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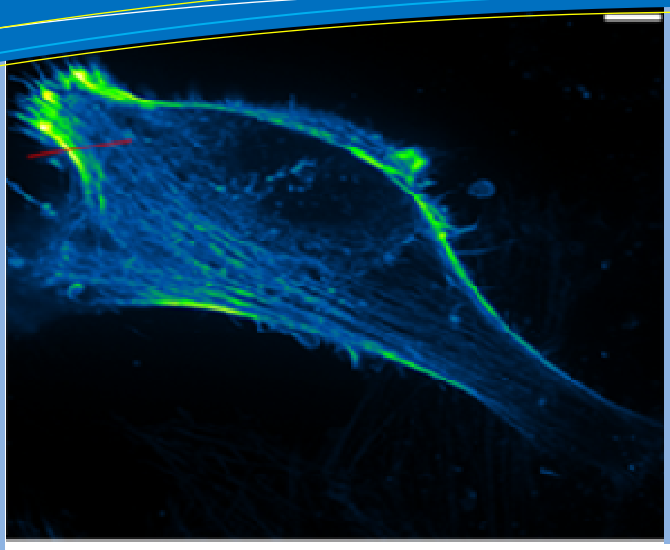
NEXPRESSO
NEWSLETTER



This Issue

About NEXPRESSO

NEXPRESSO, is the "Network for EXchange and PRototype Evaluation of photonicS componentS and Optical systems". It is a 3 year programme funded under the Seventh Framework Programme of the European Union (FP7-ICT-2009.3.7: Photonics.

NEXPRESSO's objectives are to:

- Purchase at marginal cost pre-competitive photonic devices from innovative European companies and put them in the hands of European researchers and students, at no net cost to the university or to the company that furnished the devices and
- Facilitate transfer of device evaluation results to potential end-users, assisting companies to access new markets and new applications.

Type 1 Call 3 Projects Announced

NEXPRESSO is pleased to announce the projects that will be funded after the third call for Type 1 projects.

The University of Dundee will be using a component supplied by Innolume in a project entitled "Generation of THz Radiation from Quantum Dot Photomixers". This R&D project will focus on the design, testing and optimization of quantum dot-based (QD) materials with the aim of developing an effective and practical, ultra-compact, low power THz optoelectronic device which operates at room temperature. The researchers will use QD-based surface photomixers.

Using a component supplied by Resolution Spectra Systems, the Institut de Physique de Rennes will work on a project called "Tunable High Resolution Ti:Sa Dual Frequency Laser for CW THz Oscillator". The aim of this project is to develop a compact, stable and tunable dual frequency, dual-polarization 800nm Ti:Sa laser. The frequency difference between the laser polarization modes will be in the THz range (~4nm difference). Both wavelengths are independently tunable so that beat note can be adjusted between 0 to around 1 THz. The laser will be optimized and the beat wavelength will be monitored thanks to a compact ultra-high resolution (3 GHz) and large bandwidth (> ~5nm) spectrometer. The project is a first milestone of the emission of coherent THz radiation via AsGa BT photomixer.

The third R&D project sees a collaboration between the Medical University Vienna and Exalos. "Next Generation Multi-Functional Optical Coherence Tomography for Enhanced Ophthalmic Imaging and Diagnosis" will use a 150 kHz bidirectional swept laser source to to establish a high-speed multifunctional optical coherence tomography (OCT) imaging platform for comprehensive high penetration structural imaging and non-invasive retinal angiography. The new generation swept source operating at 150kHz spectral sweep rates will provide the speed advantage necessary to suppress motion artifacts and to reduce the measurement times for wide field retinal imaging. The centre wavelength of 1060nm will provide enhanced penetration into choroidal structures, and in particular better contrast of the diagnostically highly relevant choroidal perfusion.

We look forward to seeing the progress on these projects in the future.

The different types of call in the NEXPRESSO Project

Type 1

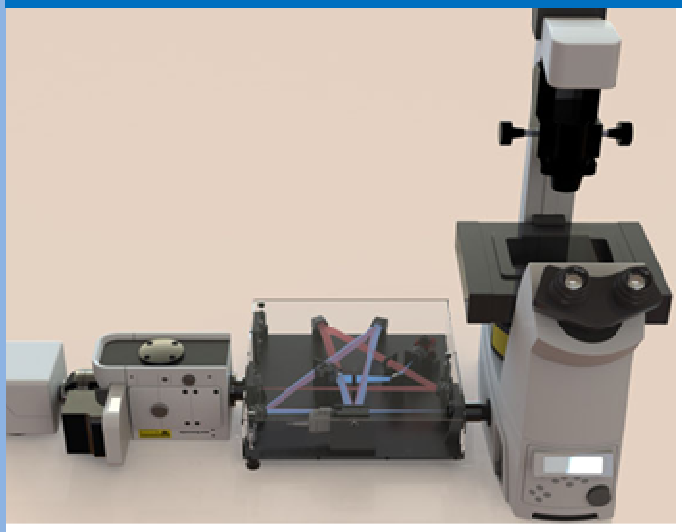
This is a continuation of the ACCORD mechanism. Manufacturers register pre-market components on which they would like researchers to conduct experiments. These components are displayed on the NEXPRESSO web site and Researchers are asked to propose projects with a selected component. The proposals are assessed and the best are selected to enter contract negotiations. NEXPRESSO purchase the component and offer it to the researcher to undertake the proposed project.

Type 2

Under this mechanism researchers can ask for a component not currently available in the market in order to progress their research. Manufacturers can then propose components nearing market launch. As in Type 1, NEXPRESSO will purchase the component and provide it to the researcher.

TYPE 3

In this mechanism an "End-User" can suggest a research project using a component not yet on the market. The Researcher and component supplier have to be identified. Once this has been achieved NEXPRESSO buys the component and provides it to the researcher.



Project Update

Some of the first NEXPRESSO projects are nearing completion. This is how one of them got on.

Our first NEXPRESSO Type 1 project has finished. Using a component supplied by Cosingo - Imagine Optic, the Institut Curie worked on a project called "Adaptive Optics in Spinning Disk microscopy (AOSD) of living samples". The aim was take advantage of adaptive optics (AO) to correct for sample and system induced aberrations. AO would be integrated into fast multi-focal microscopy at very low S/N ratio, for observation on live "medium thick" biological samples.

The component, the Adaptive Optics Box for Sectioning Optical Microscopy (AOSOM), was placed between the spinning head disc and the microscope. This allowed for corrections to be made on both path of light, both excitation and emission. Thus increasing the image optimisation further than just one path alone.

The initial work was done using 1µm beads before moving on to working with a variety of live samples, such as tumour cells, mouse oocytes, Drosophila ooccytes and live cells in Zebrafish.

Through the interaction between the company and the research group, the AOSOM prototype underwent a number of design changes to optimise it optically, such as improving the transmission, as well as further development of the software.

The AOSOM, now called MicAO SD, is now a Plug & Play device, simply inserted between the microscope and the spinning disk device, which minimises the optical defects of the microscope and aberrations caused by the biological sample.

The correction of aberrations increases the Signal to Noise Ratio of the imaging setup, enabling to use the lower power of the laser and get the same dynamics.

When live biological samples (cells in 3D, small organisms or tissue samples) is imaged with the spinning disk confocal microscope and 100x NA1.4 oil immersion objective, MicAO SD consistently improves the intensity of the signal by 30 to 50%.

The image on p1 shows the MicAO SD correction when used on MDA-MB 231 cells. The Image below is a side-by-side comparisson of HeLA cells, with MicAO SD correction on the right.