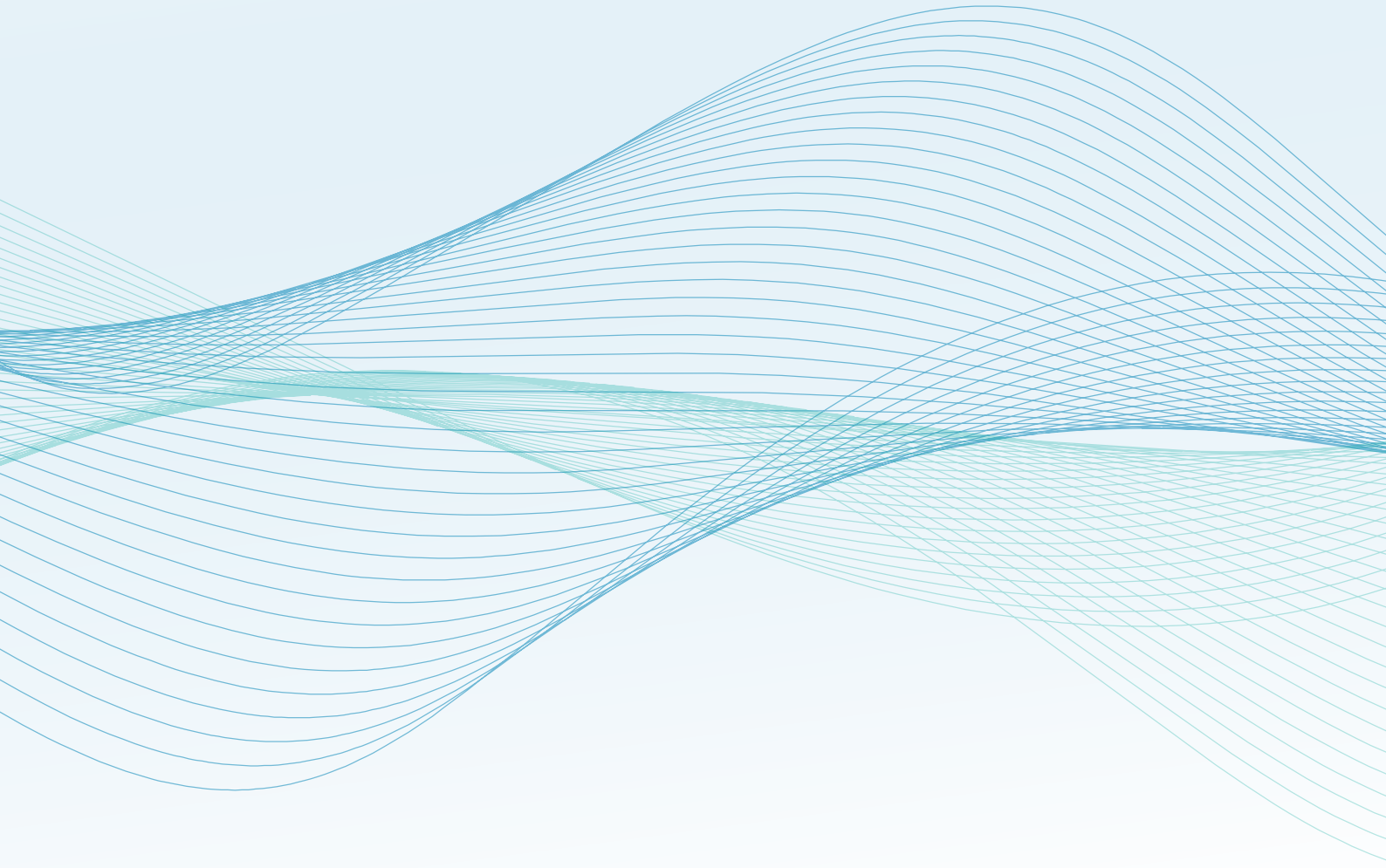
NANO FLOWSIZER

Spatially Resolved Dynamic Light Scattering



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Innovators in Process Analytical Technology

NANO FLOWSIZER

SR-DLS

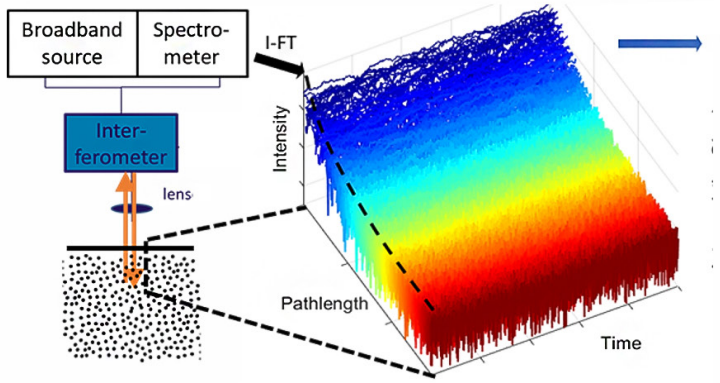
Spatially Resolved Dynamic Light Scattering

The recently developed NanoFlowSizer is the first and only instrument to employ Spatially Resolved Dynamic Light Scattering (SR-DLS) based on Low-Coherence Interferometry (LCI), and thereby provides new possibilities for non-invasive, real-time and continuous inline measurement of size characteristics in flowing and quiescent nanodispersions.

