EPSRC DTP PhD Research Project: Advertising Form

Project Title: Advanced Surface Enhanced Spatially Offset Raman Spectroscopic Imaging for Deep Minimally Invasive Clinical Applications

Primary Supervisor details:
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http://rant-medicine.com

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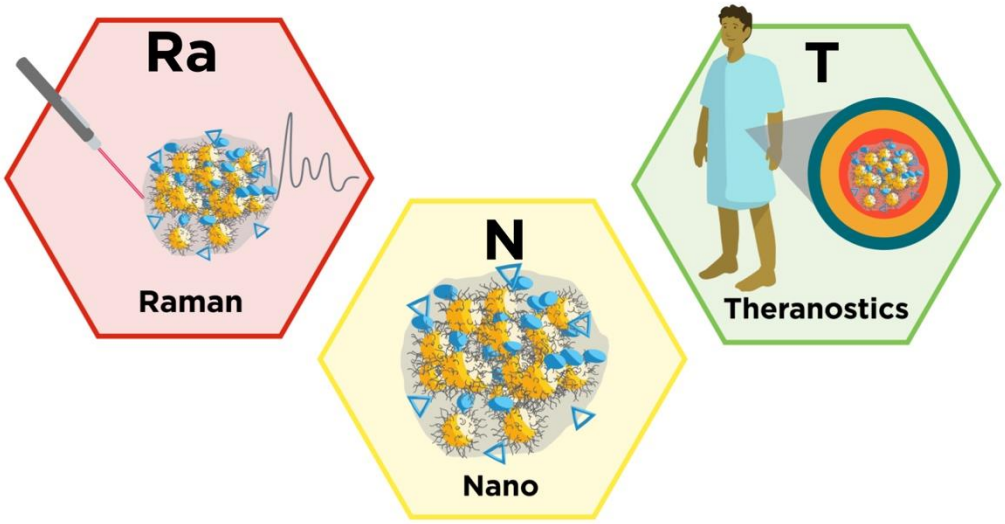
Department: Physics and Astronomy

Location: RaNT labs, Physics Building, Streatham Campus

PhD Programme: PhD in Physics

Project Description



A Vision for Future Healthcare

We are creating a whole new form of functional imaging using nanoparticles and light.

Red and near infrared light travel long distances in scattering media, such as biological tissues. By measuring the light that returns to the surface, we can measure the composition and architecture of the cells and tissues that the light has interacted with. One form of light-matter interaction is particularly powerful, this is inelastic scattering of light, so called Raman scattering after the person who discovered it. Measuring Raman scattering enables us to probe the molecules that make up the cells and tissues (and of course how they change with disease).

We combine two advanced forms of Raman scattering together to provide a powerful approach. Firstly, enhanced Raman scattering can be provided by using nanoscale noble metals, such as gold, silver and copper, to provide many orders of magnitude enhanced molecular scattering, by boosting the electric field in a way analogous to the lightning rod effect. This is called surface enhanced Raman scattering (SERS) and can be achieved with engineered functionalised nanoparticles (see rant-medicine.com). The second approach uses a combination of clever optics and a deep understanding of the way photons travel in scattering media to provide a deep Raman readout of signals, we often call this spatially offset Raman spectroscopy or SORS. Combined we achieve SESORS and this can measure and localise nanoparticles within biological tissues at depths of many cm. Together we can measure location of nanoparticles of ‘different flavours’ and tissue microenvironment, pH/T etc…

SESORS is a very new field with huge potential, but lots of key areas to explore and develop to achieve its potential. One of them is based around developing the nanoparticles to deliver unique properties and signals and the other in developing the instrumentation or the methods of reading out the signals, to achieve greater sensitivity and higher resolution

images. We have been developing both as part of a major programme of work and seek a PhD student keen on exploring either functionalised nanoparticle developments or new ways of creating and measuring images using SESORS instrumentation for future novel clinical diagnostics and therapeutics.

Entry Requirements:
Good degree in Physics, Chemistry or similar subject.

Project specific enquiries:
Contact Nick Stone as above details.