**Developing Quantum dots Sensors for Imaging Redox-Potential in Live Cells.**

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The ability to sense activity in live cells in real-time will revolutionize both the understanding of cell function, but also cellular responses to drugs and other environmental factors. Nanotechnology offers methods of realizing this. In this project we will focus on two main strategies to measure live cell redox potential. The first strategy will be to fabricate redox sensitive fluorescent quantum dots based on CdTe/CdS functionalise by short w-alkanethiols. A fraction of the alkanethiols will have redox sensitive group, which can either accept the excited electron when in the oxidised state, but not when in the reduced state. Thus fluorescence will give a measure of redox.
The second strategy is to use gold nanoparticles as Raman probes up-taken within live cells. The Raman signal will change significantly as the ligands are reduced or oxidised. This will be performed using Raman confocal microscopy techniques.

Engineering the nanoparticles surface to target and enhance uptake will be important and challenging. The student will be closely supervised and trained in nanoparticle synthesis and surface modification, along with all the other associated characterisation techniques. In-vitro cellular models will be developed to generate realistic biologic environments.