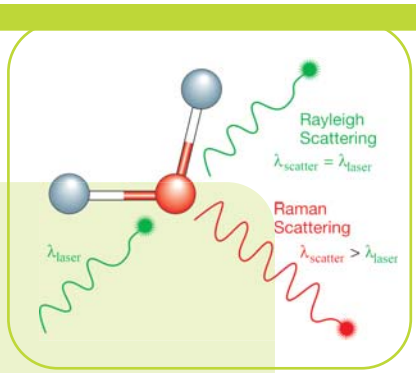
XploRA™

Smart Microscopy

XploRA PH01

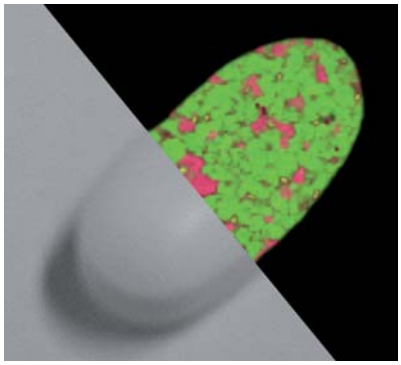
PHARMACEUTICAL



What is Raman Spectroscopy?

The vibrational Raman spectrum provides a fingerprint which characterises chemical and molecular structure. The spectroscopic information can be regarded as similar in content, but often superior to that provided by Infra-Red (IR) spectroscopy, namely due to the much higher spatial resolution available through confocal Raman microprobes.
Raman scattering is an inelastic light scattering process in which a laser photon is scattered by a sample molecule or crystal and loses energy during the process. The amount of energy loss is characteristic of the molecular bondings, thereby revealing the detailed nature of the investigated material. It enables highly specific chemical identification without ambiguity, in gas, liquid or solid phase, without requiring tedious and costly sample preparation.

Application to Pharmaceutical compounds



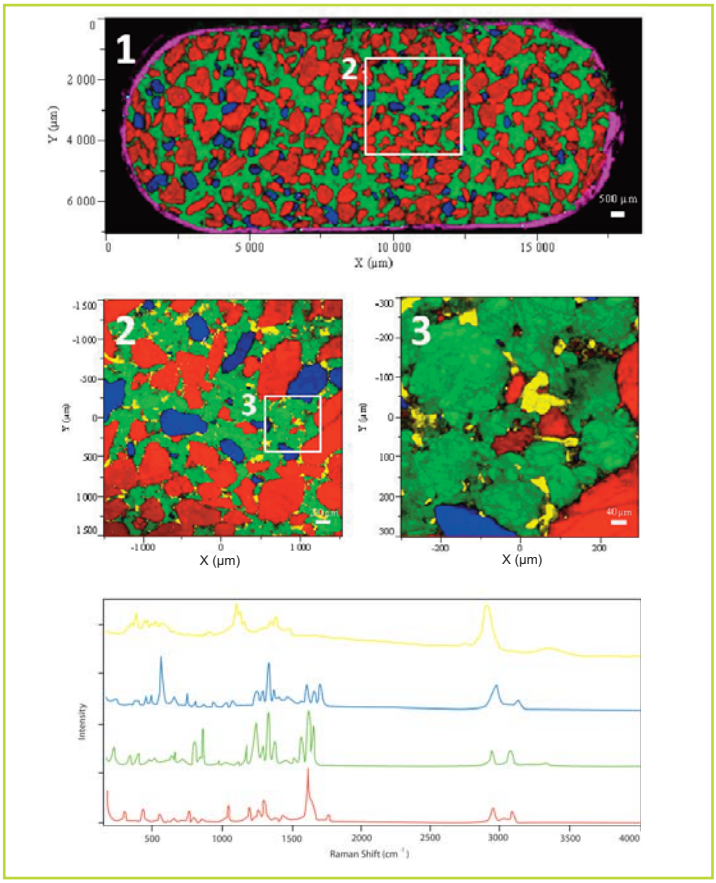
Raman spectroscopy is a powerful and widely used analytical tool within the pharmaceutical industry. It is non-destructive, and offers fast versatile chemical identification within a small compact benchtop instrument. Combination with an optical microscope offers the advantage of analysing minute material quantities (such as single grains or crystals) and the ability to monitor the distribution of components across a sample.

