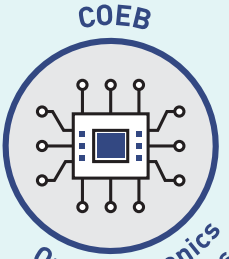
NANYANG TECHNOLOGICAL UNIVERSITY
SINGAPORE

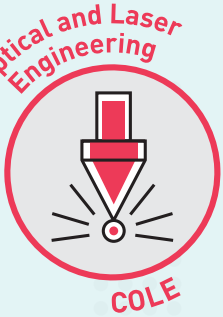
PHOTONS TO PRODUCTION

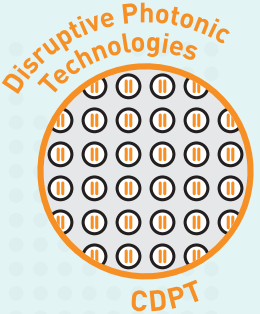
INVENTION TO INNOVATION

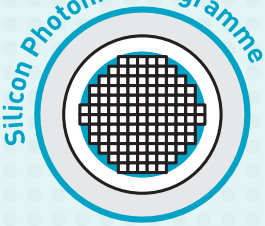
The Photonics Institute

Research Centres





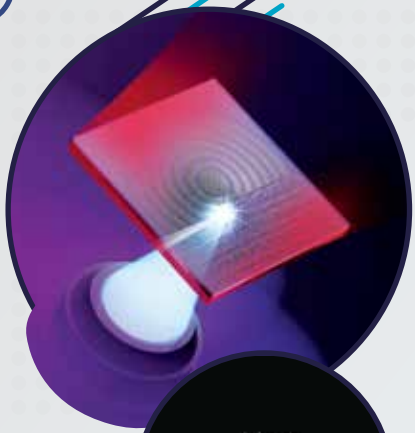


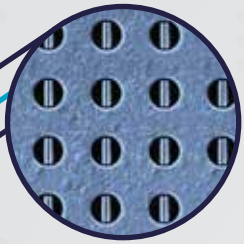


Advanced Nanophotonics

The exciting area of advanced nanophotonics constantly pushes the boundaries of scientific discovery. Since the initiation of the programme in 2012, we have gained a strong foundation and international recognition in the development of transformation optics, photonics metamaterials, nanoscale light sources, plasmonics and light localisation.

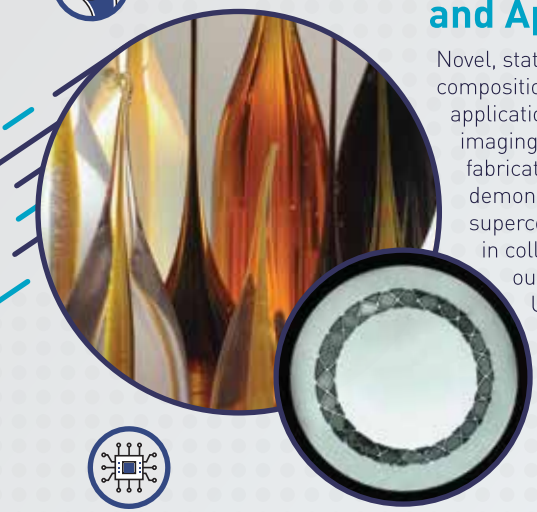
Building upon this strong platform, we are exploring emerging photonic technologies, which include quantum nanophotonics, topological nanophotonics, quantum technology devices as well as advanced materials.

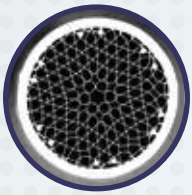




Specialty Fibres and Applications

Novel, state-of-the-art fibres with new designs and material compositions are being fabricated to meet various applications such as fibre lasers, fibre sensors, biomedical imaging, lighting and communications. One such fibre fabricated to date is a highly GeO2-doped fibre, which demonstrated record high output power ultra-broadband supercontinuum generation. The research was carried out in collaboration with DTU. Another notable invention is our collaboration with Southampton and Boston University in the first ever demonstration of optical angular momentum (OAM) fibre amplifier.





Biomedical

Advances in optics and photonics have driven progress in many areas of biology and medicine. Photonic technologies are the enablers for non-invasive clinical monitoring, molecular diagnostics, as well as sensing and imaging of cells, bacteria, patients and whole organisms.

Our research in this area has improved some of the critical limitations of water quality monitoring, bacterial detection and health monitoring.

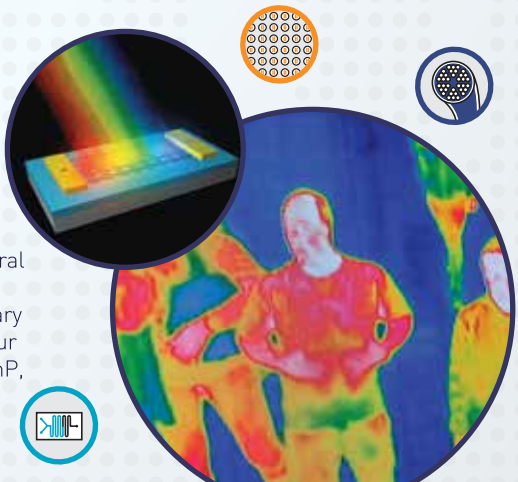
Manufacturing with Light

Light in all forms is increasingly being used to achieve significant improvements in the efficiency, performance and versatility of existing manufacturing capabilities, while at the same time, enabling new ones. Our key research in this area includes the development of lasers for manufacturing processes such as cutting, welding or drilling. Other areas of interest include optimising the 3D-printing process with high-powered lasers and photolithography to produce submicron features in thin films of photoresist.

