About OMICS Group

OMICS Group International is an amalgamation of Open Access publications and worldwide international science conferences and events. Established in the year 2007 with the sole aim of making the information on Sciences and technology 'Open Access', OMICS Group publishes 400 online open access scholarly journals in all aspects of Science, Engineering, Management and Technology journals. OMICS Group has been instrumental in taking the knowledge on Science & technology to the doorsteps of ordinary men and women. Research Scholars, Students, Libraries, Educational Institutions, Research centers and the industry are main stakeholders that benefitted greatly from this knowledge dissemination. OMICS Group also organizes 300 International conferences annually across the globe, where knowledge transfer takes place through debates, round table discussions, poster presentations, workshops, symposia and exhibitions.

About OMICS Group Conferences

OMICS Group International is a pioneer and leading science event organizer, which publishes around 400 open access journals and conducts over 300 Medical, Clinical, Engineering, Life Sciences, Pharma scientific conferences all over the globe annually with the support of more than 1000 scientific associations and 30,000 editorial board members and 3.5 million followers to its credit.

OMICS Group has organized 500 conferences, workshops and national symposiums across the major cities including San Francisco, Las Vegas, San Antonio, Omaha, Orlando, Raleigh, Santa Clara, Chicago, Philadelphia, Baltimore, United Kingdom, Valencia, Dubai, Beijing, Hyderabad, Bengaluru and Mumbai.

OMICS Group Conferences
Accelerating Scientific Discovery

5th International Conference and Exhibition on
Analytical & Bioanalytical Techniques

August 18-20, 2014 DoubleTree by Hilton Beijing, Beijing, China

Raman Mapping-A Powerful Analytical Tool to Support R&D, QbD, License Application And Fighting against Counterfeit Medicine Products And Patent Infringement

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I. Raman mapping

II. Advantage of Raman mapping

III. Case studies

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I. Raman mapping

- ❑ It's not just about Raman spectroscopy!!!
- ❑ It also contains spatial information at micron-scale
- ❑ A large number of spectra were collected from different points on sample surface pre-defined by a 2-D matrix
- ❑ Sample was on an automated XYZ moving stage
- ❑ Drug substances are mostly Raman active and stronger than excipients

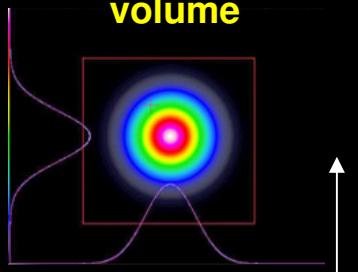
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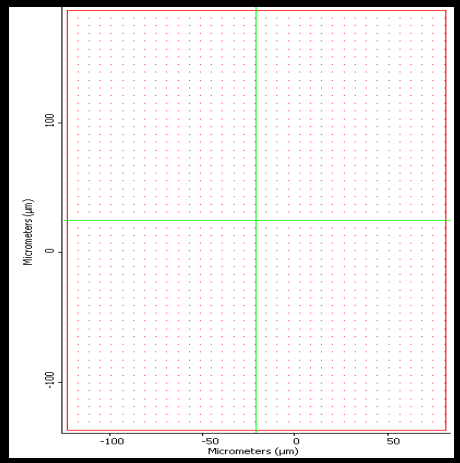
Raman microscope and mapping



