

## **IP-4 Analytical Imaging in Pharmaceutical Development: Investigation of Sterile Depot Systems**

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High resolution scanning electron microscopy (HR-SEM) yields morphological details with a resolution down to a few nanometers. Confocal Raman microscopy (CRM) on the other hand generates direct information about the underlying components. Not only different chemical species can be discriminated, the spectral resolution is good enough to even distinguish polymorphs, salts and solvates. The combination of both methods depicts an extremely powerful tool to solve intricate challenges in the whole process of drug development (drug substance and drug product).

The capabilities of these analytical imaging methods in pharmaceutical development is demonstrated by characterization of sterile depot systems.

The sterile depot systems consist of a drug substance which is confected with biodegradable excipients. Administered they gradually deliver the drug over a period of several months. During processing, the components might degrade due to increased temperature and mechanical stress as well as due to different chemical environment such as pH. A controlled distribution of drug substance in the depot system is crucial for a controlled and retarded release. Aggregates and inhomogeneities might lead to a burst or an accelerated drug disposal.

Both analytical challenges, composition and distribution, could be solved by HR-SEM and CRM in a straightforward and significant manner. Original as well as incubated depot systems of differing compositions were investigated yielding clear-cut and revealing results.

Keywords: confocal Raman microscopy, scanning electron microscopy, chemical mapping, solid state, pharmaceutical development.