

## **Photonics Innovation Fund**

### ***Photonic Manufacturing, Metamaterials and Metadevices, Silicon Photonics***

#### **Call for Proposals**

**Deadline: 18 December 2017**

The **Future Photonics Hub** together with the **Physics & Technology of Metadevices & Metasystems Programme Grant** and the **Silicon Photonics for Future Systems Programme Grant** each have available a 'partnership fund' of up to £350k\* in total, to enable the inclusion of academic partners that bring additional value to these key EPSRC-funded projects. We are inviting proposals from UK-based academic researchers for projects that contribute to the areas outlined below, grouped according to their funding.

### **General submission guidance**

This announcement comprises three separate calls for proposals:

1. The Future Photonics Hub Innovation Fund - £260k (pages 2-3)
2. The Metadevices & Metasystems Programme Grant Innovation Fund - £40k (page 4)
3. Silicon Photonics for Future Systems (SPFS) Innovation Fund - £50k (pages 4-5)

The following general submission guidance applies to each of the three calls. Where specific conditions apply, these are stated in the section for that particular call.

#### **Eligibility**

The Call for Proposals is open to any UK-based academic research group or individual. Proposals from disciplines other than photonics are welcome.

#### **Requirements and criteria**

Proposals should be submitted to the email address specified under the relevant call heading. Two-page proposals should be written in a minimum 11 point font size and include the project title, names of the investigators, brief description, start date and expected duration and costs at Full Economic Cost (FEC). Grants will be funded at 80% FEC. We expect to fund a number of projects under each call.

Proposals should contain an explanation of how the proposed work fits into the frame of the programme's objectives and what added value it brings to a specific call topic. The PI and Co-I(s) of all funded projects will be required to engage fully with the programme and to attend consortium meetings as required during the lifetime of the project, including: on commencing, mid-project, and at the end of the project. In addition, within one month of the end of the project, a final report will be submitted highlighting the project outcomes and impact.

#### **Schedule and deadlines**

**Deadline for submission of proposals: 18 December 2017**

**Announcement of the winning proposals: February 2018**

## The Future Photonics Hub Innovation Fund - £260k

Proposals, and any questions, to be submitted to the Future Photonics Hub email address:  
[contact@photonicshubuk.org](mailto:contact@photonicshubuk.org)

### 1) High-performance silica optical fibres

Contacts: [Prof Jayanta Sahu](#), [Prof David Richardson](#), [Prof Michalis Zervas](#)

The focus is on two key challenges in fibre manufacturing to meet short and long-term industry needs: improving loss, gain, 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
- Diode-pumped visible fibre lasers
- Next-generation solid-core and microstructured fibre technologies interfacing with other optical and electronic platforms
- Manufacturing technologies such as 3D printing for making optical fibre preforms

### 2) Light generation and delivery

Contacts: [Prof Jon Heffernan](#), [Prof Francesco Poletti](#)

Novel Devices emitting in the near- to mid-infrared spectral region, such as semiconductor lasers/LEDs and fibre supercontinuum sources that generate 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 develop high value and manufacturable semiconductor sources and detectors
- Reliable and integrated mid-IR delivery fibres
- A manufacturing platform for compound-glass hollow-core fibres
- Novel fabrication methods for microstructured fibre preforms (e.g. 3D printing) to improve fibre precision, yield, flexibility and integration with new light sources

### 3) Silicon Photonics Manufacturing

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 of detectors on Si and Ge platforms

- 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, 2D materials and advanced materials; Flexible Photonics, Nanostructured Photonics, Hybrid Displays**

Contacts: [Prof Nikolay Zheludev](#), [Prof Kevin MacDonald](#), [Prof Dan Hewak](#), [Prof Martin Charlton](#)

- Large scale manufacturing of metamaterials
- Roll-to-roll manufacturing of 2D materials
- Novel devices or manufacturing processes for flexible photonics, nanostructured photonics, and hybrid displays

#### 5) **Integration**

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:

- Integration of 2D materials into CMOS and TFT semiconductor technologies, in particular for the generation of light
- Novel device transfer methods; methods such as transfer printing, or microfluidic assembly are of interest for assembling large numbers of discreet devices onto novel substrates, including Si-SOI and fibres
- Integration of sources with planar passive devices, e.g. Lidar
- Integration between passive devices and detectors

For more information about The Future Photonics Hub, see [www.photonicshubuk.org](http://www.photonicshubuk.org)

### **Specific requirements and funding eligibility**

Proposals will be assessed against the following criteria:

- **Alignment with the above research themes.** Discussions with named contacts are encouraged to avoid duplication of our existing activities
- Excellence and progress beyond state-of-the-art
- Level of industrial engagement

Funding can support both directly allocated and directly incurred costs such as staff time, consumables and travel to the project partners. Normal EPSRC rules concerning capital equipment apply.

