

Fast laser helps doctors image full eye in 3D

Scientists have developed a laser-based technique that can produce a full 3D image of all the layers of the retina, allowing doctors to better diagnose and treat eye diseases such as cataracts, diabetic retinopathy, and cancer. It will enable medics to take an image of the eye ten times faster and over ten times longer range than ever before, dramatically improving their ability to assess the condition of the eye and to ensure that nothing is overlooked.

Today, more than 10% of the world's population over the age of 60 has age-related macular degeneration which causes vision loss and leads to blindness. According to the World Health Organization (WHO): "285 million people worldwide are visually impaired: 39 million are blind, and 246 million have low vision. 80% of all visual impairment can be avoided or cured". Early diagnosis and follow-up treatments are necessary to prevent eye diseases from turning into blindness.

However, early diagnosis is limited by the ability to make full 3D images of the eye. Eye specialists currently use a non-invasive imaging technique called OCT but, because the eye is continuously moving, it can only make partial images. Until now, this technology hasn't been fast enough to take a full image of the eye.

Researchers from the Technical University of Denmark (DTU) have developed a swept light source technology that makes it possible to take full 3D OCT images of the eye and this innovative technology is being commercialised by the university spin-out company OCTLIGHT ApS. With support from Europe's 'one-stop-shop' incubator for photonics innovation, [ACTPHAST 4.0](#), OCTLIGHT has been able to solve a critical challenge in miniaturising the packaging of this novel laser technology to meet commercial marketplace demands. OCTLIGHT is now manufacturing these light sources to be used by medical technology companies in the commercialisation of full 3D OCT imaging devices.

Dr Thor Ersted Ansbæk, CEO of OCTLIGHT said: "The field of vision and depth is critical to diagnosing diseases of the retina. Our technique allows you to image the whole eye from front to back in 3D. It scans faster so you can image a larger part of the retina. It allows you to image 150 degrees of the retina, and penetrates the eye, allowing you to see all the layers of the retina."

They have developed a compact and cost-efficient light source module and processing capability that "sweeps" through the wavelengths of the optical spectrum faster than existing methods and has the ability of imaging deeper into tissue than ever before. The

product addresses the challenges faced by medical devices companies in terms of finding a suitable laser technology for commercialisation of 3D full eye imaging.

Ansbæk continued: "It's a big leap forward for this type of technology and specially tailored for use in the devices that are used for diagnosing and treating eye diseases."

Cataract surgery is one of the most performed operations in the West. Imaging the whole eye is critical with diseases such as cataracts where the lens becomes cloudy and has to be replaced. 3D full eye imaging will enable surgeons to work out what lens to use and plan the operation much more accurately than previously.

The company was founded in 2014 by a team of engineers and business people and has spent three years getting a detailed understanding of their customers and their requirements. Ansbæk was then a PhD researcher at DTU working with OCT and found there was an opportunity to develop a "sweep" technique where you could change wavelength very fast giving you a much more detailed image of the tissue you are studying.

To bring their idea to market, OCTLIGHT needed to create a product that was attractive to the medical technology companies who produce the devices used by doctors. ACTPHAST 4.0 is a photonics innovation hub designed to help SMEs, including those innovating with photonics for the very first time. It provided rapid access to the technical specialists and cutting-edge technologies in photonics that the team needed to develop the product, and also funded the innovation work.

"ACTPHAST is vital for a company like ours because it de-risks the investment we have to make to develop the product to a point where a potential customer will be willing to buy or invest themselves. ACTPHAST gave us access to the right know-how to accelerate bringing the product to market. They make a huge difference to companies like ours."

"Working with them was easy, and we had an excellent experience. ACTPHAST seem like a well-oiled machine; they have a great process, are efficient, and not too bureaucratic. Their people are very helpful and great to work with."

In addition, ACTPHAST 4.0 also helped OCTLIGHT to connect with venture capital by participating in its flagship annual European Photonics Venture Forum (EPVF) where high potential start-ups and SMEs innovating with photonics get to pitch to top VCs and corporate investors.

OCTLIGHT is currently scaling up their production and aims to grow to a team of 25 people and a turnover of more than €10 million within five years.

