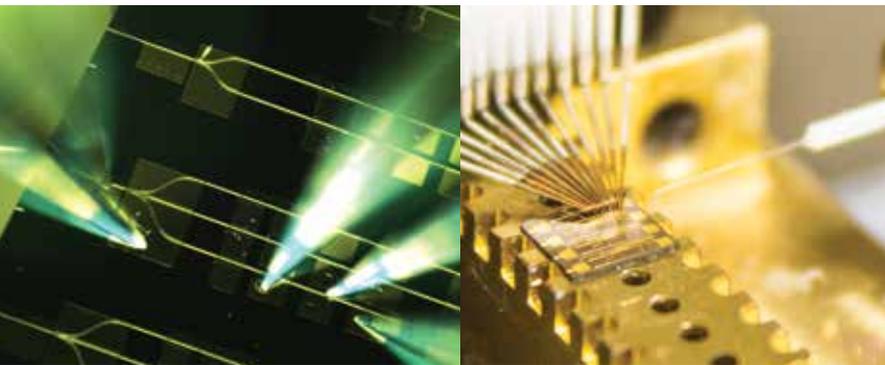


# Irish Photonic Integration Centre (IPIC)

IPIC brings together more than 150 researchers from four institutes to develop new light-enabled technologies. Photonics is the generation, manipulation and use of light. It is a key enabling technology that underpins the internet and drives growth in diverse industries such as the ICT and MedTech sectors, as well as industrial technology which includes both manufacturing and environmental monitoring.



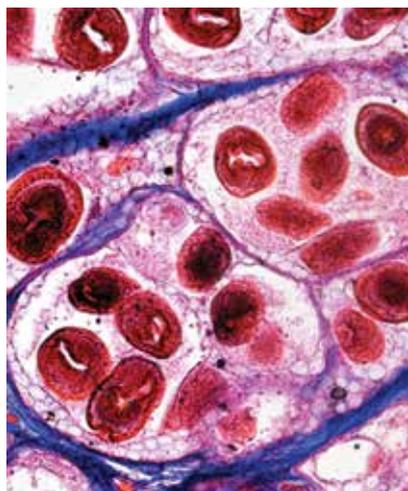
**IPIC's integrated research team has competencies in the theory of novel light-emitting materials through to the design of devices and systems. IPIC can accelerate transfer from laboratory to market by using its advanced fabrication and packaging capabilities to develop concepts and deliver low-volume manufacturing of prototypes.**

## Research Areas

- › Enabling continued growth of the internet through faster, more energy-efficient devices for information transport, storage and display
- › Delivering smart medical devices for improved treatment of disease
- › Developing highly compact instrumentation for point-of-care diagnostics
- › Developing systems for process and environmental monitoring

## Facilities

- › Modelling and design
- › Materials growth
- › Device fabrication
- › Packaging
- › Device characterisation
- › Systems testing



## Research programmes

IPIC's grand challenge is to advance and miniaturise photonic integration science and technology to produce breakthrough micro- and nanoscale optoelectronic systems, increasing device functionality, performance and energy efficiency. The Centre will achieve this through its dedicated research programmes in Optical Communications and Biophotonics. These include:

### OPTICAL COMMUNICATIONS

- › Highly energy efficient >400Gb/s transceivers for short-reach optical interconnects in data centres to address a critical bottleneck in these warehouses
- › Terabit/s communication systems for wide area networks, based on integrated photonic circuits, that allow information channels to be packed tightly to approach theoretical maximum capacities

### BIOPHOTONICS

- › Miniaturised, and potentially wearable, diagnostics systems by using the emerging science of silicon photonics, and hybrid and monolithic integration technologies
- › Surgical instruments with integrated miniaturised photonics-based sensors, including the development of flexible microLEDs for optogenetics

IPIC programmes are supported and enabled by their key technologies:

- › Packaging and Hybrid Integration
- › Monolithic and Heterogeneous Integration

## Industry and commercialisation

Targeting the ICT, medical devices and industrial technology sectors, IPIC is working with 25 industry partners to develop solutions tailored to their needs. Some 80 percent of IPIC's activity is focused on technology readiness levels 2 to 5, that is concept formulation to validation of prototypes in the relevant environment.

## Industry partners include:

- › British Telecom
- › Compact Imaging Ltd
- › Eblana
- › Epi-light Ltd
- › FazTech
- › Firecomms
- › InfiniLED
- › Intel
- › Lake Region Medical
- › Luxcel Biosciences
- › M/A-COM
- › Pilot Photonics
- › Radisens Diagnostics
- › Seagate
- › Synergia Medical
- › Stryker
- › X-Celeprint
- › Xilinx



## Education and Public Engagement:

IPIC, in collaboration with Science Foundation Ireland, is involved in many local and national events and initiatives, including Smart Futures and the BT Young Scientist Exhibition. IPIC is dedicated to training highly skilled scientists and engineers for industry, to support the next generation of scientists. The IPIC team is dedicated to showcasing the breadth and depth of career opportunities in STEM to students at all levels. Programmes include:

- › The “Secret Spectrum!” interactive workshop for primary schools, delivered to 850 primary school students in 2016
- › Photonics Explorer which provides robust experimental kits for secondary schools, allowing classes to fully experience the physics of light and optics.

*“I like using the kits with Transition Year students as it makes the topics very applicable to real life” – Teacher in Midleton College, coeducational school.*

## Key Contacts

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Centre Director

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*Paul Townsend is Research Professor in the Department of Physics at University College Cork. He is also an Honorary Professor in the School of Engineering and Physical Sciences at Heriot-Watt University in Edinburgh and a Fellow of the Institute of Physics. Professor Townsend is widely recognised as one of the founders of the field of experimental quantum key distribution (QKD). The main focus of his current research is next-generation fibre to home networks. He has written more than 170 peer-reviewed publications, including 40 invited papers, and holds numerous granted and pending patents.*

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