Drug Discovery & Development

Method for Assessing 3-D Crystal Structures from *in Situ* Digital Images

View U.S. Patent No. 7,916,935 in PDF format.

WARF: P06449US

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a method for measuring the size, shape and polymorphic form of 3-D crystal structures.

Overview

Suspension crystallization processes often result in crystals with a wide range of particle sizes. Accurately controlling the distribution of shapes and sizes is a challenge in the pharmaceutical manufacturing industry. Crystal size and shape affect the physical properties that regulate drug dissolution rate, and maintaining particle size distribution within a desired range increases the efficiency of manufacturing and the quality of the end product.

To control the crystallization process, the manufacturing industry has developed methods such as laser diffraction and backscattering to provide information about the crystal structures that develop under different conditions. However, these methods often are not effective for rod-like crystals with high aspect ratio.

UW–Madison researchers previously developed methods for detecting needle-shaped crystals such as those produced in pharmaceutical crystallizers (see WARF reference number P05340US). The methods include an algorithm for automatically extracting information from *in situ* digital images of the high-aspect-ratio crystals, which were primarily 2-D.

The Invention

UW–Madison researchers now have developed a 3-D image analysis method to automatically extract information from developing crystal populations. The method is based on object recognition and can extract crystal size and shape distributions from low-quality *in situ* images in which the particles are overlapping, out of focus, randomly oriented or poorly illuminated.

The method segments, or separates, objects from the background portion of the image. It uses a 3-D wireframe model to more accurately segment each particle. Once the objects are removed from the image, shape, size, orientation and other relevant information can be determined for individual particles. This information then can be used to control processes associated with the crystals, maximizing manufacturing efficiency.

Applications

- Crystallization process monitoring and control systems used in manufacturing of proteins and other compounds
- Monitoring systems for continuous processing operations
- Improved metallurgic and ceramic production

Key Benefits

- Provides more information regarding 3-D crystal shape than existing laser scattering and diffraction-based monitoring technologies

- Enables more efficient monitoring and control of the crystallization process, especially in the manufacturing of pharmaceutical formulations

Additional Information

Related Technologies

- WARF reference number P05340US describes an algorithm for automatically extracting information about crystal size, shape and orientation.

Related Intellectual Property

- View Continuation Patent in PDF format.

Tech Fields

- Drug Discovery & Development : Drug production & design
- Information Technology : Image processing

For current licensing status, please contact Emily Bauer at emily@warf.org or 608-960-9842