--- ends ---

For further information or interviews contact:

David Reid or Sam Young

Matter PR

david@matterpr.com

sam@matterpr.com

+44 (0)1993 880370

+44 (0)7818 518736

Notes to editors:

1. Interviews, Images, and Video News Release available.

About ACTPHAST 4.0

ACTPHAST 4.0 supports and accelerates the innovation capacity of European companies by providing them with [direct access to the expertise and state-of-the-art facilities of Europe's leading photonics research centres \(the ACTPHAST 4.0 Partners\)](#), enabling companies to exploit the tremendous commercial potential of applied photonics. Twenty-four research institutes together make up the ACTPHAST 4.0 Partners.

Together the ACTPHAST 4.0 Partners provide a full spectrum of photonics [technology platforms ranging from fibre optics and micro-optics, to highly integrated photonic platforms](#) (7 technology platforms in all), with capabilities extending from design through to full system prototyping.

ACTPHAST 4.0 operates as an open call to all European companies (big and small, but mainly targeted at SMEs) so they can avail of timely, cost-effective, and low-risk photonics innovation support. The extensive range of capabilities within the consortium can impact across a wide [range of industrial sectors and application domains](#), from communications to consumer-related products, and life sciences to industrial manufacturing.

The access to top-level experts and leading photonics technology platforms provided by the ACTPHAST 4.0 consortium is realised through [focused innovation projects executed in relatively short timeframes](#) (typically 6-9 months) with a critical mass of suitably qualified companies with high potential product concepts. The technical innovation support is

supplemented by expert business, and financial coaching supports to help ensure that the innovation activities are also commercially focused and primed for market success.

ACTPHAST 4.0 is closely aligned with the Photonics Pilot Lines and Mass Manufacturing in Europe to seamlessly progress successful prototypes developed through the ACTPHAST 4.0 incubator to large-scale production and market-ready products. In addition, ACTPHAST 4.0 includes Europe Unlimited as a 25th partner in the consortium who run the highly successful TechTour program around Europe each year to match venture capital with high potential start-ups and scale-ups in key technology areas. Together with this partner and in close collaboration with Photonics21 and the Photonics PPP, ACTPHAST 4.0 will deliver the European Photonics Venture Forum (EPVF) once a year at key locations around Europe to help boost the level of new financial investment sources for photonics innovation by European companies.

As a result of its innovation support activities, ACTPHAST 4.0 is expected to deliver a substantial increase in the revenues and employment numbers of the supported companies by enabling faster time-to-market of new product opportunities and addressing emerging markets where photonics is a key enabling technology. Furthermore, through its [extensive outreach activities](#), ACTPHAST 4.0 will ensure there is an increased level of awareness and understanding across European industries of the technical and commercial potential of photonics, especially amongst first users and "non-photonics" end-user industries.

ACTPHAST 4.0 is [particularly suited to the needs of small to medium-sized enterprises \(SMEs\)](#) who do not have the financial resources to invest in in-house R&D expertise and state-of-the-art technologies, nor to undertake risky innovation projects. ACTPHAST 4.0 support is heavily subsidised for projects undertaken with SMEs (100% subsidy for the first 30K€ of costs for an innovation project and 75% subsidy for all project costs over 30K€ including follow-on projects with the same company. For large-scale companies, the allowance is 50% on all project costs).

ACTPHAST 4.0 is designed to provide open access to photonics innovation support for all European companies who meet the eligibility criteria. We have [strict governance structures and systems in place around the key persons responsible for running the program](#) to ensure that ACTPHAST 4.0 remains true to its mission and mandate and that all decisions are open, transparent and correctly accounted for.

About OCTLIGHT

OCTLIGHT is a photonics company placed in Kgs. Lyngby, Denmark. The company develops, manufactures and sells OCT Swept Sources for application in Ophthalmology. OCTLIGHT want to become the preferred and trusted partner of OCT Swept Source technology that uses fast wavelength sweeping lasers to provide 3-D imaging in real time of sub-surface tissue layers. Our VCSEL technology enables 3D imaging in real time with high

spectral purity for OCT. We aim to make full 3D OCT imaging more accessible to improve early diagnosis of eye diseases. Long term, our vision is that this will improve the sight and life quality for millions of people.

For more information visit: www.octlight.com