

Industry Engagement and Innovation

Ceri Brenner

Central Laser Facility, STFC Rutherford Appleton Laboratory, Harwell Campus, Didcot, UK
Email address: ceri.brenner@stfc.ac.uk

This article highlights the industrial user engagement, industry partnerships, and innovation activities of the Central Laser Facility for the reporting period April 2018 to March 2019.

Industrial users and engagement

The CLF completed eight commercial contract access projects with industrial users this year, delivering experimental access to Gemini, Ultra and Octopus, and access to expertise in target fabrication and CALTA. From fluorescence microscopy for tracking intracellular pathways in drug development, to laser-driven accelerators for development of defence sector technologies, to spectroscopy to support novel catalyst development, the CLF's expertise in combination with its world-class capabilities and laser-based techniques continue to make an impact on a wide variety of industrial science themes and R&D areas.

The CLF continues to participate in the STFC Bridging For Innovators (B4I) programme – a funding scheme that has been introduced to boost industrial collaboration with national facilities. B4I is supported by the Industrial Strategy Challenge Fund and provides UK industry with access to expertise and capabilities for projects that boost productivity on existing products, rather than for early-stage research and development. This year's B4I projects include supporting validation measurements for graphene manufacture and for novel 3D cell structure manufacture (see below).

University of Oxford spinout company OxSyBio collaborated with MRC-Harwell and CLF microscopy experts to access CLF's Octopus imaging cluster, to examine their innovative 3D drug-responsive adipose models and assist in the validation of their manufacturing process. Dr Alex Graham (MRC-Harwell) said about the research, "It is a powerful platform for potentially identifying new therapeutic interventions for metabolic

diseases. This achievement has only been possible through a multi-institutional collaboration between a broad range of specialists at OxSyBio, MRC Harwell Institute and the Central Laser Facility."

Industry Partnerships

The CLF's partnership with Johnson Matthey (JM) continues, with Dr Kathryn Welsby appointed as a CLF-JM research fellow to solve industrial challenges and add insight into fundamental R&D, through the application of advanced laser spectroscopy and laser microscopy techniques on Ultra and Octopus. Regions of scientific interest for JM include next generation battery technology, fuel cell characterisation and catalytic science of zeolites for clean air applications.

The CLF's Dr Chris Thornton was successful in his application for a three-year UKRI-EPSC Innovation Fellowship. The fellowship is in partnership with JM, Manufacturing Technology Centre and Warwick Manufacturing Group. The fellowship is hosted at the CLF and is focused on laser-driven x-ray techniques for advanced micro-CT imaging and x-ray absorption spectroscopy.

Professor Marisa Martin-Fernandez at the CLF has secured development funding to prototype an integrated and cost-effective device, that exploits the STFC proprietary method to stratify cancer patients. This is a three-year project in partnership with Kings College London and AstraZeneca.

The Defence Science and Technology Laboratory (Dstl) counter terrorism and security group continue their long-standing collaboration with the CLF, which assists their programme of R&D focusing on advanced inspection and disruption technologies for defence applications. Applications of high peak power lasers and laser-driven secondary sources were explored during contracted experimental access time to the Gemini laser this year.

The collaboration between the CLF, University of Bristol, Queen's University Belfast and Sellafield Ltd continues in the exploration and development of laser-driven x-rays and neutrons for inspection and waste assay applications. Pulsed Laser Accelerators for The Inspection of Nuclear Materials (PLATINUM) is a three-year project, funded by the STFC Innovation Partnership Scheme.

The CLF hosts EPSRC iCASE studentships that are part-funded by industry partners, including two studentships partnered with Dstl and two studentships partnered with JM.

International Impact

The CLF's partnership with the HiLASE facility in Czech Republic continues under the European Commission's Widespread Teaming programme – one of the first projects within this Horizon 2020 programme to be funded. Scientists from the Czech Institute of Physics and HiLASE are working with the CLF on a "Centre of Excellence" for the industrial exploitation of new laser technology. The project is further developing the CLF's DiPOLE technology towards 100 Hz repetition rate, and strengthening collaboration in industrial engagement and technology transfer.

Build and delivery of the DiPOLE D100X system, 100 J at 10 Hz, to the high-energy density end station of the European XFEL facility remains on track for delivery in late 2019. This is the second build contract for the CLF's world leading 100 J level high peak power and high average power laser system, and paves the way for more interest from international facilities for this innovative technology.

Innovation

We constantly scan for innovation and technology transfer opportunities across the whole of the CLF, as an ongoing activity with a view to capturing and driving forward the most impactful ideas and inventions.

During this year three new proof-of-concept projects were funded and started, while four were completed. From target fabrication techniques, to microscopy optics, to detector readout solutions, the range of innovations coming from CLF expertise has the potential to impact on many sectors. Two projects funded through the Challenge Led Applied Systems Programme, related to advanced solutions for waste remediation and targeted therapeutics, continue to develop CLF know-how and inventions towards commercialisation, and an STFC Innovation Partnership Scheme project is exploring applications in nuclear waste management.

This year the CLF filed two new patent families, giving a current total of 19 active patent families, and nine invention disclosure forms were submitted for consideration for future patent filing. This year, the CLF has also licenced technologies to Ximbio, the world's largest non-profit reagent technology transfer service, and to Scitech Precision, the CLF's spinout company providing advanced target fabrication and precision engineering to customers worldwide.