer exhibitors, associations, institutes and partners to take part in discussions. There are numerous options for exhibitors, who actively take part in the accompanying programme.

Come to the Heart of Vision Technology

There are plenty of reasons not to miss the next VISION taking place from 8 to 10 November 2016 in Stuttgart, Germany.

Come to VISION, come to the Heart of Vision Technology!

Find out more:
www.messe-stuttgart.de/en/vision/

VISION

Sponsored Editorial

Fluorescence Lifetime Imaging – application simplified…

For many years the phenomenon of photoluminescence has been used for a variety of purposes in life science applications, ranging from bio markers to sensing actions. Each of the luminophores that are applied has multiple characteristic parameters, which can be exploited for investigations.

The most prominent parameter is the luminescent emission itself, the fluorescence or phosphorescence intensity. The intensity is used qualitatively and quantitatively, but the latter strongly depends on the light field and the optical conditions around the luminophore. Similarly it is known that the luminescence decay or lifetime is an additional characteristic parameter of such a dye, which can provide additional information (see figure 1) or more reliable information than the luminescence intensity.

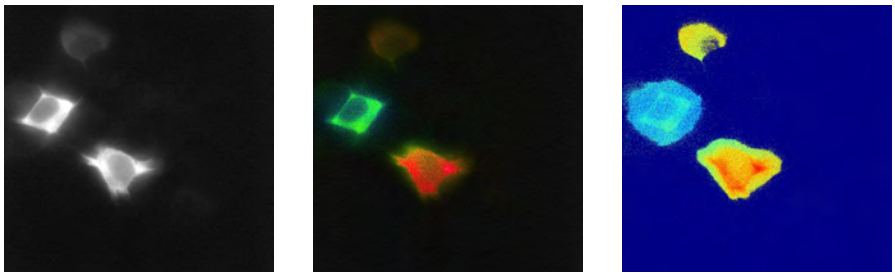

Figure 1: Three cells labelled with FRET pairs: the left image shows the donor fluorescence, which does not indicate whether FRET has occurred or not. The middle image shows the donor fluorescence lifetime distribution as measured with the pco.flim camera system in the frequency domain. The right image shows the fluorescence lifetime distribution of the middle image, but weighted with the fluorescence intensity of the left image, which clearly shows the cell which has undergone a FRET process, because it has a shorter lifetime (blue-green coded) than the others.

Although the possibilities of the luminescence lifetime have been known for many years, only few commercial camera systems are available. There are image intensifier based camera systems for frequency domain FLIM or scanning systems for time domain FLIM and camera based systems for time domain FLIM for longer lifetimes (range of microseconds and longer). Additional equipment such as frequency or timing generators was required to create such systems, which in many cases were quite bulky and expensive.

Due to technical developments in the area of CMOS image sensors, it is now possible to manufacture image sensors whose pixels can be directly modulated up to 50 MHz, which is an excellent prerequisite for the design of an all solid-state frequency domain FLIM camera system. Based on such a new CMOS image sensor, a highly integrated frequency domain FLIM camera system has been developed, which reduces efforts and costs of luminescence lifetime imaging systems. The principle is based on a charge swing in each pixel which allows for a very fast change of the direction of the luminescence induced charge carriers. In case of the pco. flim camera system it allows for modulation frequencies of up to 50 MHz. If a luminophore is excited by a sinusoidally modulated light it will react with a sinusoidal emission of light, but the reaction will be delayed due to the luminescence lifetime. This delay, technically called a phase angle between the excitation and emission, can be measured. Figure 2 shows the charge swing of the pixel, how it synchronizes with the integration of half the sinus signal and how it can be used to measure the phase angle of the emission.

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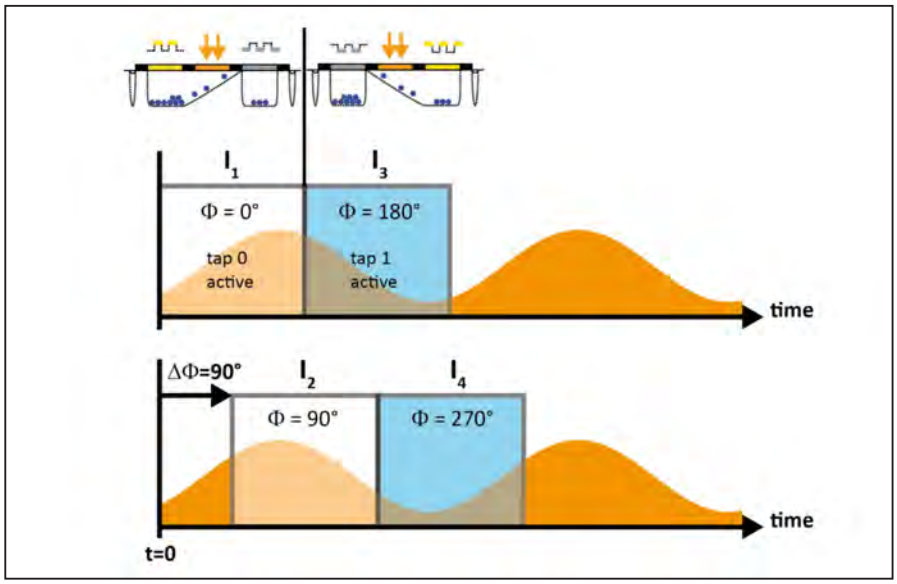

Figure 2: Sinusoidal luminescence signal (orange) with sampling integration windows (grey rectangles). First, for the first half of the period, the image I1 is integrated, which means that tap 0 is active and Φ = 0°, and subsequently the image I3 is integrated, which means that tap 1 is active and Φ = 180°. For the next recording the synchronization is shifted by ΔΦ = 90°, so that the first half period of integration covers I2, which means that tap 0 is active and Φ = 90°, and subsequently the image I4 is integrated, which means that tap 1 is active and Φ = 270°.

