

Raman and Enhanced Raman spectroscopy as micron and sub micron probes of single cells.

Don McNaughton, Bayden Wood, Monash University

Background

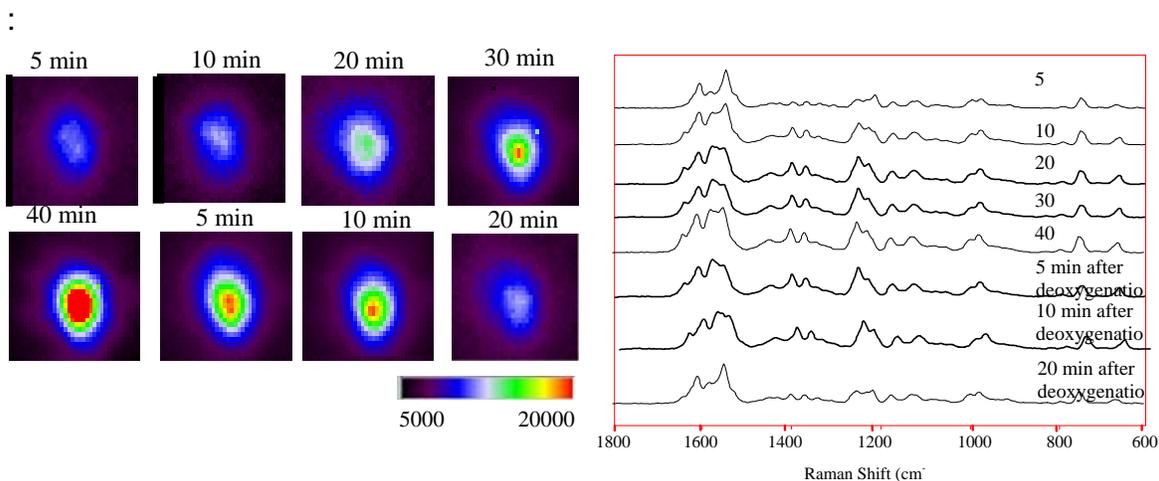
Surface enhanced and Resonance enhanced Raman spectroscopy (SERS and RERS) are techniques that increase the signal strength of Raman scattering by many orders of magnitude and when combined (SERRS) can lead to single molecule detection. These techniques are now quite well understood and are used in a number of applications for quantitative and qualitative analysis. Applying these techniques to the study of single cells, especially live cells, is however in its infancy.

Outcomes:

- Diagnostic method for blood diseases such as malaria, sickle cell disease.
- Methodology to analyse cells for the effect of pharmaceutical agents.

Progress to date.

- Raman spectra and images of functional red blood cells at micron resolution have been achieved.
- Techniques have been applied to follow ligand exchange and drug interaction in live cells.
- The chemical effects of drug interaction have been observed in live systems.



Raman images of single red blood cells (left) and accompanying spectra (right). The data was taken through a cycle of oxygenation/deoxygenation.

Funding is sought to

- Be able to monitor chemistry (eg. Drug interaction) in cells at higher spatial resolution
- Develop methods to insert gold particles into cells to achieve SERRS.

Contact: Professor Don McNaughton, MonashUniversity
Don.mcnaughton@sci.monash.edu.au