

Ultra-high bandwidth communications  
Lighting

Sensing technologies

# Create your business in Photonics!

Manufacturing

Security  
Photonics for the Life Sciences



## Introduction

UK Photonics is a significant and highly diversified industry directly employing ~70,000 people in 1500 manufacturing companies in all sectors from solid state lighting, next generation photovoltaics to lasers and imaging. Contributing £10.5bn to the UK economy, a similar level to the pharmaceutical industry, the Gross Value Added for photonics is ~40% higher than the UK manufacturing average underpinning its essential contribution to the economy. Photonics Research from UK Universities also enjoys a global reputation for excellence with multiple world leading research institutes distributed throughout the country.

## Technologies photoniques matures

UK strengths and mature photonics industry sectors include:

- Lasers, particularly short pulse ultrafast, tuneable, industrial and fibre lasers
- Security and defence optoelectronics (e.g infrared imaging & range finding)
- Space optics (including imaging, communications and large scale optics)
- Compound semiconductors (e.g. Epitaxial growth, GaN on silicon LEDs, InP photonics integrated circuits)
- Gas sensing systems (remote and direct monitoring)
- Specialist Optical Coatings (high durability, infrared, multiband)
- Optical fibre (doped, high power and next generation geometries)

Significant advances are being made in extending the performance and capability of all photonics technologies in the UK to extend into new applications. One of the most significant overall trends is toward greater integration and design for integration at all levels to enable more complex photonics systems to be rapidly and economically fabricated.

# PHOTONICS APPLICATIONS RELEVANT FOR THE FUTURE

## Photonics for the Life Sciences



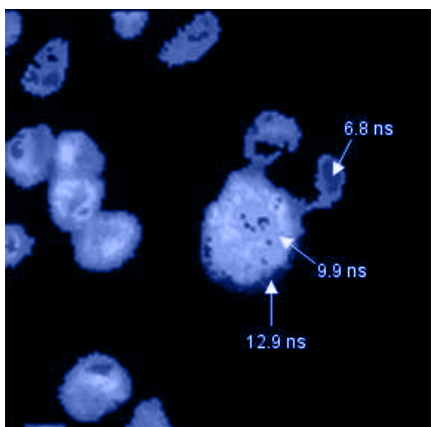
Optical imaging techniques provide easily-accessed in-depth imaging of the structures of the eye, surface tissues, mucosal, the gastrointestinal tract and vascular systems. These hold out the real promise of swifter and better diagnostic procedures with highly targeted treatment options enabled via photodynamic therapy.

## Ultra-high bandwidth communications



Optical fibre and photonics technologies already provide the backbone of the modern communications network. The next great challenge is to extend current technology to provide another 1000 fold increase in bandwidth in the backbone network whilst providing lower cost and more energy efficient solutions in the datacentre and access networks.

## Sensing technologies



The ability of photonics to sense at a distance, is critical to the development of next generation sensors that will enable self-driving cars, remote monitoring of emissions and enhanced security. Indeed sensors will be at the heart of the internet of things. Cost and energy efficiency will be key to the success of photonics sensing solutions which must compete against many alternative technologies.

## Lighting



Lighting is not just a significant user of global energy it is has a significant influence on our sense of wellbeing as well as our safety. From car headlights to street lights to displays and interior and ambient lighting solid state LED lighting will be ubiquitous. Critical will be the adaptation of solid state lighting to utilize its full capability rather than just replace existing sources, with a second revolution coming form OLED and flexible lighting solutions

## Security



Photonics is long been a key enabler in security and applications requiring rapid remote identification. The latest development includes the widespread deployment of laser systems to identify bottled liquids in airports and significant extension of smart image processing for early threat identification combining leading edge photonics and software development. The future will see further extension of technologies into the infrared.

## Manufacturing



Laser and cameras are vital technologies for improving manufacturing productivity. Already deployed in key processes, lasers and imaging based feedback systems will penetrate much more widely in factories as utility in processing more materials, e.g. next generation composites and delivering return in more processes is demonstrated.

## Support for entrepreneurship in Photonics in UK

- The UK provide one of the most attractive business environments for company creation and growth in the world. The UK is ranked first in the EU for ease of doing business. Corporation tax will soon be just 20% ,with attractive incentives for investment such as Patent Box that further reduces tax on profits from products incorporating UK patented inventions as well as attractive R&D tax credits for off-setting the cost of product development.
- Multiple grants are also available, particularly from Innovate\_UK to support innovative product development. These include a range of collaborative grants and the popular SMART grant with multiple stages covering proof-of-market to proof-of-concept and development-of-prototype that can make a substantial difference to supporting a small company through the new product development process.





Photonics4All is a European Horizon 2020 Outreach project, funded by the European Commission to promote photonics and light based technologies to young people, entrepreneurs and the general public across the EU. Photonics4all's unique selling point is that it will both develop a set of new promotional tools and apply them during a wide variety of outreach activities with different audiences.

*Discover our unique approach and check out our tools and events :  
<http://photonics4all.eu/>*

**Photonics4All**  
Discover the Power of Light 