MacPherson Terahertz Group

Chinese University of Hong Kong

Prof MacPherson set up a terahertz laboratory at the Department of Electronic Engineering, CUHK during her post between 2006 and 2009 as an Assistant Professor. She spent 3 years at HKUST as a Visiting Assistant Professor (September 2009 -2012) and returned to the Department of Electronic Engineering, CUHK in Sept 2012. Prof MacPherson has represented Hong Kong on the International Organising Committee for the Infrared and Millimeter Wave and Terahertz Wave conference series since 2009.

2015 is an exciting year for the MacPherson Terahertz Group! In August we will host the biggest international conference in our field, the International Conference on Infrared, Millimeter, and Terahertz Waves (IRMMW-THZ). Prof MacPherson is the general chair and over 600 participants are expected to come to CUHK for this event http://www.irmmw-thz2015.org/.

Terahertz light is strongly absorbed by water – this is both a blessing and a curse! It means that terahertz light is very sensitive to subtle changes in water content, such as those that occur in biomedical tissues due to the presence of a tumour or other abnormality. However, it also means that the terahertz signal will be strongly attenuated by biomedical samples and this means the penetration depth in tissues is very shallow. For these reasons, if terahertz imaging is to be employed in vivo then it will be so in a reflection imaging geometry. One of our research goals is to improve the accuracy and speed of reflection terahertz imaging and spectroscopy. To this end, we work on both hardware and software aspects of terahertz reflection imaging. Recently funded projects include two RGC grants titled: 1. Liquid crystal Variable Index Terahertz Adaptive Lens (VITAL) device for biomedical imaging (Jan 2015) and 2. THz Ellipsometry for Biomedical Applications (Jan 2014). In (1) we aim to develop an adaptive lens to remove the need to raster scan samples – it is often the raster scanning of a sample rather than the response rate of the THz sources and detectors that limits the overall data acquisition speed. In (2) we aim to use recently developed high extinction, low absorption THz polarisers fabricated by our collaborators http://www.opticsinfobase.org/ol/abstract.cfm?uri=ol-39-4-793 to build a THz ellipsometry system – having sufficiently high quality THz polarisers has hitherto been a main bottle neck for THz ellipsometry and very few systems currently exist.