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Fluorescence Lifetime Imaging – application simplified…

While the switch in the pixel points to tap 0, all generated charge carriers are collected there; this is done to integrate along half of the period of the sinusoidal emission, then the switch changes direction, and the second half period is integrated into tap 1. The first integral corresponds to the phase angle value of 0° (tap 0) and the second integral corresponds to a phase angle value of 180° (tap 1). To reconstruct the sinus signal and determine the phase angle at minimum, a second measurement is required. Therefore a phase angle offset of 90° is introduced between the excitation and the emission, and the measurement is repeated (lower signal in figure 2). Now the integrals correspond to the phase angles of 90° (tap 0) and 270° (tap1). With these values or images it is possible to calculate three images: an image of the luminescence intensity, an image of the phase angle distribution and an image of the modulation index distribution. The latter two can be converted into luminescence lifetime distributions. Since one integration in most cases is not enough, the integration is repeated until sufficient signal is collected, which means that during an exposure time of for example 10 ms, the switch is triggered with the modulation frequency.

FLIM set-up

Now the devices needed for a FLIM measurement are the new pco.flim camera system and an appropriate light source that can use the modulation signals and the dark gate signal coming from the camera. In principle, that is all that is needed. Figure 3 shows a structural overview of a set-up for luminescence lifetime imaging with a pco.flim camera system, in which the camera is the frequency master. The pco. flim camera sends the modulation signal and the "dark" gate signal to the light source, which should be capable of accepting both signals. While the modulation signal controls the modulation of the excitation light, the gate signal controls whether the excitation light in general is switched ON or OFF, because the light has to be switched OFF during image readout time . It depends on the application which modulatable light source (fig. 3, modulatable light source) is appropriate (the required frequency range), which can be anything from LED to laser diodes that can be properly modulated in the intended frequency range. The modulated light can pass an optical excitation light filter (fig. 3, excitation filter) and will excite the luminophore in the sample of interest.

For that purpose it might be necessary to add additional optics to guide and shape the light to the sample. The optics are not included in the overview. The luminescent sample in turn will emit luminescence light. This light has to pass some sort of optical emission filters (fig. 3, emission filter) and will be imaged by optics (fig. 3, imaging optics) to the image sensor of the pco.flim. It is not important whether the emission has to first pass the optics and then the filter or vice versa; figure 3 shows just one version. The optics can range from lenses to microscopes, depending on the application. According to the operation modes and settings, the pco.flim camera system will transfer the images to the controlling computer (fig. 3, computer) via the USB 3.0 data interface. The examples given in figure 3 are just placeholders to show the flexibility of the pco.flim system. Since the camera includes

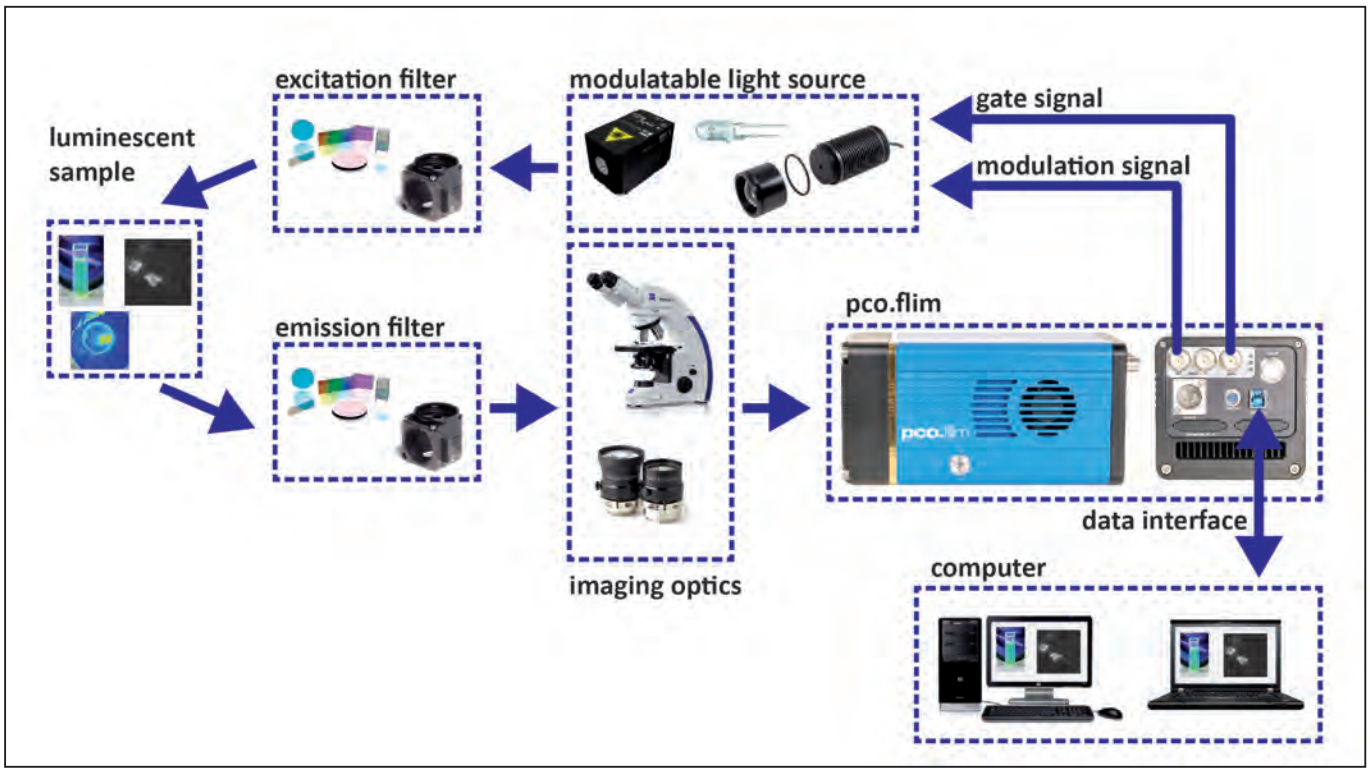

Figure 3: Structural overview of a set-up for luminescence lifetime imaging with a pco.flim camera system.