## The Metadevices & Metasystems Programme Grant Innovation Fund - £40k

Proposals, and any questions, to be submitted to Prof Kevin MacDonald [kfm@orc.soton.ac.uk](mailto:kfm@orc.soton.ac.uk)

Metamaterials provide extraordinary properties that disrupt conventional ideas on device performance. We focus on the integration of metamaterials with fibre and quantum technologies, and explore new material platforms for metamaterials:

- Fiberised metamaterial devices for optical switching, isolation and limiting, dispersion compensation, and frequency conversion
- High-index dielectric media, epsilon-near-zero materials, topological insulators and other advanced materials for photonic metamaterials
- Quantum optics with metamaterials

For more information about the Metadevices & Metasystems Programme, see [www.metamaterials.org.uk](http://www.metamaterials.org.uk)

### Specific requirements and funding eligibility

The best proposals will be short-listed based on their innovation, compatibility with the Metadevices & Metasystems Programme and the added value that they offer. Based on their final ranking, winning proposals will be awarded up to £40k.

The grant can support directly incurred (DI) costs such as consumables, travel between project partners and research staff time, but no directly allocated (DA) costs such as investigator time or overheads. If you require any clarification on DI or DA costs please contact us prior to submitting the proposal.

## Silicon Photonics for Future Systems (SPFS) Innovation Fund - £50k

Proposals, and any questions, to be submitted to [spfs@sotonfab.co.uk](mailto:spfs@sotonfab.co.uk)

### 1) Wafer-scale testing of photonic components

- Erasable grating couplers, suitable for comprehensive wafer-scale testing of individual photonic components and devices
- Low-cost, high-throughput solutions

### 2) Multi-layer 3D photonic platform

- Upgrade to the existing Silicon-on-Insulator (SOI) photonic platform to effectively offer only a single photonic layer, following trends in microelectronics
- Development of a three-dimensional platform in Silicon Photonics, offering integration of multiple photonic layers - an important prerequisite for creating a low-cost, high-density integration platform suitable for mass market

- Proposals that complement and/or support the ongoing research within the SPFS programme that involves the development of amorphous silicon and silicon nitride as additional layers in a multilayer photonics platform

### **3) Novel Silicon Photonics modulator architectures and coding formats for high capacity transmission**

- Development of modulators in Silicon Photonics and appropriate modulation formats that offer high-speed and low power consumption and are suitable for optical interconnects
- Research related to the study of devices, circuits and techniques that are suitable for ultra-high data rate transmission via Silicon Photonics

### **4) Advanced packaging solutions in Silicon Photonics**

- Low cost, passive alignment solutions to the coupling/packaging problem suitable for the application of photonics to mass markets
- Development of robust and low cost packaging solutions for Silicon Photonics

### **5) Integrated optical sources**

- Integration of lasers for telecommunication wavelengths with Silicon Photonics integrated circuits that are suitable for future industrial-scale fabrication

For more information about the SPFS programme, see [www.uksiliconphotonics.co.uk](http://www.uksiliconphotonics.co.uk).

### **Specific requirements and funding eligibility**

The best proposals will be short-listed based on their innovation, compatibility with the SPFS programme and the added value that they are offering. Authors of the selected proposals will be asked to give a 15-minute presentation to the SPFS Management Group, followed by a 10-minute questioning session. The winning proposals will be awarded up to £50k.

The grant can support any directly incurred (DI) costs, such as research staff time (excluding academic time), consumables and travel to the project partners, but no directly allocated (DA) costs such as investigator time or overheads. If you require any clarification on DI or DA costs please contact us prior to submitting the proposal.