Security

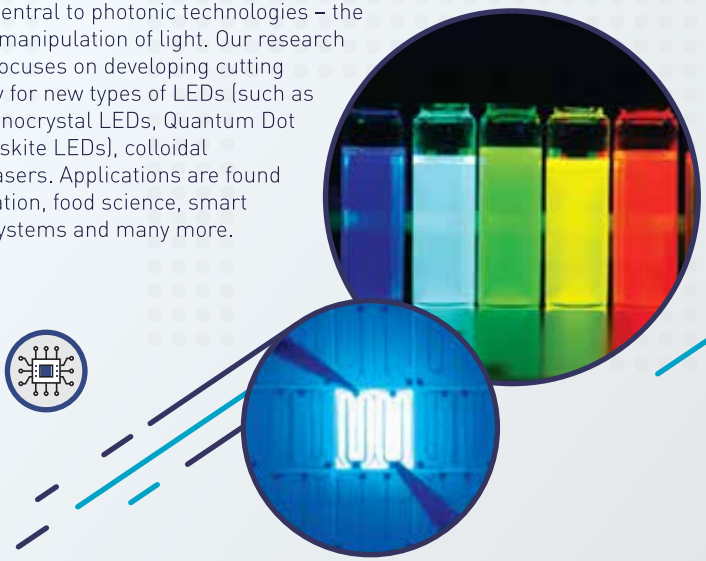
Security is about balancing attack and defence. However, this balance is ever changing. To respond to the constant new threats, photonic technologies can be incorporated into new systems, equipping our defenders with new capabilities.

Terahertz/Infrared sources and components are integral in sensing and detection systems used for concealed weapons and area security. Fabrication of the necessary Terahertz/Infrared components is made possible by our developments on the quantum cascade laser (QCL), InP, GaAs, GaN, InSb, etc. and compound semiconductors.



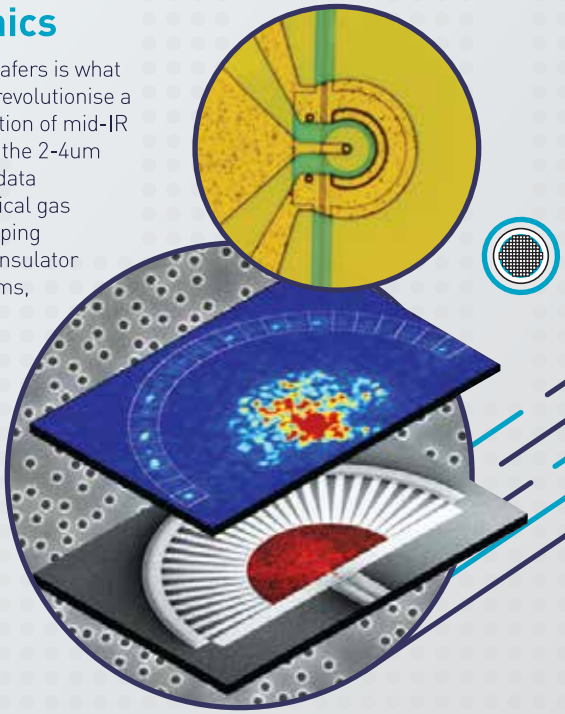
Illumination

Illumination is central to photonic technologies – the generation and manipulation of light. Our research in illumination focuses on developing cutting edge technology for new types of LEDs (such as Micro-LEDs, Nanocrystal LEDs, Quantum Dot LEDs and Perovskite LEDs), colloidal materials and lasers. Applications are found in water purification, food science, smart home lighting systems and many more.



Mid-IR Silicon Photonics

Integrating optical functions on silicon wafers is what Silicon Photonics is all about. Poised to revolutionise a number of application areas, the integration of mid-IR photonic devices on a silicon platform in the 2-4um wavelength range has huge potential in data communications, lab-on-chip and chemical gas sensing. Our research focus is on developing transceivers and sensors on silicon-on-insulator (SOI) and Germanium-on-silicon platforms, paving the way for silicon and III-V compound semiconductor nanophotonics integration.



The Photonics Institute

About Us

The Photonics Institute (TPI), one of the most advanced institutes in the field today, is the culmination of over 20 years of photonics research at Nanyang Technological University (NTU). It is an interdisciplinary research institute that consolidates various research centres in the area of photonics within NTU, and is in partnership with the Optoelectronics Research Centre at the University of Southampton UK. The TPI has established Singapore as a world leading centre of research excellence in applied and fundamental photonics.

Contact us

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