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Fluorescence Lifetime Imaging – application simplified…

the generation and control of the modulation signals, the overall set-up is reasonably simple.

Frequency vs. time domain luminescence lifetime measurements

In theory there is no difference regarding the information content of the two types of decay or lifetime measurements, since both methods give the same results, but with different experimental requirements. The frequency domain measurement requires a reference measurement to cancel out the influence of the optical path, which might not be necessary for the time domain measurement,

Figure 4: The pco.flim FLIM camera system.

but time domain measurements with image sensors are not possible down to the nanosecond range, since the fastest available CMOS image sensors still have minimum exposure times of more than 100 nanoseconds, while the frequency domain camera system pco.flim, even at a modulation frequency of 30 MHz (which is below the optimum frequency of 160 MHz), can resolve 100 picoseconds. For example the differences between the blue and the red cell in figure 1 (middle) were in the range of 1.5 ns.

FLIM camera system

The FLIM camera system pco.flim includes a complete frequency synthesizer, which is required for the generation of the modulation signals in the frequency domain. Therefore the only further device needed for FLIM measurements is an appropriate excitation light source, which can use either sinusoidal or rectangular modulation signals and a dark gate signal to switch off the light during readout of an image. The pco.flim has a resolution of 1008 x 1008 pixels and can read out a maximum of 80 double images/s. The effective frame rate is about 20 frames/s, due to the fact that a minimum of 2 double images have to be read out for a proper sinus fit and this has to be done twice for a proper asymmetry correction. The camera system can be operated at a single frequency or multiple frequencies in the range of 5 kHz – 50 MHz and it can perform an asymmetry correction even before image readout. With its widely used USB 3.0 interface it can connect to all sorts of computers. A thermo-electrical Peltier cooler keeps the image sensor at 10 °C by using either a fan or a water cooler to dissipate its own waste heat. With the c-mount it is easy to connect to any microscope or lens. Therefore the camera system significantly reduces the required efforts and costs for operation and research.

Application simplified

If it is integrated into a good software environment, the measurement of 2D fluorescence lifetime distributions now has been simplified. Instead of an image intensifier camera, light source and timing or frequency generators, the application requires only a CMOS camera and light source, which should enable a broad range of applications that were previously unfeasible due to the complexity of the existing system requirements.

Therefore, numerous applications, including FRET applications for measuring the donor fluorescence to determine how much FRET has occurred, the measurement of auto fluorescence lifetimes in natural tissue or the measurement of the luminescence lifetime for sensing purposes ranging from optical chemical sensors on a cellular scale up to the use of pressure sensitive paint in wind tunnels, can all benefit from the new FLIM system.

Sponsored Editorial

Edmund Optics

Meeting the needs of the customers

From design to prototype to volume production

Edmund Optics® (EO) is a leading global manufacturer and distributor of precision optics, optical assemblies and imaging components. Headquartered in the USA, Edmund Optics has four manufacturing facilities in the USA and Asia as well as sales locations around the globe.

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These lenses utilize an internal liquid lens to easily and seamlessly adjust focus over a 7X range, from 0.65X to 4.6X, while maintaining the zoom capabilities of the standard VZMTM Zoom Imaging Lenses. The lens also features a lockable iris, zoom control, and a rotatable mount that allows the camera to be properly oriented. The liquid lens focus can be controlled via the ruggedized 6-pin HIROSE connector and a USB port, while coarse magnification adjustments can be made manually. The included software allows the Dynamic Focus VZM Lens to be programmed to cycle through focus with a square, sinusoidal, or sawtooth waveform or adjustable frequency and focus-shift range.

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Edmund Optics® offers a wider range of laser optics and is continuously expanding its portfolio and capabilities in this field. Besides the mentioned Laser Lenses EO supplies Laser Mirrors, special Laser Coatings, and Laser Assemblies featuring designs from 193 nm till 10.6 µm.

DSS 2015

Defense and security components showcased

High-spec cameras, sensors, lenses and more in abundance at SPIE's Baltimore exhibition and conference.

The SPIE Defense, Security and Sensing (DSS) conference and exhibition in Baltimore, MD, US, is one of the year's most important technical meetings on optics, imaging, and sensing for defense and security.

Around 6,000 scientists, researchers, program managers, and company reps gathered to learn about new developments – and to do business. The associated SPIE DSS Expo sees 400 companies presenting their latest developments in optics, lasers, sensors, image processing, spectroscopy, infrared systems, thermal imaging, optoelectronic components, instrumentation, data analysis, and more. Here, Vision Focus presents a sample of some of the new launches.

