

# Accurate Raman imaging of rough samples and/or those with complex surface topographies

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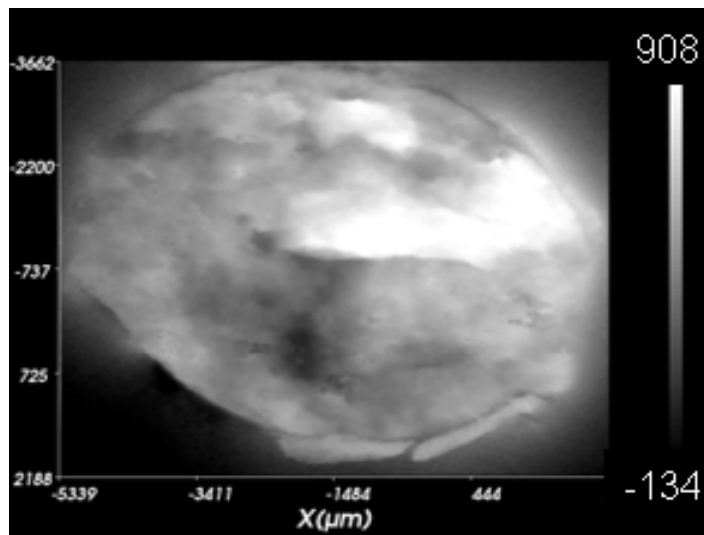
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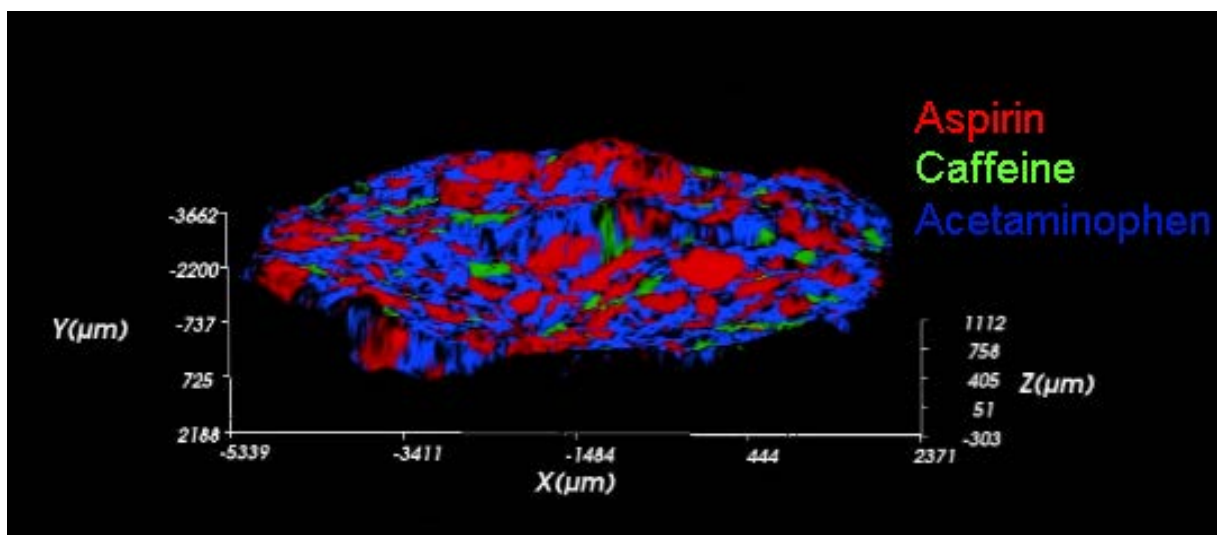
In this work we compare and contrast the different solutions for maintaining focus and conducting Raman imaging on samples which are inherently rough and/or have complex surface geometries. We will describe and illustrate the application of the new LiveTrack™ dynamic focus tracking technology, which not only provides in-focus Raman images of the most challenging samples but also topographic information, allowing three dimensional surface Raman images to be generated.

When collecting micro-Raman data the focus of the microscope objective is vital as it determines both the illumination/collection volume and the Raman signal strength. This is particularly important when conducting Raman imaging/mapping as the sample may move in and out of focus as it is scanned laterally, which may result in image artefacts or even compromised data. In an ideal world all Raman samples would be perfectly flat negating the need for any form of surface tracking; however, in reality we are forced to deal with a range of samples that may demand complex focus adjustment when generating high resolution Raman images. Here we discuss and present data on a range of extremely difficult samples including:

- Graphene on a Cu foil, a sample that is inherently rough on a micrometre length scale
- Unprepared pharmaceutical tablets where the sample surface is both curved and has a complex surface geometry which contains indented logos and lettering
- A snapped pharmaceutical tablet section demonstrating the ability to map extremely rough samples (Shown in Figure 1 and Figure 2)
- A polyethylene pellet undergoing phase transitions in a hot/cold cell, demonstrating that LiveTrack can be used to maintain focus in moving systems



**Figure 1** Topographic image of a snapped Anadin tablet illustrating the variation in surface height in micrometres. This data was collected during the Raman measurement using LiveTrack.



**Figure 2** Raman image illustrating the distribution of chemicals in the tablet overlaid on a 3D surface corresponding to sample topography.