Micron sampling volume



Very large sampling number

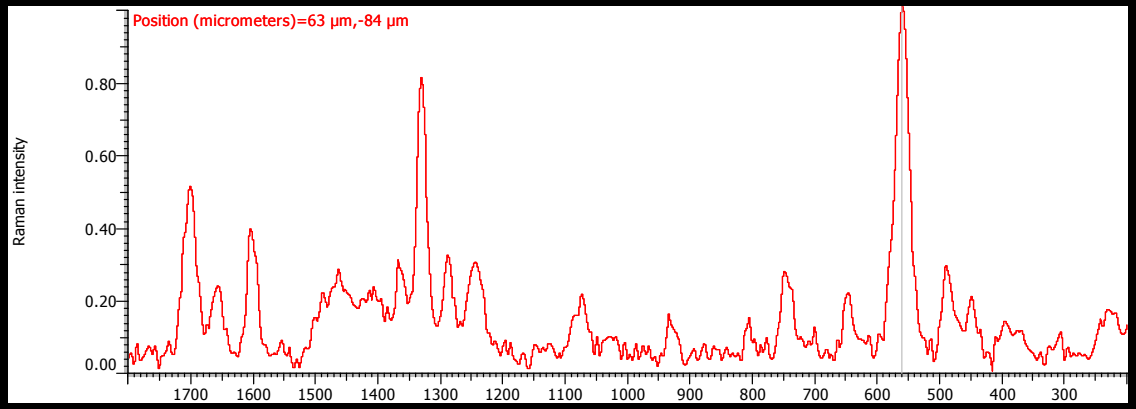


Y

X

- Wavelengths: 633nm and 780nm
- Raman shifts: 68cm^{-1} up to 3908cm^{-1}
- Objectives: 10×/0.25, 20×/0.40 and 50×/0.75
- Automated XYZ moving stage (0.1µm steps)

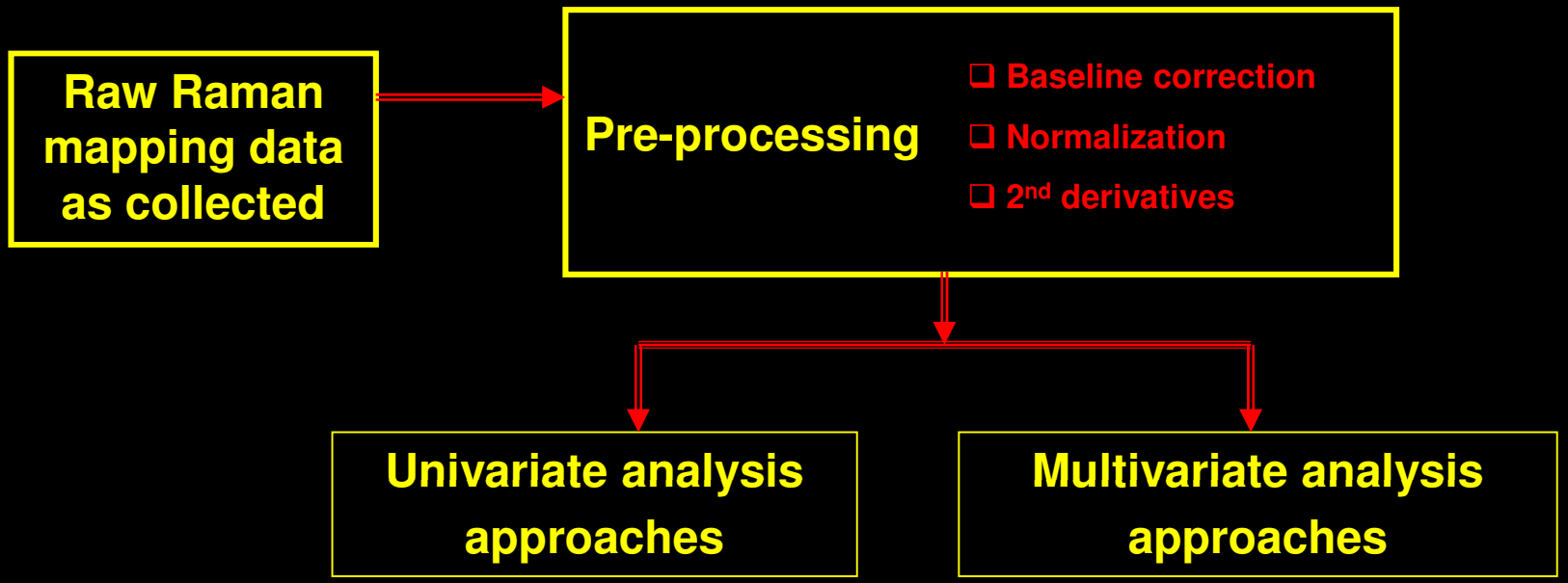
Raman spectra collected from the red dots pre-defined by a matrix



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Data processing



❑ Based on unique peaks such as peak intensity, intensity integral, 2nd derivatives, etc.
❑ Simpler and time efficient
❑ Easy to use

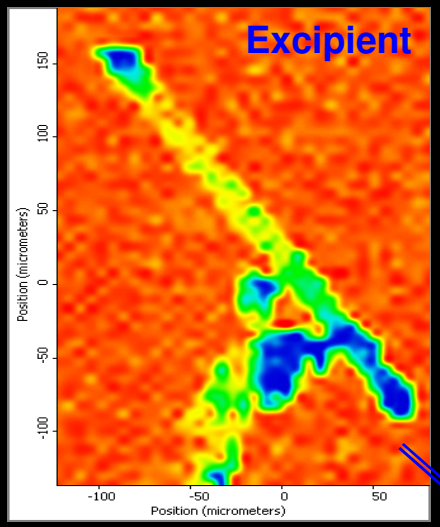
❑Mathematic modeling/data processing
❑ Complicated and take longer time developing the model
❑ Difficult to use

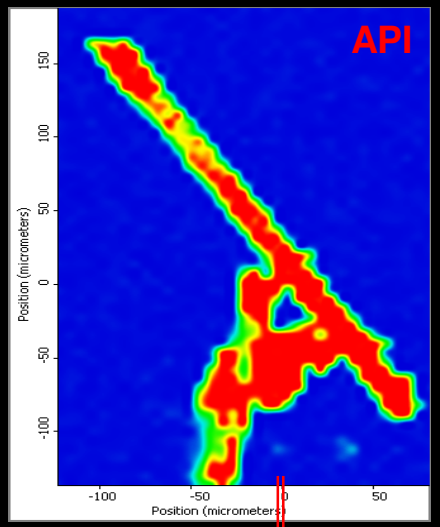
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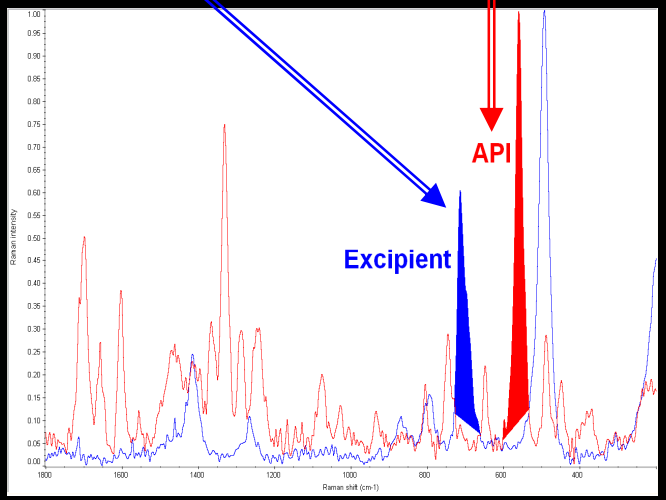
Raman chemical image







- Identification of each component in sample
- Detection of components spatial distribution
- API particles size/shape



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II. Advantage of Raman mapping

- Amount of materials for measurements is very small
- Detection is non-invasive so that tested samples can be re-used-cost effective
- Strong ability to discriminate slightest differences in the formulated samples due to very small sampling volume (micron-scale)
- Higher sensitivity - lowest LOD/LOQ in comparison to other ordinary technique, such as Macro-molecular spectroscopy (Raman/IR, FT Raman/IR, XRPD,
  and DSC, Hyper-DSC, GVS and TGA, etc
- Detection/quantification of API or physical form impurities down to 50ppm/0.01%

