Equipment Name:	Category:
SNOM, Raman Microscope, Confocal Microscope & AFM System	**C. Particle Characterisation in and ex-situ and/or X** **Institute: CRANN, Trinity College Dublin** **Location: CRANN, Trinity College Dublin, Dublin 2, Ireland** **Contact Details of Technology Expert:** **Name, Dr Jing Jing Wang** **Phone, 0035318964633** **Fax,** **E-mail, jjwang @tcd.ie**

Short technology description/Overview:

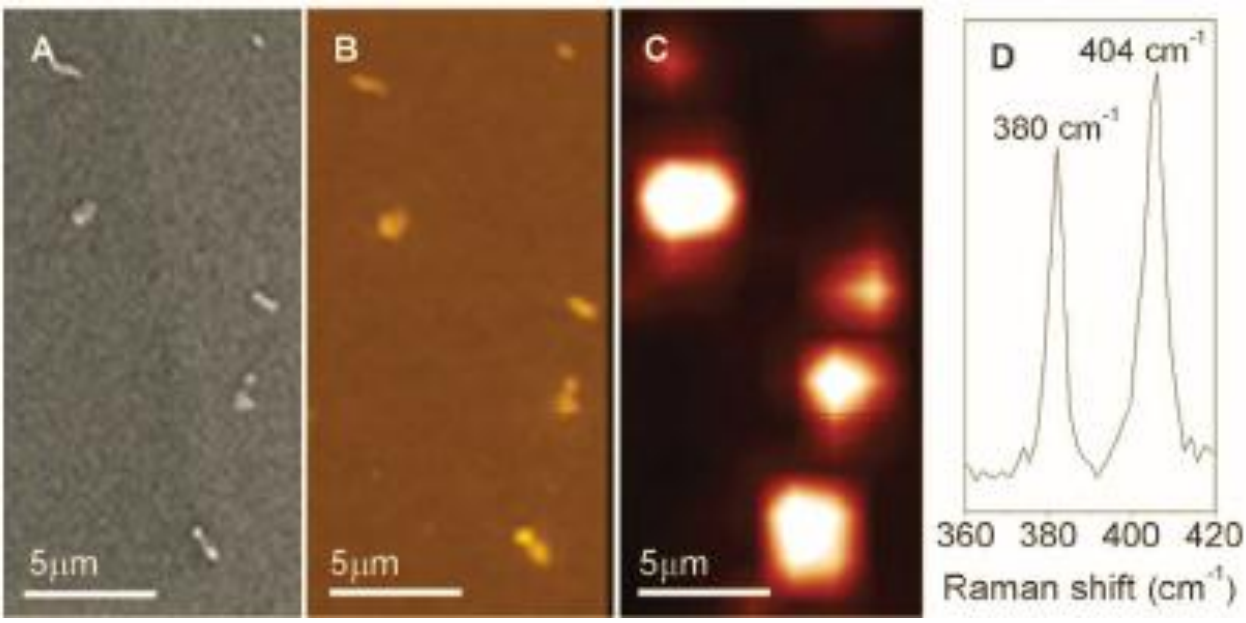
SNOM, Raman Microscope, Confocal Microscope & AFM System
The SNOM (near-field optical microscope), Raman spectroscope & AFM (atom force microscope) platform consists of a Renishaw inVia Raman spectrometer with both three lasers operating at 488 nm, 532nm and 633 nm respectively. The AFM is from NT-MDT and is mounted on an inverted Olympus microscope which enables bright field imaging (60x oil, 20x and 50x dry). Both Raman and AFM imaging can be carried out in either liquid or dry phase. This hybrid system allows for the generation of high resolution AFM images (in various modes) of nano-materials and cells (and tissue) and characteristic Raman spectra of these samples. Using this unique setup, characterisation of nanomaterials/cells interactions can be performed in live cells in a non-invasive way.Full training on the system use with on-site assistance is available at all times.

- Raman spectroscopy provides information on the vibration frequencies of molecules from a small volume of sample. Such frequencies depend on the masses of atoms in the molecules and on the strength of inter-atomic bonds. Raman spectroscopy is therefore a rapid, non-destructive analytical tool for multi-component analysis, yielding highly compound-specific information for chemical analysis.
- AFM (atom force microscope), is a high resolution type of scanning probe microscopy while a sharp tip mounted on the end of cantilever scans over the sample surface. The cantilever bends in response to the force between the tip and sample. It provides 3D topographic features of sample surface with high resolution.
- SNOM (Scanning near field microscope) is able to achieve high spatial resolution beyond the optical limit. It is a useful tool for multi-component chemical analysis in nanometer scale.

