



Raman Analysis and Characterisation of pharmaceuticals

Raman Spectroscopy has many useful properties which can be explored and exploited in the analysis of pharmaceutical formulations.

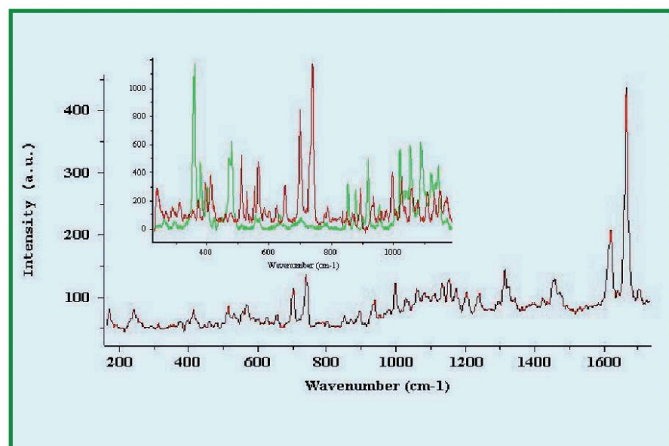
- **Highly specific spectral fingerprints,**
- **In-situ, non contact, and most importantly, non destructive analysis,**
- **Differentiation of amorphous and crystalline phases,**
- **Detection of the lattice vibrations of a crystal,**
- **Single particle characterisation,**
- **Fast and robust raw material analysis,**
- **Automated and enclosed operation.**

These advantages ideally lend the technique to the analysis of an increasing number of pharmaceutical products, of especial importance to the growing regulatory agencies. The applications of Raman in the Pharmaceutical Industry can be related to different study types :

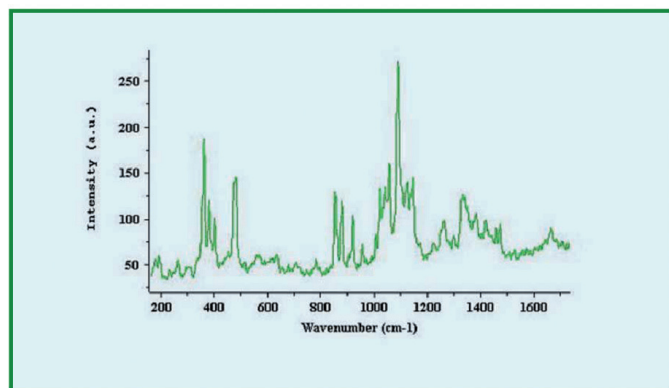
- Polymorph Identification
- Coatings
- Polymers
- PDT Studies
- Component Mapping
- Molecular Characterisation
- Phase determination
- Raw Material Confirmation

Polymorphic Form can influence solubility and efficacy of an active drug as well as provide patent protection. Yet it may be altered during processing. Dispersion of a drug through a tablet ensures correct dosage, yet aggregation can occur even though there were only subtle changes in raw material or processing conditions. Raman spectroscopy can give detailed information on these most important properties.

Spectra The reference spectra of such components as an excipient, lactose and different polymorph forms of an active drug in a pharmaceutical formulation can be obtained by Raman spectroscopy.

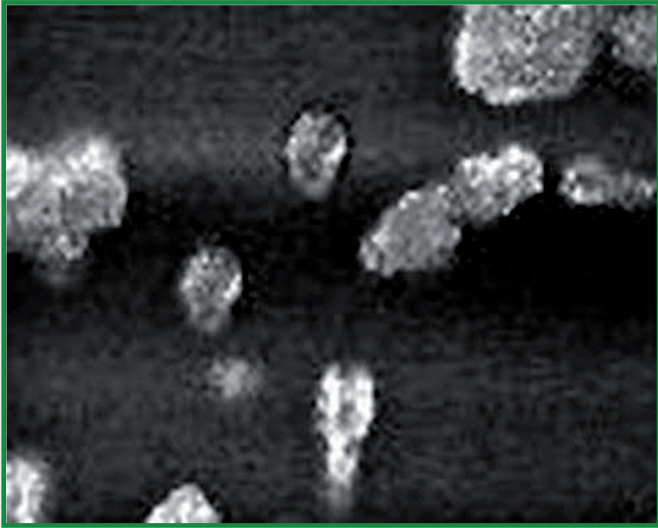


Active form and polymorphs



Excipient and binders

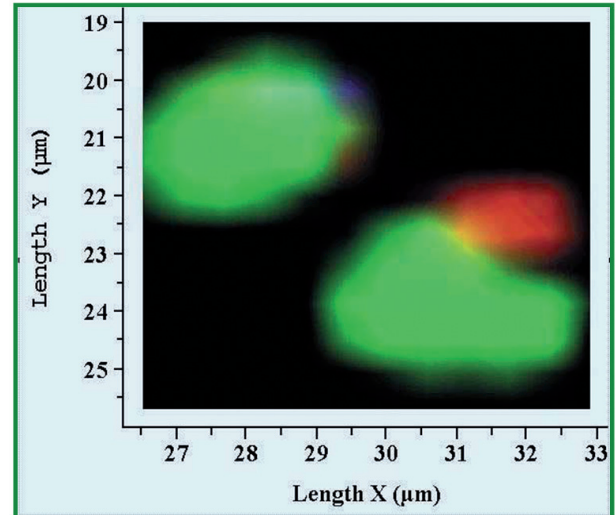
Images: Using a spectral model function in the software to generate a **Raman Mapped Image**, the spatial distribution and particle sizes of different components can be conveniently demonstrated.



Optical microscopy images

White light generated images give traditional interrogation of crystal structures Raman mapped images.

Raman map of 2 components of this sample. Lactose is represented by green and the active drug by red. (Magnification is higher than the micrograph on the left)



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