Excipients and active pharmaceutical ingredients (APIs) can be analysed within seconds, and extensive Raman spectral libraries allow easy chemical identification. Beyond this, more subtle changes in structure such as polymorphism (in which a material can exist in more than one crystal form, but always with identical chemical composition) and crystallinity can also be investigated using Raman spectroscopy. Both can have strong influence on drug dissolution and efficacy, so understanding the true nature of an API is critical to the success of drug development and manufacture.

A key requirement for Raman is for tablet mapping, which is widely used to assess tablet uniformity and investigate the distribution and grain size of excipients and APIs. Mapping areas can range from a full tablet (for a quick overview of the tablet) through to just a few tens of micrometers (for detailed analysis of individual grains and phase boundaries). New technology such as SWIFT™ imaging allows these information rich maps to be acquired in minutes/hours rather than days/weeks as used to be the case until very recently.

APPLICATION NOTE

HORIBA Scientific



Colour-coded Raman images of a pharmaceutical tablet highlighting the spatial distribution of the various components at different scales, allowing to explore the tablet uniformity as well the grain size and boundaries. The spectral signatures underneath are linked to the different chemical constituents

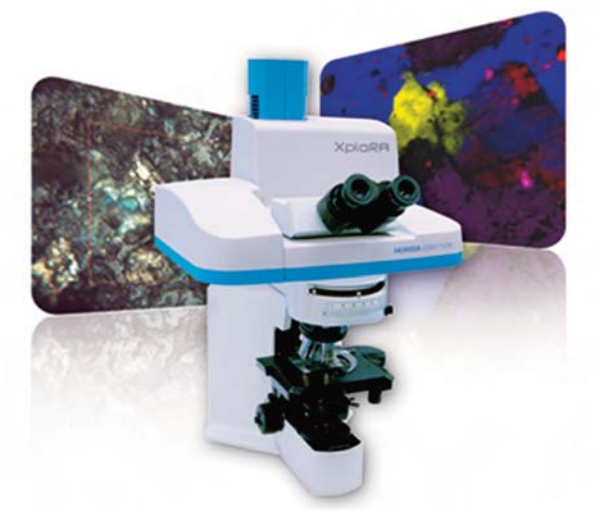
In this application note Raman fast mapping data from an aspirin containing painkiller are shown. Pharmaceutical tablets contain a number of components in addition to the API which is chosen for its therapeutic effects. These components are used to bulk out the tablet, provide lubrication during mixing and compaction, and aid digestion.

Three Raman maps have been acquired, moving from a large area low resolution whole tablet image, through to a high resolution small area of interest to analyse individual grains/particles in detail.

In the whole tablet map (1), which comprises 50,901 pixels over a 7 x 18 mm^2 area, the major constituents (**aspirin**, **paracetamol** and **caffeine**) are visible, in addition to the tablet coating. A higher resolution image (2) highlights a fourth component (**cellulose**) widely spread across the tablet, but present only in small, discrete areas. The final image (3) was acquired with 2 µm step (90,601 data points), and allows the size and shape of individual cellulose grains to be observed. Spectra from these four main components are also shown, illustrating the ease with which they can be distinguished using Raman.

The XploRA

The XploRA is a new concept in Raman microscopy bringing Raman chemical identification directly to your microscope. Combining microscopy and chemical analysis the system retains the full functionality of your microscope coupled with high performance Raman spectroscopy. Compact and rugged in design, the XploRA is easy to use and transport due to its minimal footprint, making it the ideal smart microscope for every R&D, QA/QC and forensic lab. Now you can explore the true nature of your sample with rapid compound identification and chemical imaging, with no sample preparation and at atmospheric conditions. This non-destructive technique of analysis will boost you into the new dimension of microscopy. Intuitive operation through new fully compliant software modules including GO!™, Guided Operation wizard ensures complete ease of use and gets you up to full speed immediately.



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