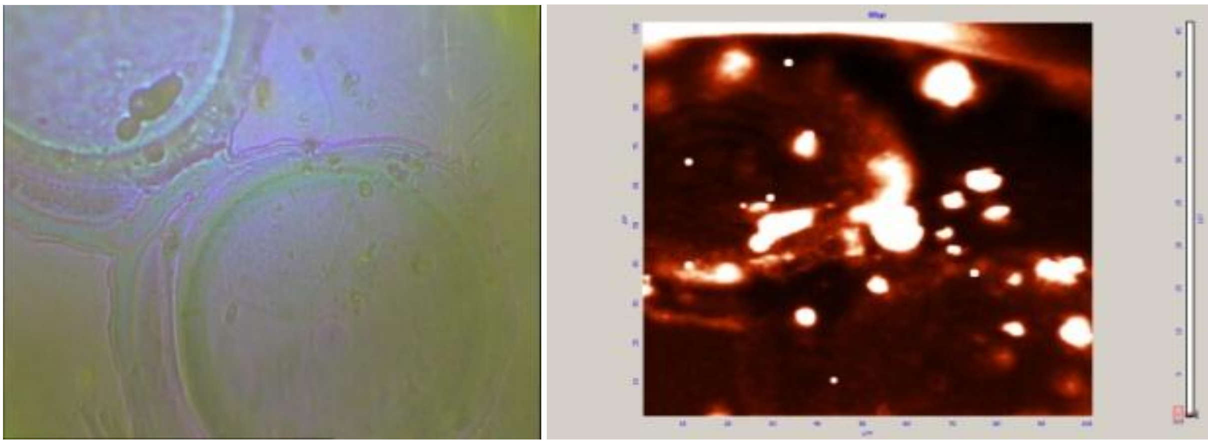
Main Features (Equipment Capabilities):

- Raman spectroscopy
- AFM (atom force microscope),:
- SNOM (Scanning near field microscope)
- Confocal microscope

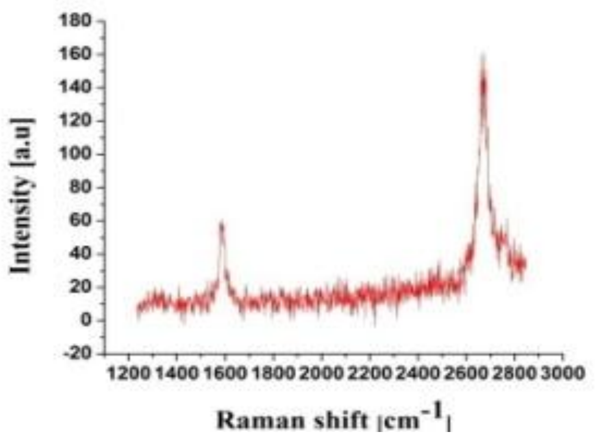
Typical Samples & Images:

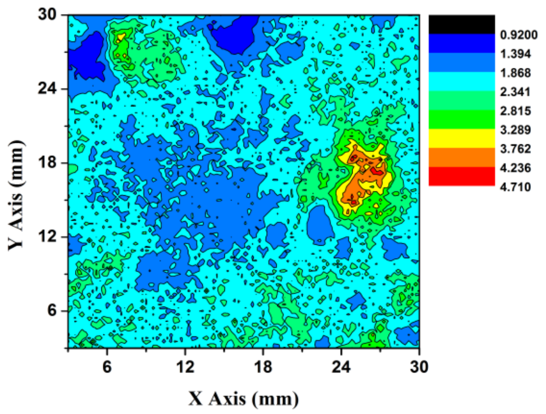


Deposition of nanosheets onto surfaces. (A and B) An SEM and an AFM image of MoS_2 flakes deposited on SiO_2 by spraying. (C) A Raman map of the same region. (D) Typical Raman spectrum of an individual flake. **Raman mapping confirms that the flakes consist of MoS2**



Optical image (left) and fluorescence mapping (right) of the drug-polymer disks on the Stent





Typical Raman spectrum of Graphene (left).2D band at ~ 2650cm^{-1} and G band at ~1580cm^{-1},2D/G ratio gives an indication of film thickness. Raman mapping of 2D/G ratio of Graphene (right).

Any further Information: