



Image Analysis System Distinguishes Drug Particle Sizes

Few commercial products confront the degrees of inspection and approval faced by experimental pharmaceuticals. Prior to testing, these substances must be analyzed to ensure the consistency of particle sizes from one batch to the next.

Particle sizing in the pharmaceutical industry uses laser diffraction as the method of choice. However, this method provides data that relate to the overall size of the particles and assumes that the particles are spherical in shape. Image analysis not only is complementary to laser diffraction, but also gives information on individual particles, such as compactness and aspect ratio. After searching extensively for instrumentation versatile enough to perform these tasks, Novartis Pharmaceuticals of East Hanover, N.J., selected the Clemex ImPak color image analysis system from Clemex Technologies Inc. in Montreal.

Pascal Toma, leader of Novartis' Crystal Engineering Group, said Clemex's turnkey system was chosen based on its ease of use and its ability to adapt to the group's requirements. "One of the major problems in image analysis is user-to-user variation," Toma said. "Already, sample preparation can bring in user variation, but if the system itself also introduces variability, the measurements can become quite useless. If

you don't run the image analysis system the same way, you can potentially get different results for the same sample. Clemex's system allows us to easily write a macro specific to each new compound and generate reproducible data from one user to the next."

image — in this case, particles of various sizes and shapes.

Toma explained that for a low-dosage drug, particle size is extremely important to attain content uniformity. The amount of the drug substance should vary as little as possible from one tablet to another.

Inability to determine the presence of large drug particles can hinder this process, because large particles could raise the percentage of the active ingredient in a tablet. "Clemex's image analysis system allows us to look at every single particle in a field of interest and to easily calculate the number of out-of-specification particles," he said.

The system's software also allows the researchers to autofocus on particles of varying sizes simultaneously by acquiring images at different focal lengths and recombining them into

one image. Toma said this is especially useful when analyzing images at magnifications of 200 \times and greater.

"From all of the systems I evaluated, Clemex's offered us the most versatility, flexibility and ease of operation, including calculation of a wide range of parameters to describe in detail the particles of a bulk substance," he said.

DCM



Clemex's ImPak color image analysis system enables pharmaceutical researchers to differentiate items of interest within the image, such as these pure drug crystals. Courtesy of Novartis Pharmaceuticals.

Before delivering it to Toma's lab, Clemex integrated and tested the system's components, which include a high-resolution charge-coupled device (CCD) camera and Clemex Vision image analysis software. Ron Goldman, Clemex's marketing director, said the Sony CCD camera can deliver enhanced resolution of drug particles because it is equipped with three detector chips instead of one. But the software, he added, is the key to Clemex's system because it allows Toma's staff to accurately differentiate items of interest within the

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