CASE STUDY

Laboratoire Meiners Uses FlowCam for Visual Analysis of the Microencapsulation Process

SUMMARY

Microencapsulation is a process that applies a shell layer around a core particle to control the rate of chemical reactions, protect bioactive ingredients during digestion, and extend the rate of diffusion of fragrances, flavors, or other other active ingredients. Visual analysis following the microencapsulation process is necessary to verify the stability of the process and the quality of the shell layering.

Jean-Antoine Meiners, owner of Laboratoire Meiners

THE CHALLENGE

As owner of contract laboratory Laboratoire Meiners in Switzerland, Jean-Antoine Meiners offers a complete range of highly specialized microencapsulation services ranging from product development and formulation to manufacturing, performance testing, patent asistance and market research. His customers represent a who's who of multinational food, chemical, pharmaceutical, paper, and cosmetics giants, all seeking his 30+ years of experience in microencapsulation and emulsion technology.

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-Jean-Antoine Meiners

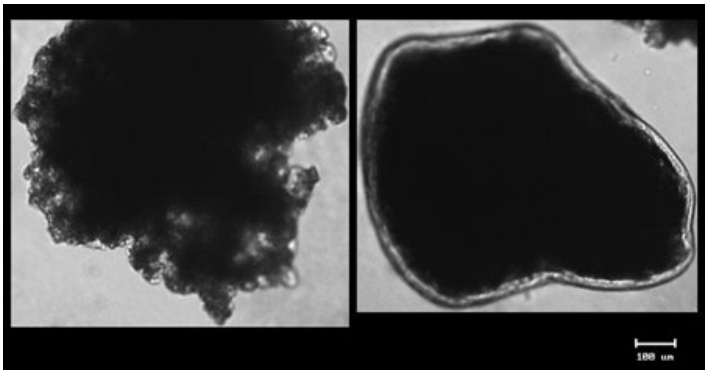
Yet even after three decades using many of the finest microscopes, X-ray systems, and particle analyzers available, Meiners still needed hours upon hours to see just a small sample of his encapsulated particles. "In theory, we could visually inspect using microscopy, but it's too slow and labor-intensive to be practical," said Meiners. Getting enough data for a statistically significant sample was impossible.

Using laser diffraction-based particle analyzers offers more speed but cannot provide the visual documentation, cannot detect transparent or translucent particles and requires all measurement data to be based on equivalent spherical diameter (ESD). "This would be fine if every one of my particles was a naturally perfect sphere - but they're not," says Meiners. "I need to know the actual particle shape and size because the morphology affects the performance of the encapsulated product." If the coating is applied too thickly, not thickly enough, does not entirely encase the particle, or otherwise does not meet precise specifications, then the performance would suffer, potentially affecting the delivery of medicine, for example, or the nutritional value of animal feed. It was while grappling with these concerns when Meiners first saw the FlowCam.

THE FLOWCAM SAVES TIME

Meiners found that the FlowCam particle analyzer was able to provide him with a visual analysis of the microencapsulatin process like traditional microscopy, but at a far faster pace with far less work. Additionally, the microencapsulated particles' shape was not distorted between glass slides.

Recognizing the FlowCam offered a fast, practical way to get large volumes of statistically significant data with measurements based entirely on the actual size and shape of each individual particle, Meiners invested in the system. In the two years after integrating the FlowCam into the lineup of analysis equipment, its impact was nothing short of transformative, according to Meiners. "It used to take more than an hour to get 50 images with a fully trained lab tech," says Meiners. "Now we can get 26 images every second. You could never get that speed with a manual instrument and almost anyone can use it."



Visualizing the quality difference in microencapsulated particles

Every encapsulated product ranging from approximately 2 µm to 800 µm in size gets run through the FlowCam during product development.

Seeing the wall thickness, the coating coverage, and other criteria enables Meiners and his team to verify the stability of the encapsulation process during product development before scaling up to full production. "Most of us are accustomed to taking a long time to complete an analysis of a process this complex," says Meiners, "but now, with the FlowCam, we can get the visual documentation and comparison we need to advance to the next step in the process in a matter of minutes."

FROM START TO FINISH

The FlowCam is also used to verify the particle shape of incoming raw materials and sometimes as a final quality check to verify that encapsulated products meet specifications. "Whether we start with a round or elongated particle has a dramatic effect on the encapsulation process and on how the product is ultimately released," says Meiners. "Using a laser diffraction device when you need to know the shape of the particle really is just a waste of time."

He frequently brings the portable instrumentation to his customers to show them their products in a visual form that most have never seen. "They love it. And I can feel far more confident in the analysis since the measurement data is more accurate," says Meiners. "Most importantly, the type of data we're getting allows us to ask new questions that we'd never have considered asking before."