



**Crystal**  
LINE

# EVERY PICTURE TELLS YOUR STORY

**Access crystallization and formulation information at mL scale with the Crystalline PV/RR**

The in-line analytics -with no need for cleaning of the reactor- and AI-based image analysis gives every chemist valuable answers and much quicker than ever before. The **Crystalline PV/RR** with through the vial analytical capabilities like turbidity, particle view imaging or Raman is easy to set up and operate. The ergonomic design and effortless operation removes all the barriers to using technology which was previously only accessible to experts. The intuitive control and AI-based software analysis allows every user to classify crystal shapes into different shape classes and obtain the three-dimensional reconstruction of the crystals. Overlapping particles are history. No insert probes into reaction vessel and no cross contamination.

#### AI-based image analysis

AI-based software analysis ensures improved image analysis and research capabilities.

#### Next level hardware engineering

- 6.0 times magnification reaching 0.63 microns per pixel
- Improved temperature accuracy, control and stability
- Ready for robotics

#### Advanced analytical features

- Digital particle viewer, Real time Raman, Particle Size Distribution (PSD), Turbidity
- Growth rate, particles size and shape assessment have never been so easy

PRODUCT SHEET CRYSTALLINE PV/RR

**Technobis**  
CRYSTALLIZATION SYSTEMS

## Every picture tells your story

The **Crystalline PV/RR** combines temperature and turbidity measurements with real time particle imaging. With eight in-line high quality digital visualization probes reaching 0.63 microns per pixel, seeing what is happening in the vial has never been easier: no moving parts, no cumbersome insertion probes. With a robust design, the probes are contained in a sealed, pre-aligned and sturdy environment, giving the user walk-up access to eight parallel particle view cameras.

- Visualization of the complete crystallization or formulation processes
- Real time particle size and shape information at the smallest scale

## Find out what is happening

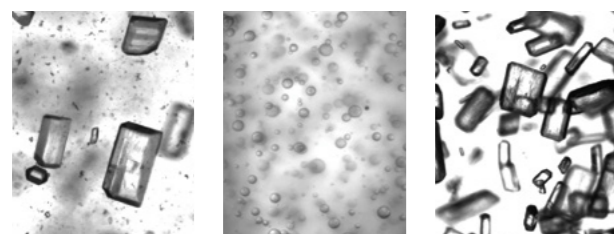
Have you ever wondered what is happening during the crystallization or formulation processes? How do you know if the sample is aggregating, foaming or oiling out? Stop guessing: now you can see what is happening. You can easily correlate the turbidity signals with visual information finally getting the complete picture of the crystallization or formulation processes.

- Polymorph and solvate screening
- Monitoring of habit changes
- Searching for less stable intermediates
- Controlling growth of certain polymorphs
- Develop and optimize your process
- Optimize and control your formulation process

The instrument comes with eight cameras positioned in a standard configuration, capable of up to 6.0 times magnification.

The resolution of 0.63 microns per pixel can be reached without any problems, making information close to nano scale easily available while you are performing your experiments.

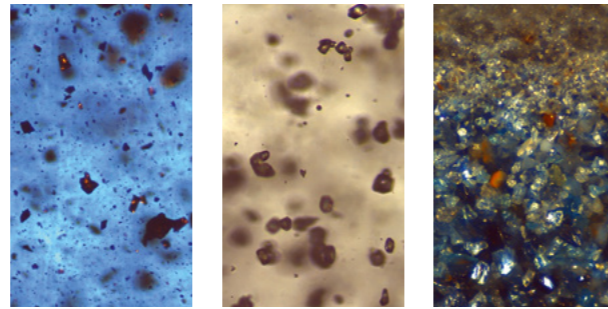
The **Crystalline PV/RR** makes use of front light, which has twice the intensity of the previous model, allowing operators to visualize particles clearly in darker samples. The user can also choose to visualize their experiments in color, by making use of the color cameras option.



Nucleation within droplet

Emulsion

Crystallization



Colored particle view imaging

## AI-based software analysis for better process control

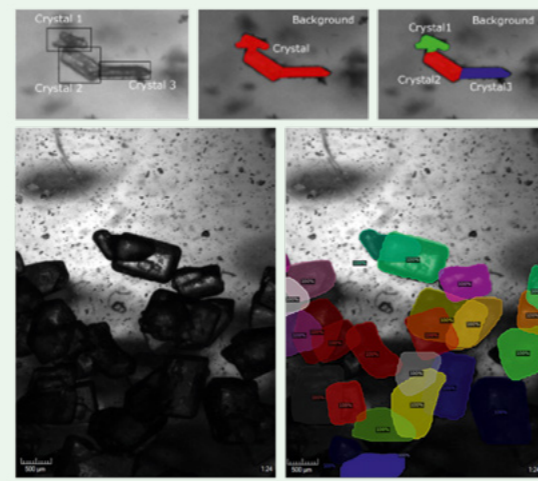
Have you ever puzzled over off-line analytics, trying to figure out what happened during the process? With the real time particle viewer you know exactly what is happening, when it is happening.

Crystallization usually involves several phenomena such as nucleation, growth, agglomeration, and several others. The advanced in-line particle viewing cameras and AI based software of the **Crystalline PV/RR** helps the user to reliably monitor, design and optimize the crystallization processes.

The software allows the detection of different crystal shapes and sizes. The user can routinely classify crystal shapes into different shape classes and obtain the three-dimensional reconstruction of the crystals. Overlapping particles are history.

