

Chinna DEVARAPU



Institution: Centre for Advanced Photonics & Process Analysis, CIT

Academic Mentor: Dr Liam Lewis

Commercial Partner: Vario-optics

Commercial Mentor: Dr Felix Betschon

Dr Devarapu's research focus is to employ novel photonics technologies to build cost-effective analytical and diagnostic devices.

He has a strong background in photonics and its application, including experience in theory, simulations and experimental techniques.

Before getting the Career-Fit fellowship, he was building a novel Raman spectroscopy system to detect water contaminants.

Dr Devarapu contributes to CAPP group's research activities by designing, simulating and fabricating nanophotonic devices for high-speed data communication works.

His responsibilities include writing grant proposals and researcher articles, presenting results at conferences, establishing collaborations, mentoring new members and participating in outreach

Dr Liam Lewis

Dr Liam Lewis is a world-leading expert in the field of photonic devices, optoelectronics and semiconductor physics. He worked at CAPP at Cork Institute of Technology on several Industry-led research projects. Dr Lewis has been published in internationally peer-reviewed journals and at international peer-reviewed conferences with an H-index of 19. He has led many advanced photonic device projects for industrial applications and has an extensive network of experts in academia and industry.

Dr Felix Betschon

Dr Betschon received his master's degree and PhD at the Swiss Federal Institute of Technology, Zurich where he also worked as a research assistant. He later became head of R&D at Oerlikon Esec where he was responsible for the electronics development department of Presta ThyssenKrupp in Budapest. After he joined Varioprint, he spun-off their electro-optical circuit board activities into an independent company, Vario-optics, where he is now CEO. His work has included the modelling, fabrication and characterisation of waveguides, devices, and connectivity solutions.

Centre for Advanced Photonics & Process Analysis, CIT

CIT has been involved in research projects with over 130 companies. It operates one of the largest incubation centres in Ireland, housing 65 start-up companies with annual turnover exceeding €65m.

Vario-optics

Vario-optics focusses on the fabrication of electro-optical printed circuit boards based on polymer optical waveguides. It has a world-wide customer base, with applications range from industrial and medical sensors, optical communication applications to electro-optical substrates for photonic packages.

Chinna's project

Quality control in a pharmaceutical industry is critical to ensure that medicines are manufactured according to the strict guidelines. One of the devices routinely used in the pharmaceutical industry for quality control is an ELISA (Enzyme-linked immunosorbent assay) plate reader that has a market share of \$2 billion.

This device shines light on to a sample container which is usually divided into 96 or 384 wells. The reflected light from the container is received by a light detector. By analysing this reflected light, properties of the chemical compounds are determined.

Existing ELISA readers consist of complex and bulky optics and moving parts, thus making them space restrictive, expensive and slow. They are regarded as a premium device and therefore have not been used to their potential in the pharmaceutical industry.

The proposed project addresses these challenges by designing a novel multi-wavelength light source that is compact, contains no moving parts and employs a small camera for detecting light. The parts will be assembled on a printed circuit board (PCB) that has optical waveguides to convey light from source to sample and from sample to detector.

The necessary electronics for the laser and camera will be integrated on the same PCB to realise a portable, cost-effective and low-power reader, thereby saving power, money and time for each analysis.

A further benefit of the proposed ELISA reader, is the option to separate electronic and optical parts so the reader can be employed in places with volatile chemical compounds high-risk manufacturing lines.