Xenics: Stirling-cooled MWIR imaging core suits surveillance

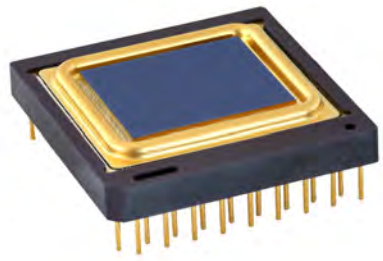
Xenics, Leuven, Belgium, a developer and manufacturer of advanced infrared detectors, cameras and customized imaging solutions covering the LWIR to visible spectrum, introduces the third member of its high-resolution Xenics Core Infrared OEM product family. The

Stirling-cooled XCO-640 MWIR module provides high stability and optical performance for perimeter surveillance, law enforcement and homeland security.

The new XCO-640 long-range MWIR surveillance core offers a rugged setup with several 22x zoom lens options, fully controllable via Serial Protocol. Lenses with different focal lengths (up to 825mm) can be used on the same MWIR imaging core. Xenics also provides on-board autofocus functionality. This way, large-area infrastructures, such as airports, can be monitored by a few pan-and-tilt cameras, simplifying the surveillance logistics.

ULIS' Pico640 Gen2 integrated in Thermoteknix's miniature thermal imager

Thermal image sensor developer ULIS, a subsidiary of Sofradir, has announced the selection of its Pico640



Gen2 into Thermoteknix System's MicroCAM 3, a new micro-weight thermal imaging core. Pico640 Gen2 is a thermal imaging sensor offering "important advantages" to portable military systems. Pico640 Gen2 and MicroCAM 3 take the size, weight, power and performance of thermal imaging to new levels, making the technologies suitable for handheld, battery-powered head-mounted and weapons-mounted systems.

Dr. Richard Salisbury, managing director of Thermoteknix Systems, commented, "By combining recent advantages in FPGA technology with the Pico640 Gen2 detector we have been able to make substantial improvements in both power consumption and imaging performance; while minimizing the size, weight and0 form factor of the new MicroCAM 3 which are ideally suited to Thermoteknix shutterless patented XTi imaging."

Ophir Optics launches four high-performance lenses

Four new high performance lenses were presented by Ophir Optics, a developer of precision infrared lenses. Ophir produces a wide range of high quality, cost effective, superior

performance infrared and vision components, lenses, and motorized zoom lens systems.

The four lenses consist of: an extremely wide angle, 180 degree field-of-view fisheye; a 15-60mm focal length F 1.4 uncooled motorized continuous zoom, a 19-200mm focal length F/4.0 cooled motorized continuous zoom; and a 15-280mm focal length F 5.5 cooled motorized continuous zoom.

Each lens is tailored to meet specific market needs. The fisheye is ideal for surveillance, security and situational

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DSS 2015: defense and security components showcased

awareness; the 19-200mm zoom is optimized to fit within a 7in gimbal for UAV applications; the 15-280mm zoom integrates with an F 5.5 cooled detector; the 15-60mm zoom meets the growing demand for thermal weapon sights, small UAV payloads, and surveillance.

Edmund Optics awarded IR smart sensors defense contract

Just a few days before the DSS conference and expo, Edmund Optics announced that it had received a "multi-million dollar" defense-related contract for some of its custom optical components supporting a smart sensors system. Besides its extensive catalog of COTS optics, the company also manufactures precision grade custom optics for DSS industries.

In addition to smart sensor applications, EO supplies optics for such programs as PVS 14, ENVG Night Vision, One Shot, Family of Weapon Sights for Individual ground soldier (FWSI), and smart munition and missile systems with leading US Prime contractors.

Bill Dover, Director of Business Development for Defense and Special Programs, commented, "What makes EO unique in the defense industry is our ability to quickly modify our COTS components domestically, while offering cost-effective volume optics at one of our off-shore manufacturing locations through our Technical Assistance Agreements."

- Further news on products launched or demonstrated at DSS 2015 is available on the **SPIE website**.

http://optics.org/news/6/4/32

JAI A/S

New JAI GO-2400
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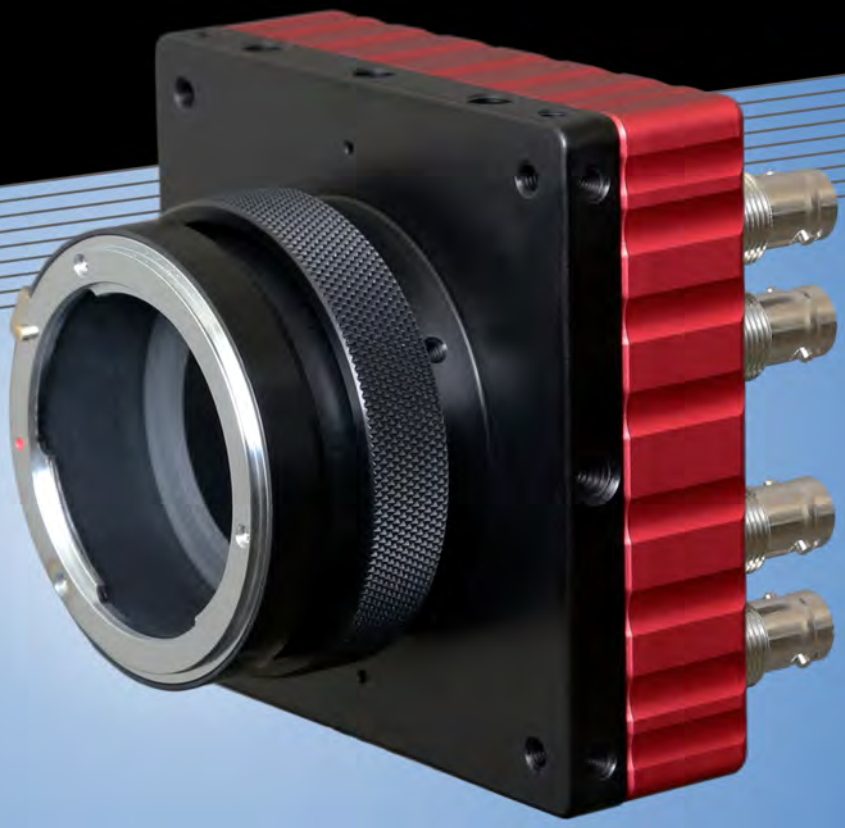

