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# The power of Raman spectroscopy for protein and nucleic acid determination

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**Protein-based biopharmaceuticals are becoming increasingly popular therapeutic agents despite the fact that the bioanalytical characterization of such therapeutics continues to present numerous analytical challenges. Raman spectroscopy offers vast potential for the biopharmaceutical industry as it is non-destructive, label free and insensitive to water. This makes it an ideal technique for biomolecular characterization at every stage of the biomanufacturing process from engineering to production to formulation. Furthermore, with the rapid development of Raman imaging techniques it is also now possible to monitor single cell uptake of the final product. Firstly, we will report on our research using Raman spectroscopy combined with two-dimensional correlation analysis (2DCOS) to characterize perturbation-induced aggregation in antibody variants where Raman assignments provide information on changes in protein stability including increases and decreases in solvent exposure of side chain residues as well as changes in H-bonding of β-structure that occurs with aggregation. This type of information can greatly aid in the initial screening for promising protein based biopharmaceuticals. Secondly, we will report on our recent developments in live cell Raman imaging. Raman imaging is a label free approach that provides vast amounts of spatially resolved biochemical data from which cellular composition and subcellular components can be identified. By placing a specialized cell incubator within the chamber of the Raman microscope mammalian cells can be kept alive and healthy for several days enabling monitoring the drug-induced and surface induced biophysical and chemical changes in single cells.**

## Biography

Lorna Ashton joined the Chemistry Department at Lancaster University in October 2014. After receiving her degree from the Open University in 2003 she studied for her PhD at the University of Manchester with Prof. Ewan Blanch. She then stayed at Manchester to continue her Post-Doctoral studies with Prof. Roy Goodacre. She has over 15 years experience in the field of Raman Spectroscopy, which utilizes the interaction of light with molecules to determine sample chemistry. She has worked closely with numerous biopharmaceutical companies developing Raman as a high throughput technique for bioprocessing. In 2018 she was awarded the prestigious RCUK Catapult Researcher in Residence at the Cell and Gene Therapy Catapult at Guy's hospital, London, where she is developing Raman spectroscopy for quantitation of viral titre. Her present research also uses Raman spectroscopy to monitor structural changes in therapeutic biological molecules and to chemically image molecular interactions within live cells.

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