

**Applications are invited for a PhD studentship for the following project:**

**Tuneable plasmonic metasurfaces for on-chip beam steering applications**

The position will be based with the group of Prof. Louise Bradley at the School of Physics at Trinity College Dublin and be part of the information communication technologies (ICT) theme within the Advanced Materials and Bioengineering Research Centre (AMBER) centre.

**Summary of project:**

Optical frequency reflectarrays are much smaller than those operating in the Radio Frequency (RF). The smaller footprint allows for on-chip integration and lower power consumption. Many potential applications including Light Detection and Ranging (LIDAR), free-space optical communications and on-chip photonic devices can be realised. Plasmonic structures and silicon-based structures coupled with Vanadium Dioxide are ideal candidates for tuneable optical frequency antennas and are fully CMOS compatible. Preliminary simulations undertaken in the Bradley group have shown that a metasurface based on a metallic phased array incorporating a VO<sub>2</sub> component can achieve beam steering over an angle greater than 40° at a wavelength of 1.55 microns on transition from semiconducting to the metallic phase of VO<sub>2</sub>, without any moving parts. This is much higher than any reports currently in the literature for optical frequency reflectarrays<sup>1,2</sup>. The aim of this project is to optimise and realise plasmonic VO<sub>2</sub> reflective metasurface devices for strategic wavelengths including 830 nm and 1.55 microns. The project will include design, growth, fabrication and optical characterization. All the facilities required for the project are in available in TCD.

**Requirements:** The ideal candidate will have a minimum of a II.1 Class Honours Bachelor's degree in Physics or a related discipline.

**Desired abilities:** Strong laboratory and computational skills are required. A good knowledge of optics is also required. Excellent written and oral communication skills are essential.

**How to Apply:** Send a CV including the names and contact details of three referees to Prof. Louise Bradley ([bradl@tcd.ie](mailto:bradl@tcd.ie)), School of Physics, Trinity College Dublin.

Positions will remain open until filled but preferred start date is *September 2 2020*. Only short-listed applications will be acknowledged.

**This position is funded by AMBER, SFI Research Centre for Advanced Materials and BioEngineering Research & CRANN Institute.** The AMBER research centre, as a community of researchers, welcomes its responsibility to provide equal opportunities for all. We are actively seeking diversity in our research teams and particularly encourage applications from underrepresented groups.

**References:**

- [1] C. T. DeRose et al., "Electronically controlled optical beam-steering by an active phased array of metallic nanoantennas," *Opt. Express* 21(4), 5198–5208 (2013).
- [2] G. Kaplan et al., "Dynamically controlled plasmonic nanoantenna phased array utilising vanadium dioxide," *Opt. Materials Express* 5(11), 245897 (2015).