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III. Case studies

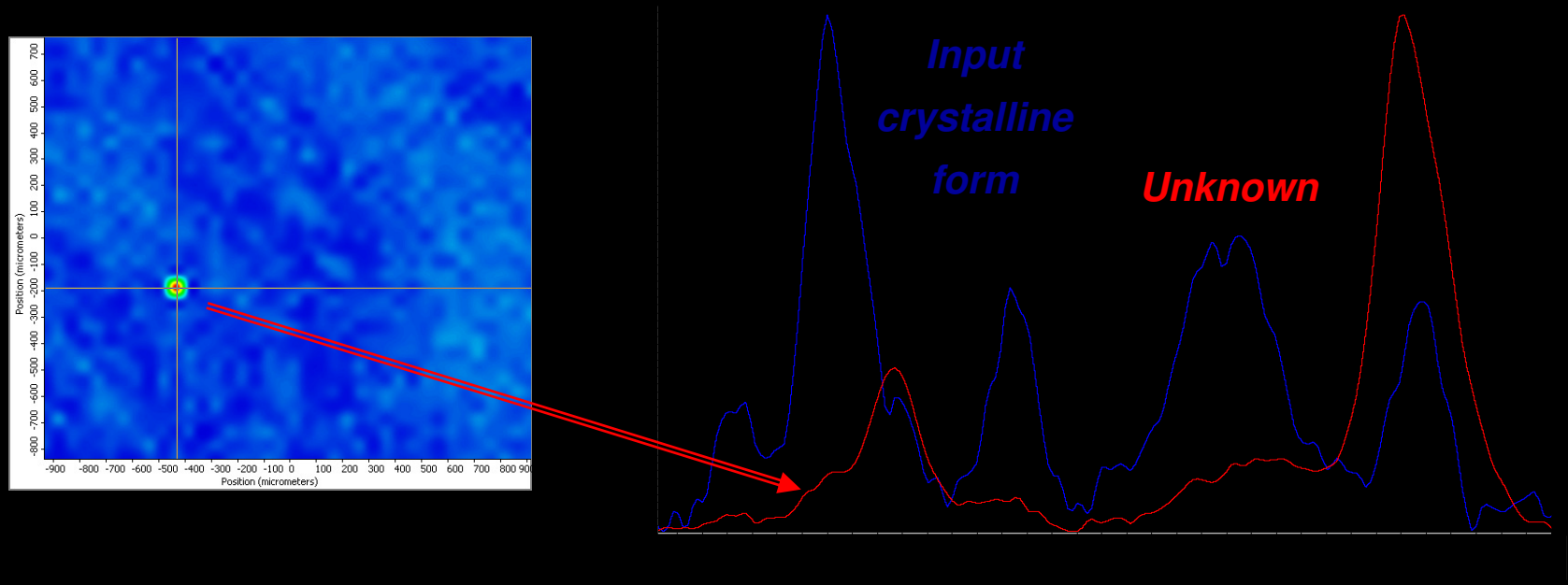
- To confirm the API physical form in the products to support license application
- To demonstrate the capability of detection and quantification of physical form impurities, if any different from the input, in the products to support license application
- To discriminate the slightest differences in the formulated products to support R&D and QbD
- API quality control with respect of physical form impurity (like chemical impurity by HPLC)
- To identify the patented form presented in the generic products against patent infringement

Lowest LOD/LOQ (down to 50ppm/0.01% *w*/*w*) in comparison to other ordinary techniques, such as Macro-molecular spectroscopy, XRPD, and DSC, Hyper-DSC, GVS and TGA, etc

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API presented as input crystalline form in the products