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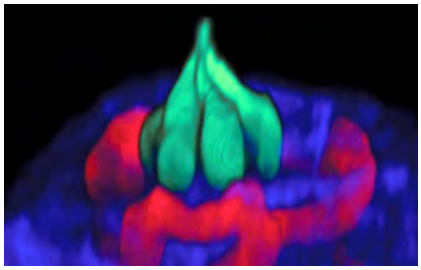
Scientists observe living taste cells in action

Process of taste sensation on the tongue analyzed by combination of infrared illumination and multiphoton microscopy.

There are more than 2,000 taste buds on the human tongue, which can distinguish at least five tastes: salty, sweet, sour, bitter and umami. However the relationship between the many taste cells within a taste bud, and human perception of taste has been a longstanding mystery.

Now a team of scientists have for the first time captured live images of the process of taste sensation on the tongue using a combination of infrared illumination and intravital multiphoton microscopy. The international team from ANU, Australia, Harvard, USA, and Sungkyunkwan University, Korea, imaged single cells on the tongue of a mouse with a specially designed microscope system. The research has been published in Nature's *Scientific Reports*.

Biomedical engineer Dr Steve Lee, from the Australian National University's Research School of Engineering, commented, "We've watched live taste cells capture and process molecules with different tastes." And Professor

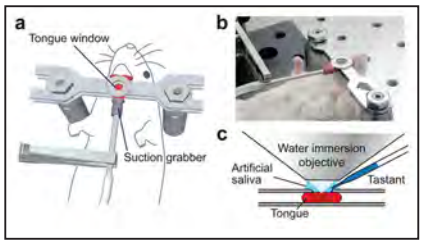


Credit: S. Lee, S. Yun, M. Choi.

A taste bud showing receptor cells (green) blood cells (red) and collagen surrounding the bud (blue).

Seok-Hyun Yun from Harvard Medical School, added, "With this new imaging tool we have shown that each taste bud contains taste cells for different tastes."

The team also discovered that taste cells responded not only to molecules contacting the surface of the tongue, but also to molecules in the blood circulation. Assistant Professor Myunghwan (Mark) Choi, from Sungkyunkwan University in South Korea, commented, "We were surprised by the close association between taste cells and blood vessels around them. We think that tasting might be more complex than we expected, and involve an interaction between the food taken orally and blood composition."



(a) Schematic. (b) Lab set-up. (c) Method of topical administration of aqueous tastant solution.

The team imaged the tongue by shining a bright infrared laser on to the mouse's tongue, which caused different parts of the tongue and the flavour molecules to fluoresce. The fluorescence from the tongue was captured with a technique known as intravital multiphoton microscopy. They were able to pick out the individual taste cells within each taste bud, as well as blood vessels up to 240 microns below the surface of the tongue.

The team says this breakthrough complements recent studies by other research groups that identified the areas in the brain associated with taste. They are now hoping to develop a new experiment to monitor the brain while imaging the tongue to track the full process of taste sensation. Dr Lee said, "However to fully understand the complex interactions that form our basic sense of taste could take years. Until we can simultaneously capture both the neurological and physiological events, we can't fully unravel the logic behind taste."

How it works

The *Scientific Reports* article reports, "Intravital microscopy is a powerful tool in neuroscience but has not been adapted to the taste sensory organ due to anatomical constraint. [The team] has developed an imaging window to facilitate microscopic access to the murine tongue in vivo. Real-time two-photon microscopy allowed the visualisation of three-dimensional microanatomy of the intact tongue mucosa and functional activity of taste cells in response to topically administered tastants in live mice.

"Video microscopy also showed the calcium activity of taste cells elicited by small-sized tastants in the blood circulation. Molecular kinetic analysis suggested that intravascular taste sensation takes place at the microvilli on the apical side of taste cells after diffusion of the molecules through the pericellular capillaries and tight junctions in the taste bud. Our results demonstrate the capabilities and utilities of the new tool for taste research, also *in vivo*.

Other applications: cancer research and treatments

The team also reports on further possible applications of their technique:

"Beyond taste sensation, intravital tongue imaging is expected to provide a wide range of applications, particularly for pathogenesis and homeostatic maintenance, by allowing longitudinal observation of cellular dynamics over prolonged period of time. The lingual keratinized epithelial cells constituting the filiform papillae are one of the most rapidly regenerating cells in the body, with a typical turn over time of 10 days in human. Their rapid proliferation is closely associated with the genesis of squamous cell carcinoma31 and oral mucositis after cancer therapy.

"Observing cellular dynamics during the disease progression and therapeutic interventions would facilitate deeper understanding on cellular mechanisms. Moreover, dynamic repopulation of the taste cells, and their renewed connectivity to the afferent nerve fibers should offer an exciting model to study highly orchestrated cellular maintenance and plasticity. Structural and functional mapping of vascular network in the taste bud may also be useful to elucidate the functional role of vascular perfusion in peripheral taste sensation and to measure the potential spatiotemporal correlation (i.e. neurovascular coupling) between neuronal activity and vascular perfusion in the tongue."

http://optics.org/news/6/4/43

Hannover Fair 2015

Video control by eye drives new microdisplays

Fraunhofer FEP presents latest wearable smart vision control system based on new SVGA-OLED microdisplay.

