Application of the mid-infrared spectral region to medical diagnosis and surgery in dermatology.

Investigators: *Professor AB Seddon, Chair of Inorganic Materials. School of Mechanical, Materials & Manufacturing Engineering (School of M3). University Park, University of Nottingham.*

The Royal Academy of Engineering / Leverhulme Trust have awarded Prof Seddon a Senior Research Fellowship 2007/2008 to explore use of the mid-infrared spectral region in dermatology; the work is also supported by NEAT. The approach is to work with Clinicians in the Centre for Evidence-Based Dermatology, in QMC, to explore use of novel infrared optical fibres in medical applications *via* development of optical fibre based devices and systems which are robust, functionally designed and cost effective. High silica glass optical fibres are the 'work-horse' of the Internet, being transparent conduits transferring voice, video and data as high-bit-rate optical pulses in the near-infrared. However, silica glass is opaque at longer wavelengths and novel glasses are required for mid-infrared light transmission. In the School of M3 (co-located with Queen's Medical Centre) Prof. Seddon & Dr D Furniss have commissioned a unique facility, in the UK, for making highest optical quality, mid-infrared-transmitting, novel glass fibres. Fibreoptic sensing in the mid-infrared will potentially access tissue molecular signatures based on vibrational absorption. For skin diagnostics, the reference standard at present is visual inspection by an experienced dermatologist, but this is time-consuming and dependent on human judgement. The first objective is to explore development of a mid-IR fibreoptic device for skin evaluation and possible early detection of cancer. A second objective is to develop flexible-fibre power delivery in the mid-infrared at 10.6 µm (the carbon dioxide laser wavelength) for surgery. The Fellowship is enabling personal development in terms of learning in detail what is required by Clinicians, in order to map their needs onto what is achievable in engineering infrared devices.