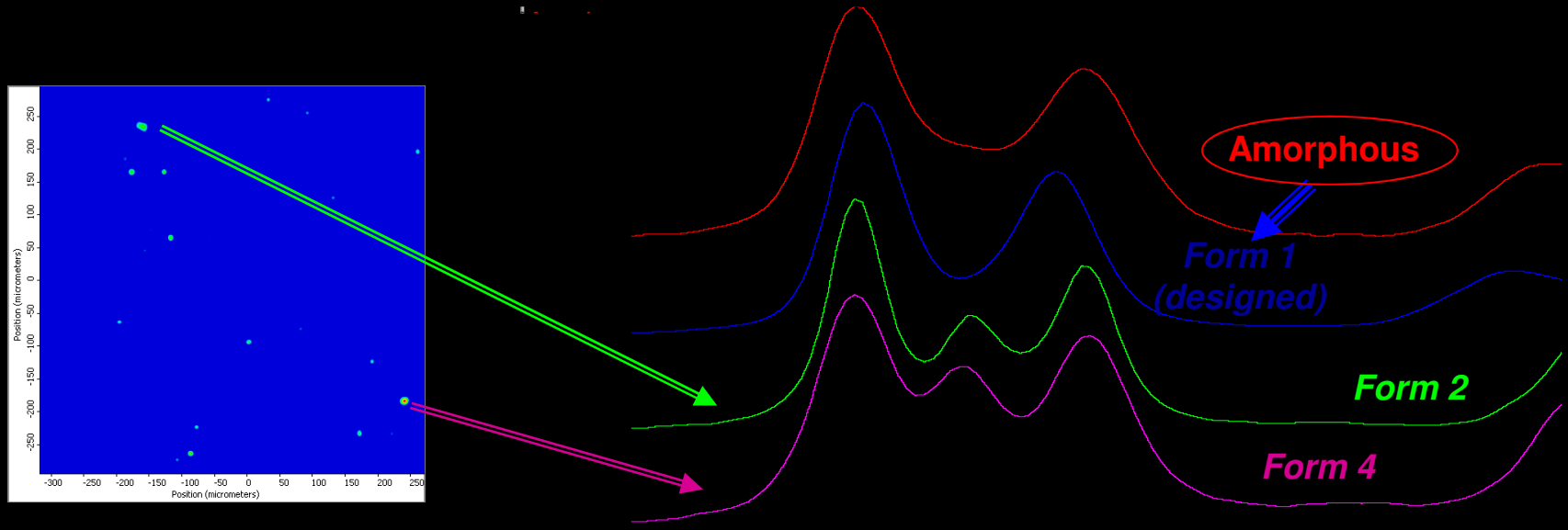


- No evidence of form changes of API during manufacturing and storage under stress conditions
- Potential physical form impurity identified, which is at small Amount (<0.1% w/w) and should not deteriorate the therapeutic performance of the product (like acceptable chemical impurities by HPLC)

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API re-crystallized to the form as designed in the products

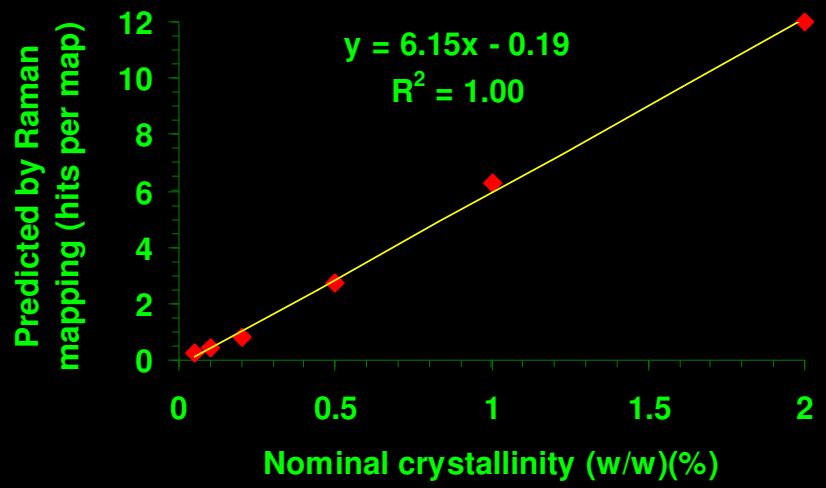


- Most API presented in the product as the Form re-crystallized from amorphous as designed under proper control
- Small amount of API form impurities (Form 2 and 4) Identified
- Further studies are needed (change control or evaluate the impact of form impurities)

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Detection and quantification of form impurities (<0.1% w/w)



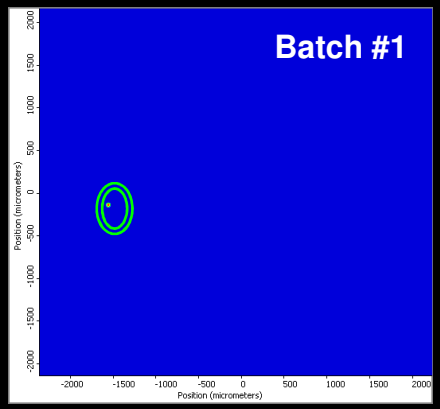
- Detection & linear quantification of crystalline API in amorphous formulations at sub-percent (<1% w/w) (physical impurity test like chemical impurity by HPLC
  - Using univariate analysis approaches and hence time-efficient

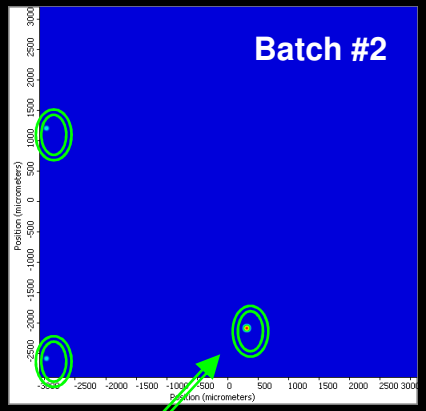
1. JP Wu, J Raman Sepctrosc, 44, 1578-1586 (2013), '*Linear quantification calibration of crystallinity based on a simple univariate analysis of binary chemical images by selecting a threshold to define the sampling depth in Raman mapping*'
2. JP Wu, J Raman Sepctrosc, 45, 686-695 (2014), '*Linear quantification calibration of crystallinity at subpercent and its evaluation based on spectral and spatial information inherited in Raman chemical images*'