The Fraunhofer Institute for Organic Electronics, Electron Beam & Plasma Technology (FEP) has been working for a long time on the development of OLED micro displays that combine display and camera functions. Their latest work was displayed at the Hannover Fair in April.

The fast-growing world of wearable technologies is colorful and versatile: wrist bands measure the pulse, buttons herald the arrival of e-mails with color change and spectacles provide interactive information about the environment.

Since 2012, the Fraunhofer FEP has been refining its pair of glasses that give the wearer simultaneous viewing of the surrounding environment and of digital information projected directly into the user's field of view, which can even be controlled by eye movement.

Thus, a technician can read a manual while working and scroll the pages with his or her eyes without interrupting working activities. This is possible with the integration of a so-called bidirectional OLED microdisplay, which is a display element that includes an embedded image sensor. The sensor can record the user's eye movement with this integrated camera and thus enables an interaction with the displayed information.

A full-color OLED microdisplay has now been developed by the scientist where the display as well as the integrated camera functions have SVGA resolution (800×600×RGBW).

Photo: Fraunhofer FEP.

Video projection controlled by eye movement, based on Fraunhofer FEP's new generation of micro displays.

'Quantum leap'

Bernd Richter, Head of IC and System Design at the Fraunhofer FEP, where the new display was developed, commented, "The new generation of bidirectional microdisplays represents a quantum leap in many ways. And all essential key parameters of this chip could still be improved significantly.

"These improvements could include increased resolution of the display and the image sensor as well as an enhanced color depth and the integration of further important components directly into the microdisplay chip. By this means, the microdisplay could be operated with significantly fewer external components, which could contribute to further development of miniaturized and efficient systems."

To ease customer-entry into these new technology areas, the FEP scientists are offering development kits in various configurations. The new microdisplay can be transferred directly into product-specific applications. Moreover, fast and cost-efficient customer-specific adaptations and further developments towards innovative microdisplays are possible, which are based on an efficient design methodology of the Si-CMOS backplane circuit.

Part of the development work was financed by the German Federal Ministry of Education and Research (BMBF) and by the Fraunhofer-Gesellschaft.

http://optics.org/news/6/4/13

Automotive 'a great opportunity' for photonics – analyst

Market research by Tematys finds the car industry to be a good business prospect for photonics manufacturers and reveals the in-demand technologies.

Over the past 15 years or so, car manufacturers have been showing increasing interest in new technologies – especially photonics-based developments – in all areas: from powertrain, through lighting to driver assistance and vision systems.

Market analyst Tematys, which has just released a new report into this sector, says photonic technologies have significantly enabled developments such as high-performance electric vehicles, laser-based headlamps and optically-assisted parking systems.

Tematys comments, "The trend toward innovation is a huge opportunity for the photonics industry. Until relatively recently, photonics was integrated into car only through lighting functions. However, photonic technology provide critical functions for imaging, sensing, smart displaying or for media communication networks. As a consequence, photonics is expected to be widely adopted beyond lighting."

The €4990.00 report presents the market segmentation of existing and likely future photonics technologies to be embedded into cars as well as market forecasts for photonics integration into market segments such as: Advanced Driver Assistance System (ADAS), interior of the cabin, exterior of the car, and powertrain (delivery of power from engine through to the road).

Explaining how the company defines photonics technologies, Benoît d'Humières, partner at Tematys, told optics.org, "We employ a broad definition including the science and all technologies and systems that generate, transmit, detect, collect, modulate, amplify flux, from the terahertz band at around 300GHz through to X-rays."

Tematys says that the automation of certain driving tasks could help reduce the human error factor and so the number of car crashes. It is the reason why Advanced Driver Assistance Systems (ADAS) are now being developed and implemented in new cars.

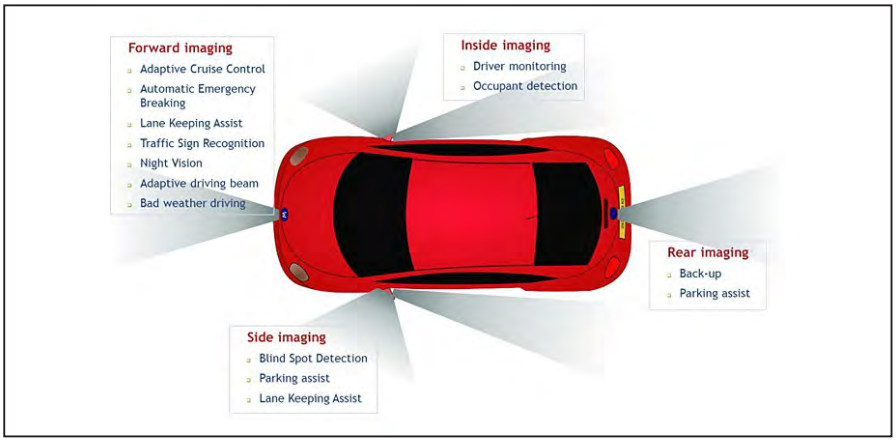


Image: Tematys.

The report details ADAS functions and analyzes the photonic technologies that can fulfill them.

ADAS 'most promising'

Demand for considerably fewer accidents has been expressed by a number of stakeholders worldwide. According to the U.S. Department of Transportation's National Highway Traffic Safety Administration (NHTSA), human error is the critical reason in around 90% of all car accidents.

"Photonics is a key enabler of ADAS. Indeed, cameras, combined with non photonic technologies already allow reliable parking assistance. LIDAR systems and new types of cameras will enable new functions such as automatic emergency braking.

