soniccatch
by usePAT

soniccatch - accurate measuring solutions

Optimization of your measurements in crystallization processes by using ultrasound

Your advantages:

- High-quality in-line data
- Real-time process monitoring
- Increased signal intensity
- Improved stability by in-line cleaning

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Ultrasound improves the monitoring of crystallization

Crystallization is one of the most widely used techniques in chemistry and is therefore used in many industries e.g. as a separation and purification process. In the following, we discuss ways to improve the crystallization process by optimizing the measurement signal of in-line probes in combination with the sonic**catch** technology.

The crystallization process can change key properties of the product, such as its purity, stability, solubility, bio-availability and morphology.

The crystallization dynamics of nucleation and crystal growth are influenced by several complex factors such as pressure, temperature, supersaturation and flow pattern. These can affect the quality and yield of the product as well as the efficiency and cost-effectiveness of the process. It is therefore important to understand and control the crystallization process in order to achieve the desired results. It is possible to obtain accurate in-line data with the sonic**catch** as an add-on for different probes.

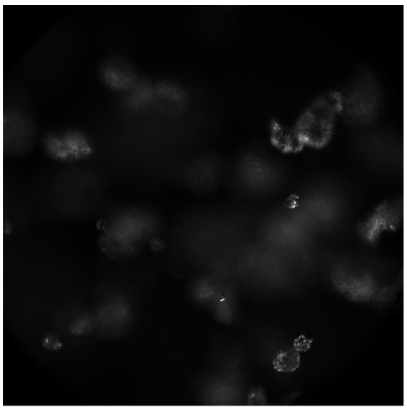
1 Particle control for improved sensitivity

sonic**catch** captures crystals precisely in the focus of the probe, improving the accuracy of the information obtained.

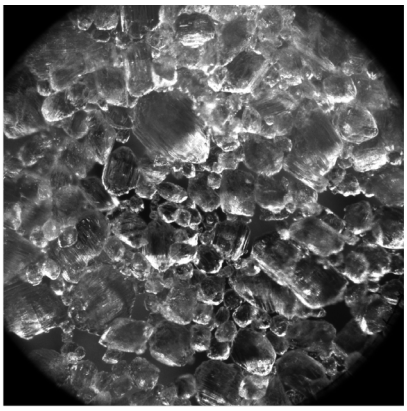
Monitoring crystallization with in-line microscopes can be used to accurately track crystal size and provide critical information about the process. With a **BlazeMetrics** probe, for example, **Raman spectra** can be obtained at the same time as the imaging analysis. Particularly at the beginning of crystallization, it is difficult to obtain specific information about the crystals using Raman.

The sonic**catch** captures the crystals in the focal plane of the probe. This increases the number of particles, improves the distribution statistics of the particle sizes and at the same time amplifies the Raman signal of the crystals. This enables optimised detection of the crystal structures.

The images on the right show the effect of sonic**catch** in combination with an in-line microscope. By catching the crystals in the focal plane of the probe, a sharp image with a significantly higher number of visible crystals is produced (image below).



