



Press Release

Coin-sized scanner to target blindness

Hand-held, wireless retinal scanner harnessing new photonics technology will enable early diagnosis of glaucoma and diabetic retinopathy

A European group of scientists are working on the development of a breakthrough, compact, cost-effective retinal scanner that will play a key role in targeting the early diagnosis of retinal diseases that are worldwide leading causes of blindness. Funded by the Photonics PPP platform, OCTChip is set to revolutionise diagnosis of retinal diseases and prevent millions of cases of blindness.

Diabetic Retinopathy accounts for the leading cause of blindness, with 200 million cases worldwide, and 60 million affected Europeans. With an ageing population, higher life expectancies and rising levels of diabetes, the number of cases preventable blindness are increasing.

The retina, with a thickness of 0.25mm and composed of over 10 layers, is very difficult to access at the back of the eye with any other technology than OCT (Optical Coherence Tomography), the established method of diagnosis in eye-related diseases.

However, as Professor Wolfgang Drexler, Professor of Medical Physics and Head of Center for Medical Physics and Biomedical Engineering at the Medical University of Vienna, who heads the OCTChip project, observes:

"State-of-the-art OCT technology has its limitations: it is bulky, the size of a desk top and quite expensive, costing anything in the region of €100, 000 per unit. It can detect abnormalities but at the present moment, compact, cost effective versions that can be used outside of hospitals and in private practice in a hand held mode do not exist."

"The core component of our OCTChip project targets the size of a 1 cent coin. It will reduce costs and is maintenance free. Hence retinal diseases like Diabetic Retinopathy and Glaucoma as well as other retina diseases that are worldwide leading causes for blindness might be diagnosed via screening with this cost-effective compact point-of-care version of OCT."

"OCTChip fosters wide spread use to visualise and quantify the retina in more definition, so we can diagnose diseases better, quicker, and cheaper." Professor Drexler said.

The long term potential for OCTChip is exciting: hand-held, wireless and robust, it will work via Bluetooth, on a mobile phone or a tablet, enabling improving healthcare in remote Third World areas. As a miniaturized imaging technique, the implications mean it could probably be used as a battery operated capsule for gastrointestinal diagnosis in the future.

It is believed that the OCTChip scanner can be made so user friendly that self-diagnosis will be possible. "Perhaps in the future this will be available in supermarkets, for self-diagnosis" said Professor Drexler.

The OCTChip team hopes to have refined their first prototype by end of 2017 and targets for mass commercialisation to begin around 2020.

About OCT Chip

OCTCHIP - MOTIVATION / BACKGROUND

Optical coherence tomography (OCT) is a medical diagnostic technique that can be considered as a non-invasive optical analogue of ultrasound providing 2D or 3D tomograms with significantly higher lateral (10-15 μm) as well as axial (1-10 μm) resolution.

In ophthalmology OCT is commercialized since about 20 years but at the moment none of these 5th generation commercial ophthalmic OCT systems is low-cost or miniaturized.

All commercial systems comprise optical fibers and free-space optical components, which make them costly (up to 100k€) and bulky (table space of > 0.15 m³) as well as sensitive to misalignment resulting in high maintenance costs.

OCTCHIP - SOLUTION

The size and cost of OCT systems can be significantly decreased by the use of photonic integrated circuits (PICs), which combine planar optical waveguides and electronics. A suitable PIC fabrication and packaging technology combined with optimum design will allow the realization of extremely compact, low-cost, and even higher performing OCT systems.

In addition to its low cost and small footprint, this approach provides mechanical stability due to its monolithic and essentially alignment-free construction. On top of that, the use of integrated optics and electronics provides a significant manufacturing scalability advantage arising from the micro-fabrication processes (the envisaged silicon-based platform).

About Photonics21

Photonics21 is the European Technology Platform (ETP) for photonics –a technology encompassing all of the products and processes around the emission, manipulation and detection of light. It is integral to a wide range of industries that include the medical, healthcare, transport, manufacturing, and telecommunications sectors. In December 2005 "Photonics21" was set up to bring the community of photonics professionals and industries together.

In September 2009, the European Commission defined photonics as one of five European Key Enabling Technologies (KET's) and shortly after the European Research & Innovation Program "Horizon 2020" invited Photonics21 to become a "Public Private Partnership" (PPP). In November 2013 the "Photonics 21 Association", a legal entity under Belgium law, became the private contract partner in a Public Private Partnership (PPP) in conjunction with the EU Commission.

Today Photonics21 represents more than 2500 personal members from all over Europe. Our members are experts in the photonics industry, research organisations and universities who actively engage with us to develop a joint photonics strategy for future research and innovation in Europe.

With the global photonics market growing at twice the world economic growth rate, from 350 Billion Euros in 2011 to 615 Euros in 2020, Photonics21 stands in a secure global market position. The production of European photonics alone accounts for 60 billion Euros and employs over 350,000 people directly.

With strong growth forecast, current industry trends like digitalisation, resource efficiency, individual and zero failure production will drive the photonics industry further.

For more information about Photonics21 please go to <http://www.photonics21.org/index.php>