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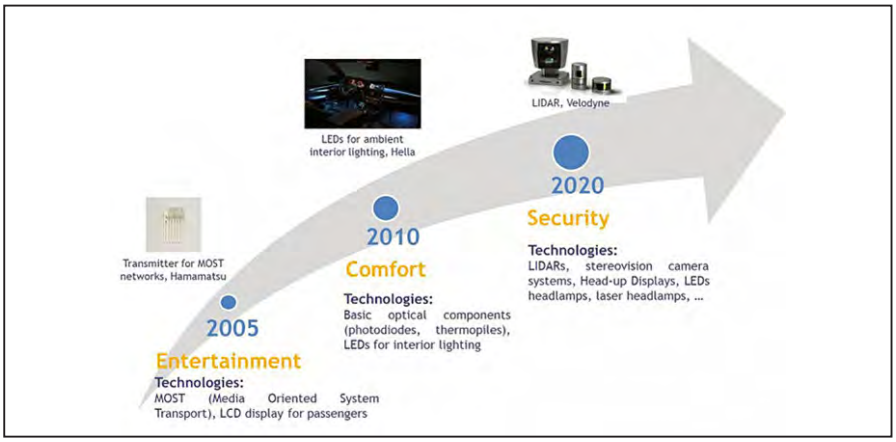

Figure: Tematys.

Some of the photonics technologies expected to benefit from car industry.

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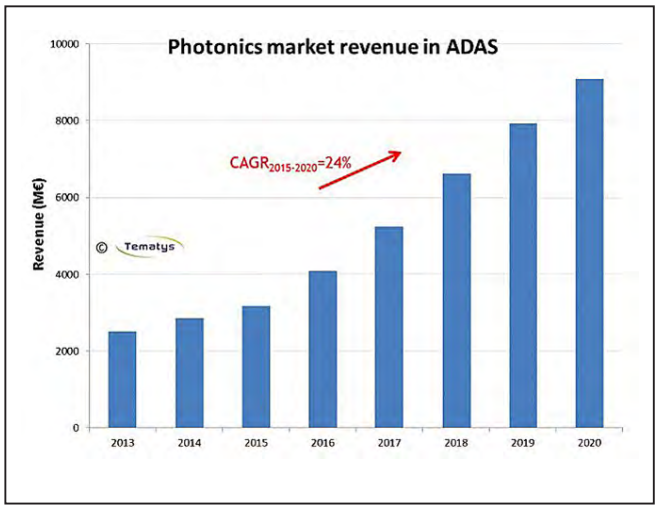
Automotive 'a great opportunity' for photonics – analyst

Infrared camera systems or adaptive frontlighting will allow safer driving at night," says the introduction to the report.

ADAS to grow at 22% CAGR

ADAS is one of the most promising segments in terms of economic perspective for photonic technologies manufacturers. Indeed, the market of Photonics in ADAS will grow from around € 2.8b in 2014 to around € 9b in 2020 with a CAGR2015-2020 of around 22%.

Currently restricted to few thousands of units per year in the luxury car segment, high-end photonic systems have the potential to reach tens or hundreds of millions units/year, says the report.



Tematys forecasts 24% CAGR increase for auto-related photonics sales through 2020.

"This is thanks to strong cost decreases while maintaining ADAS technologies' high performance abilities." The report also presents detailed market forecast by photonics technologies in ADAS from 2013 to 2020, as well as likely adoption rates over this period.

The report also mentions the contributions made by a number of key suppliers of components and sub-systems, including: Advanced Scientific Concepts, CMOSIS, Cognivue, CSEM, Efkon, Excelitas, FLIR, Fraunhofer IZM, Hamamatsu, Ibeo, Innov+, LeddarTech, Lemoptix, Mesa Imaging, Mobileye, Navdy, OledComm, Omnivision, ON Semiconductor, Osram, Philips, PMD Technologies, PureLiFi, Samsung, Sensata, Seoul Semiconductor, Sony, ST Microelectronics, Stereolabs, Texas Instruments, Two Trees Photonics, Ulis, Velodyne, and Vislab.

http://optics.org/news/6/3/29

ProPhotonix CEO hails 'landmark' year

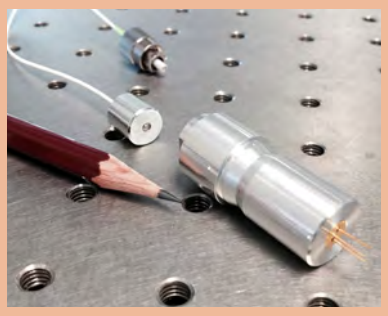


Photo: Tyndall National Institute.

A laser diode module developed at the Tyndall National Institute in Cork, Ireland. The institute recently signed a licensing deal with ProPhotonix.

Tim Losik reports first full year of positive operating income in nearly two decades.

LED system and laser diode vendor ProPhotonix has reported improved financial results for 2014 – but also warned that recent movements in exchange rates looked likely to impact its sales this year.

The company, which is headquartered in Salem, New Hampshire, but mostly operates out of the UK and Ireland and is listed on the London Stock Exchange (LSE), has just reported a solid increase in sales to $16.4 million last year.

That represented a rise of 5.3 per cent on the 2013 figure, while earnings before interest, tax, depreciation and amortization (EBITDA) swung to a $0.6 million profit from a loss of $0.7 million in 2013.

CEO Tim Losik, appointed in May 2013 following the departure of long-term chief Mark Blodgett, hailed the turnaround, describing 2014 as a "landmark year" in the company's trading statement to the LSE.

Another key development since Losik took over as CEO was a significant change of ownership in August 2014, when the UK-based engineering company 600 Group bought a 26.3 per cent stake in ProPhotonix. And earlier this year, the company agreed a new licensing deal with its Cork, Ireland, neighbor the Tyndall National Institute.