- Study nucleation and crystal growth
- Investigate reaction rates
- Monitor slurry conversions, oiling out, foaming, gelling, aggregation

## AI-based image analysis



## Real time Raman

The **Crystalline PV/RR** gives the user access to real time Raman spectroscopy, in combination with a sophisticated parallel crystallizer with turbidity measurement. The independent Raman probes are integrated in an ergonomically designed, pre-aligned, robust and sealed module. The user does not have to insert any probes into the reaction vessel.

Tailor your **Crystalline PV/RR** to suit your need. Select any combination of particle view imaging and/or Raman optics in your 8 reactor set-up.

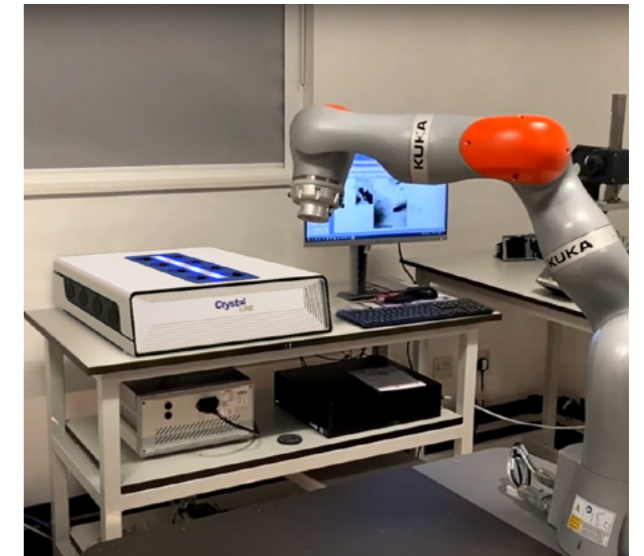
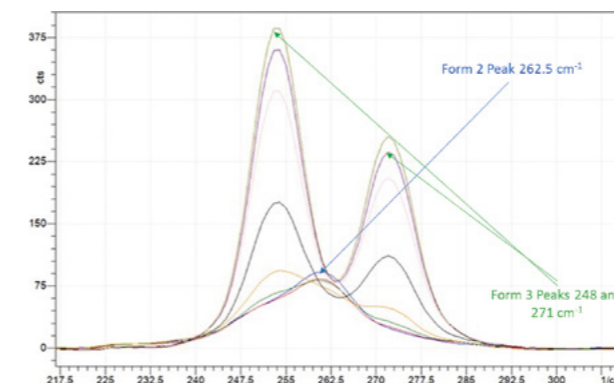
## See when it happens

Traditionally analytical techniques are implemented in an off-line fashion, where samples have to be removed from the reaction or process, in order to obtain information about chemical composition or interactions. With offline techniques one obtains information on a few data points in time, but the nagging question always remains: Have I missed something? With the **Crystalline PV/RR** it is easy to follow crystallization processes and to study polymorph conversions, hydration or the formation of solvates in slurries.

Chemical interactions like co-crystal and salt formation can be studied effortlessly during the process. This hassle-free tool enables you to screen many solvents, counter-ions or co-formers on a small amount of compound – giving you valuable answers much earlier on in the process and in short time.

- Real time information on chemical interactions
- Drive reactions based on spectroscopic results
- Measure relative reaction rates

## Raman spectrum transformation for carbamazepine captured using the Tornado HyperFlux integrated with the Crystalline PV/RR



## Ready for robotic automation

At a time when research facilities and laboratories are becoming more automated, the new **Crystalline PV/RR** is future-proofed for robotic integration. Pick and place robots can be programmed to automatically transfer samples to and from one part of a laboratory to the **Crystalline PV/RR**.

Laboratories can save time and reduce costs associated with manual labour, allowing technicians to focus their energy on advancing scientific research. With improved software capabilities, users will not need to mechanically adjust the instrument. Instead, the software can be programmed to allow for remote access. This has been demonstrated in partnership with several research organisations, who have been prototyping the **Crystalline PV/RR** series as a part of AI driven Data Factories.

This is the future of our research facilities, designed by scientists, for scientists.



### Specifications Crystalline PV/RR

<b>Reactors</b>	8
<b>Reactor Type</b>	8 ml vials
<b>Working Volume (ml)</b>	2.5-5 ml
<b>Temperatures profiles</b>	8
<b>Temperature range (°C)</b>	-25 to 150*
<b>Temperature accuracy (°C)</b>	0.5
<b>Heating/Cooling rate (°C/min)</b>	0-20
<b>Stirring modes</b>	Overhead or stirrer bar
<b>Stirring rate (rpm)</b>	0-1250
<b>Turbidity (%)</b>	Every reactor
<b>Chiller necessary</b>	Yes
<b>In-line analytics</b>	8 particle view imaging cameras and/or Raman probes
<b>Particle size and shape analysis</b>	Yes – with particle view imaging cameras
<b>Extra functions</b>	Reflux, antisolvent, seeding, evaporation and pH monitoring integration
<b>Data export</b>	CrystalClear, Word Report, XML
<b>Footprint (DxWxH in cm)</b>	52 x 77.8 x 19.7
<b>Software</b>	Advanced image analysis based on AI

\* When ambient temperature is 21°C ± 2°C and chiller cooling capacity at 18°C is about 1180 watt.



Visit our product page to learn more



### Technobis Crystallization Systems workflow



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