sonic**catch** off



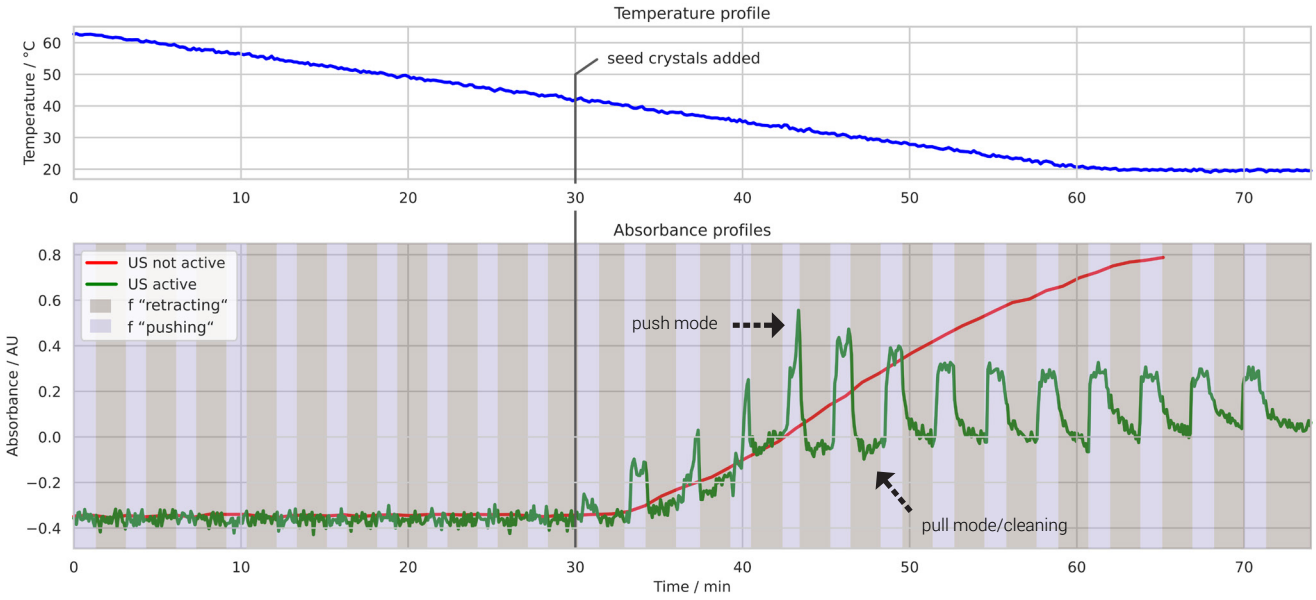
sonic**catch** on

Functionality of the sonic**catch**:

2 Improvement of selectivity for in-line ATR-FTIR probes

sonic**catch** controls the position of the trapped crystals and can either move them into or out of the evanescent field of an ATR probe.

ATR probes are only sensitive in a µm-thick layer above the probe tip. This area is often blocked by crystals during a crystallization process. This leads to spectra that do not correspond to the current process status. sonic**catch** either pulls the interfering crystals away from the probe or towards the probe in a controlled manner, thus enabling optimum in-line quality control.



The red line in the graph below shows the measurement signal of a typical crystallization process without sonic**catch** (US not active). The crystal-specific spectra increase in an uncontrolled manner as crystals cover the ATR probe. In comparison, the green line (US active) shows a controlled intensity curve of an analogue process with active sonic**catch**, which alternately switches the ultrasound (US) between push and pull mode. The Raman probe can efficiently measure the crystals after each ultrasonic cleaning interval. The blue line in the graph above represents the temperature curve of a crystallization process.

3 In-line cleaning for accurate real-time data

The sonic**catch**'s cleaning mode prevents crystals from sticking to the probe window, ensuring a stable measurement signal, even with a high solid load and vigorous stirring. The ultrasonic add-on can therefore also be used for in-line cleaning of probes. The cleaning armature (right image) prevents the build-up of contamination and keeps the sensors clean. This allows the probes to be used continuously in the process. This results in the best possible process control in terms of energy efficiency, resource conservation and yield.

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The multi-award-winning usePAT-Team led by managing directors Dr. Stefan Radel & Mag. Georg Heinz consists of experts from various disciplines. The technology combines various scientific fields such as ultrasound & technology development, mechanical engineering, chemical analysis, electronics and process engineering. In addition, usePAT works together with experts from the fields of spectroscopy, process technology, software, microcontrollers and industrialisation.

usePAT is an Austrian company with headquarters in Vienna and serves customers worldwide. We develop, produce and distribute ultrasonic armatures to improve in-line measurements in liquids.

„We are proud and happy to have so much expertise and enthusiasm in our team“

Dr. Stefan Radel & Mag. Georg Heinz I Managing Directors, usePAT GmbH

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