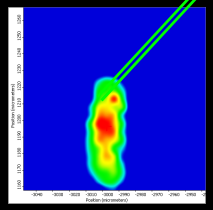
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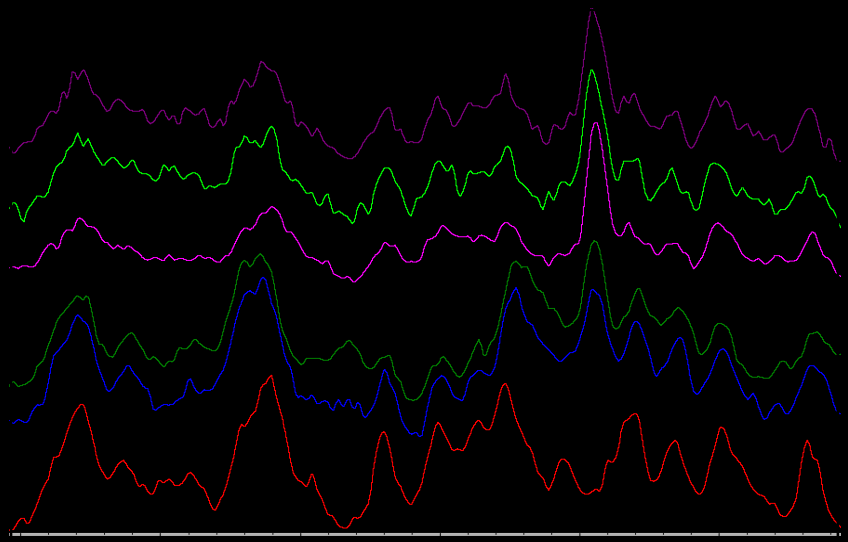
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API physical form purity









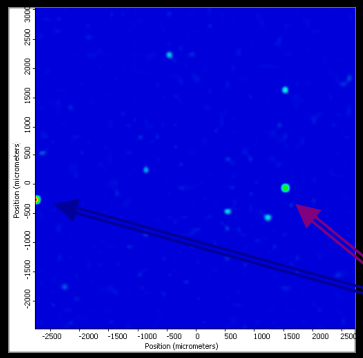
- Detection & linear quantification of API form impurity at sub-percent (<1% w/w) (physical impurity test like chemical impurity by HPLC

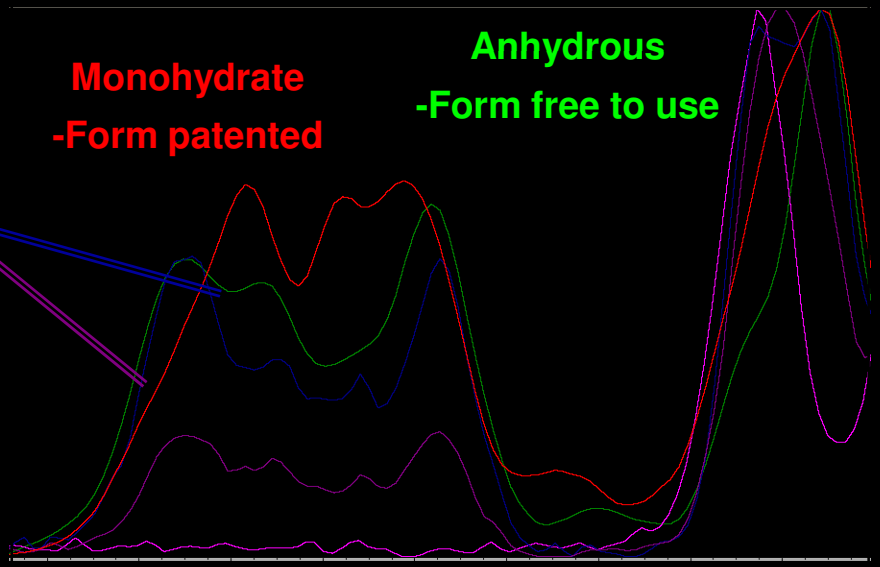
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Dry powder inhalation formulations

- Detection of micronized crystalline API in DPI
- Confirmation of the form of micronized crystalline API-anhydrous
- Other general techniques such as XRPD, thermal methods, etc., can not even detect micronized crystalline API at all, let alone determination of its physical form
- Technical issues to protect unstable anhydrous form





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Thank you!

Any questions?

We welcome co-operations!

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