The FUTURE PHOTONICS Hub

Advancing the manufacturing of next-generation light technologies

Innovation Fund

First call for research proposals (September 2016)

The EPSRC-funded Future Photonics Hub has available a "Innovation fund" to enable the inclusion of academic partners who bring additional value to the programme. Initial engagement will be via short research projects that support the objectives of the programme – specifically the development of next-generation photonics manufacturing processes to provide lower-cost, higher-performing integrated sensors, lasers and sub-systems. Industry are encouraged to participate as project partners to demonstrate a pathway to manufacturing and exploitation, although cannot receive funding directly. Partners from photonics manufacturing sectors and those that utilise photonics technology are particularly welcome.

Core research themes of the Future Photonics Hub are listed below and should give a general steer to proposers. Proposers are encouraged to discuss their proposals with the named Hub investigators.

1) High-performance silica optical fibres

Hub Contacts: Prof Jayanta Sahu, Prof David Richardson, Prof Michalis Zervas

Focus on two key challenges in fibre manufacturing to meet short and long-term industry needs: improving loss, gain and power handling and increasing the transmission window to enable new applications.

- Developing volume-scalable, cost-effective, manufacturable special fibres and fibres for use in ultra-high-power light sources and transmission
- Large-scale, low-cost integration with III-V sources
- Designs and processes for cheaper, more reliable and efficient near-IR fibre lasers and systems
- Next-generation solid-core and microstructured fibre technologies interfacing with other optical and electronic platforms
- Manufacturing technologies for fibre preforms such as 3D printing

2) Light generation and delivery

Hub Contacts: Prof Jon Heffernan, Prof Francesco Poletti

Devices such as quantum-cascade lasers, antimonide-based lasers/LEDs and fibre supercontinuum sources have generated new markets in areas such as sensing, imaging, healthcare and spectroscopy. This platform will drive the transition required for growth in these photonics-enabled industries, from discrete components to low-cost, compact, integrated platforms.

- New manufacturing methods to integrate semiconductor sources with Si/SOI, based on bespoke metamaterials and microstructured fibres
- Reliable and integrated mid-IR delivery fibres
- A manufacturing platform for compound-glass hollow-core fibres
- Novel fabrication methods for microstructured fibre pre-forms (e.g. 3D printing) to improve fibre precision, yield, flexibility and integration with new light sources

3) Silicon Photonics

Hub Contacts: Prof Graham Reed, Prof Goran Mashanovich

Silicon photonics has made major advances in functionality at the chip level, but integration remains an obstacle to the development of the technology. This platform focuses on solutions to this key challenge.

- Integration with optical fibre devices, III-V light sources and the key components of wafer-level manufacturing, e.g., on-line test and measurement
- Development of economical manufacturing processes to enable the growth or integration of metamaterials, chalcogenide glasses or III-V light sources directly on the silicon platform

4) Large-scale manufacture of metamaterials and 2D materials

Hub Contacts: Prof Nikolay Zheludev, Dr Kevin MacDonald, Prof Dan Hewak, Prof Martin Charlton, Dr Ian Ferrer

Metamaterials and 2D materials provide extraordinary properties that disrupt conventional ideas on device performance. This platform focuses on low-cost, scalable manufacturing of metamaterials that has so far been an obstacle to their proliferation in devices and systems.

- Development of processes for low-cost and high-throughput manufacturing of metamaterials and integration with optoelectronic, planar waveguide and optical fibre technology
- Driving new epitaxy and integration processes for the manufacturing of large area (wafer scale) 2D materials, from proof of principle to industrial validation
- Characterization and optimization of 2D materials for emerging applications

5) Integration

Hub Contacts: Prof Jon Heffernan, Prof Gilberto Brambilla

Proposals involving integration of two or more of the above themes are particularly welcome. Example topics could include:

- Novel device transfer methods - methods such as transfer printing, or microfluidic assembly are of interest for assembling large numbers of discreet devices on to novel substrates including Si-SOI and fibres.
- Photonics packaging technologies

For more information about the Future Photonics Hub visit: www.photonicshubuk.org