

## soniccatch & sonicwipe

Two add-on devices for the improvement of industrial liquid measurement technologies

We offer two ultrasound-based devices which are used as add-ons to the „operational process analytical technology“ (PAT) in use. Our devices allow for particles to be condensed in specific locations in liquids or areas to be kept free of particles. Based on these properties, the devices can be applied in various industries in highly useful ways for in-line measurements – that gain data directly from the process.

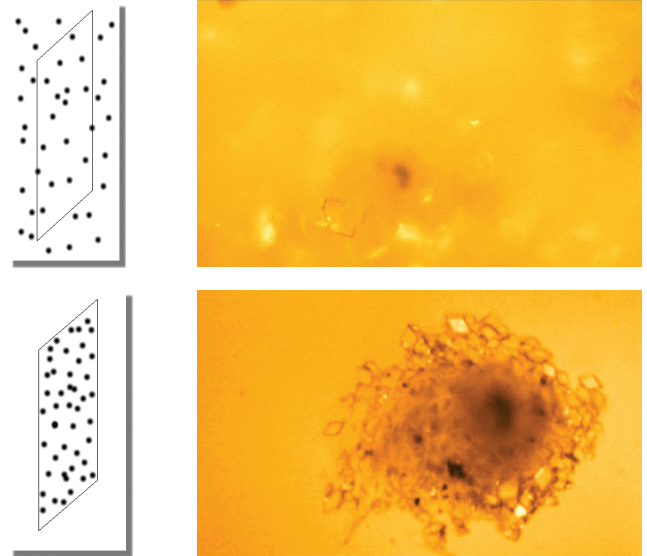
### Objective

The primary goal was to improve the efficiency of existing sensors and measuring systems in order to obtain more accurate and stable measurement results. Such improvements enable more precise control of industrial processes. Accurate process regulation in turn enhances the control of the product quality and ultimately increases the yield.

### Approach

We use ultrasonic standing wave fields where forces act on particles. Those forces depend on the diameter and the material properties of the particles. In the appropriate configuration, particles can be concentrated in preferred regions for the optimal presentation to the sensor. This results in an improved signal-to-noise ratio and thus in increased sensitivity. On the other hand, the corpuscular portion of the suspension can be separated from those particles. In that case, only the liquid is accessible for measurement – undisturbed by signal components of particles. This proves to be highly beneficial for the process management.

It allows, for example, for considerably more accurate measuring of the residual concentration in the liquid part of a crystallisation system or a cell culture. An example is the use of Raman spectroscopy probes in the industrial crystallisation process.

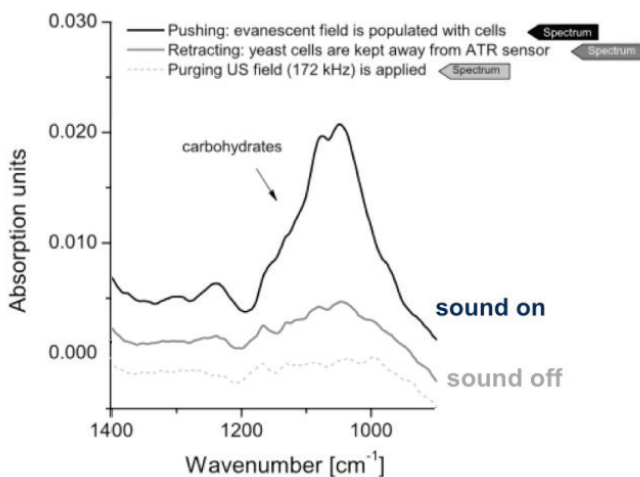


Crystallisation process, captured with a process microscope: ultrasound off (top), ultrasound on (bottom)

Although this measuring method in particular provides valuable information regarding the type of crystal formed (polymorphic), it is currently not possible to support crystallisation processes with in-line measuring. This is due to the fact that the signal is too weak and the concentration of the formed crystals is not high enough. At present, samples have to be taken in order to examine the suspension. However, the sample can change during removal. In addition, the measuring process takes time and the results are not available in real time.

Another problem is probe fouling. Liquids which need to be measured often contain particles which settle on smooth surfaces. This has a negative impact on the measuring results. Windows and probes must therefore be removed, cleaned and installed again resulting in production downtimes. Through the use of ultrasound, specific parts can be kept clean or cleaned. Our **sonicwipe** makes sure that your PAT gains longer measuring periods without downtime.

Our add-on devices are made from materials appropriate for industrial process technology. The devices are FDA compatible and suitable to cleaning in place (CIP). The products can also be sterilised under pressure and are autoclavable.



Spectroscopic measuring in a bioreactor – with ATR sensor

## Results

The results of the research show that the measuring results of various sensors regarding stability, sensitivity and specificity are improved significantly through our ultrasound-based add-on devices:

- the world's first mid-IR spectroscopy of fermented cells inside a bioreactor
- improvement of sensitivity of a process Raman spectrometer by a factor of 100
- observation of a crystallisation process with a process microscope – detection of the crystal shape

- time resolution improvement of stopped-flow measurements of yeasts by a factor of 3
- significant stabilisation of an ATR FT-IR in bypass – performance comparable to cleaning protocols with SDS and NaOH

## Your benefits

### soniccatch:

- in-line measuring with various sensor techniques
- real-time measuring
- real-time process optimisation
- no production errors
- ongoing quality control
- optimisation of results of production and laboratory processes

**soniccatch** guarantees the optimisation of production processes through in-line measuring. It helps users recognise undesirable developments quickly, allowing them to take appropriate measures and to optimise production quality and quantity.

Furthermore, it enables users to know when crystallisation processes are completed and helps them save resources and reduce production capacities.

### sonicwipe:

- extension of undisturbed measuring periods
- no interruption of the production process
- no distortion of measuring results due to dirty windows and probes

**sonicwipe** improves the measuring accuracy and at the same time reduces downtimes.

**soniccatch** and **sonicwipe** were developed at TU Wien. Production and marketing are provided by the spin-off called usePAT.

## Notes

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