"Our financial performance has dramatically improved during 2014," reported the CEO. "Growth in revenue, improvement in the gross margin rate, and elimination of costs, all factor into the continued financial improvement of ProPhotonix."

Losik also pointed out that the result delivered the company's first full year of positive operating income in nearly two decades, and its first full year of positive EBITDA since 2001. The stock market appeared to agree, with shares in ProPhotonix rising in value by 5 per cent on the LSE following the trading update.

Order book shrinks

However, on the flip side, bookings in 2014 were down 9 per cent from the 2013 level, to $16.1 million, with the ProPhotonix book-to-bill ratio slipping into negative territory at 0.98.

It means that, as of December 31, 2014, the company's order backlog was down 20 per cent from 2013, to $5.6 million.

"Several factors contributed to the decline in bookings and backlog," Losik says, pointing to customers' reluctance to place large "blanket" orders, and opting instead for smaller, short-cycle purchases.

Losik also cited a general softness of business and delays at several industrial customers, while recent fluctuations in foreign currency exchange rates have not been helping.

The CEO wrote: "Putting this in perspective, 2014 revenue would be $14.5 million using the March 18, 2015 exchange rates." However, because the company's operations are mostly in the UK and Ireland, profitability is likely to be less impacted than sales figures.

"ProPhotonix begins 2015 in a strong position, having completed many of the development projects that were in process at the beginning of 2014, and we are now well positioned to start receiving production orders to increase our overall revenue," Losik summed up.

He sees potential high-volume custom OEM applications including illuminators for semiconductor, optical sorting, 3D printing, and UV curing applications.

Because of the recent booking trends, macroeconomic environment and exchange rate impacts, he is exercising caution for the first half of 2015. "But we remain very positive about our business pipeline and confident in our ability to achieve continued positive momentum toward our profitability objectives," he concluded.

http://optics.org/news/6/3/31

OmniVision board agrees China buy-out

Hua Capital Management leads $1.9 BN acquisition of one of the world's largest manufacturers of optical imaging sensors.

The board of directors at OmniVision Technologies, the California-headquartered maker of imaging sensors for smart phones and other consumer applications, has finally agreed to sell the company to a consortium of Chinese investors – nearly nine months after the deal was first proposed.

Last August the consortium – led by Hua Capital Management, a Chinese investment group specializing in semiconductor technologies – offered to buy OmniVision for $29 per share. On April 30, OmniVision said that its board had unanimously approved a bid at the slightly higher price of $29.75.

That values OmniVision at around $1.9 billion, and although the agreed figure represents a premium on the company's historic stock valuation on the Nasdaq exchange it also indicates the highly competitive environment in which it operates.

OmniVision's sales are dominated by hard-fought agreements with consumer electronics companies, including Apple, who drive a tough bargain for their business. As a result, OmniVision's annual turnover is well in excess of $1 billion but tends to translate to a relatively small profit.

For the firm's current fiscal year, which ended April 30 – the same day that the Hua-led acquisition was agreed - OmniVision expects to post sales of just under $1.4 billion.

As well as Hua, the consortium that is buying out the company includes CITIC Capital Holdings and Goldstone Investment. CITIC Capital Holdings is part-owned by CITIC Group – described as China's largest conglomerate.

CITIC used to be known as the China International Trust and Investment Corporation, and is state-owned.

Photo: OmniVision.

OmniVision co-founder and CEO Shaw Hong is expected to continue in the same role at the company despite the planned takeover by an investor group from China. The deal should be completed by early 2016, assuming that regulators and shareholders vote in favor of it.

Other CITIC Capital Holdings backers include Qatar Holdings LLC, the private equity wing of the Qatari sovereign wealth fund. Goldstone Investment is also part of the CITIC group of companies.

Diversification plan

Announcing the acquisition, OmniVision's CEO Shaw Hong said in a company statement: "Hua Capital Management, CITIC Capital and GoldStone Investment are highly regarded China-based private equity firms with deep experience in the semiconductor industry."

He went on: "With our new partners' knowledge and insight and the added flexibility that we will have as a private company, OmniVision will be able to focus on reaching the next level of growth, which will benefit our employees, customers and business partners."

Under Hong's leadership, OmniVision has been aiming to diversify its business so that it is not so reliant on the relatively low-margin deals with consumer electronics companies, and expand into potentially more lucrative sectors such as automotive and medical imaging.

The company has made some progress on that front in recent quarters, with Hong reporting strong growth in automotive sales, where the sensors enable new safety features like rear-view cameras, elimination of "blind spots", and automatic detection of pedestrians and other potential hazards.

Yue Lin, a managing director at Hua, said of those emerging markets: "The world-class management team and employees of OmniVision have built a global leader in digital imaging that is well-positioned to capitalize on fast-growing market opportunities in automotive, security, entertainment, and the Internet-of-Things, while continuing to expand their market leadership in mobile phones."

JV impact

According to the official announcement by OmniVision and the Chinese consortium, Hong is expected to remain with the company "in the same capacity", while the deal should close towards the end of this year or in early 2016.

However, approval from OmniVision's shareholders and anti-trust bodies in both the US and China is needed before that happens, as well as review and clearance by the Committee on Foreign Investment in the US.

Meanwhile under Taiwanese legislation, OmniVision will need to sell off some of its investments in Taiwan – including its interest in VisEra Technologies, a joint venture with the giant semiconductor wafer foundry TSMC.Currently, the company outsources the color filter and micro-lens phases of sensor production to VisEra, an approach that allows OmniVision to "significantly reduce" its capital requirements and financial risks.

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