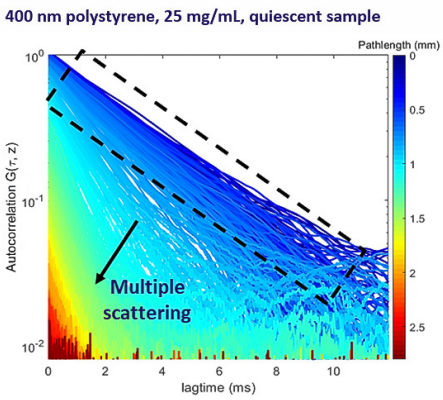
Conventional Dynamic Light Scattering (DLS) is a well-accepted technology for measuring particle size and size distribution of nanoparticles in liquids. It is based on measurements of fluctuations in light scattering caused by **Brownian motion** of suspended particles.

The frequency of light intensity fluctuations due to scattering depends on the particle size; smaller particles diffuse (move) more rapidly and thus correspond to higher frequencies. Therefore, the fluctuations in light scattering hold information on the particle size.

Conventional DLS measurements need to be performed under static conditions ensuring that particle movements are solely caused by Brownian motion and not influenced by other factors like liquid flow. Additionally, conventional DLS cannot be applied to relative turbid suspension without dilution, while these are often encountered in industrial or process environments. Since nanosuspensions are in motion during processing and vary in turbidity levels conventional DLS is unsuitable for process analytical (PAT) applications.



Intensity graph



Correlation graph

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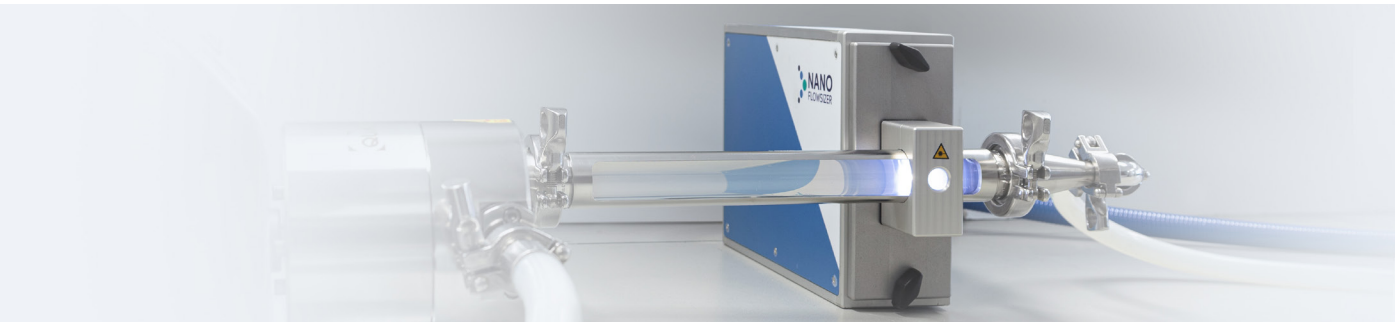
To overcome the limitations of conventional DLS for process analytical applications InProcess-LSP developed a new innovative technology: **Spatially Resolved Dynamic Light Scattering (SR-DLS).**

Low Coherence Interferometry

SR-DLS allows particle size characterization in process flows and is able to **measure highly turbid suspensions without dilution.** The NanoFlowSizer technology is based on low coherence interferometry providing light scattering information as a function of optical pathlength (pathlength or depth in the sample).
In LCI, the sample is illuminated by low coherence light from a **broadband source** (instead of a laser), and backscattered light interferes with light split from the source with a specific optical path length. The interferometer part of the technology allows resolving backscattered light for specific path lengths in the sample simultaneously.

The depth-resolved light scattering data holds information on particle movement caused by both Brownian motion as well as flow rate and pattern. The contribution due to Brownian motion is extracted by smart algorithms and used for calculation of the particle size characteristics, while the flow rate information is obtained instantaneously for every measurement as well.



The patented NanoFlowSizer technology automatically isolates single scattered data from the obtained depth-resolved scatter patterns and corrects for flow contribution resulting in real-time particle size distribution data of turbid and flowing nanosuspensions.

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Together these features bring strong advantages for nanoparticle sizing:

i. **Highly turbid** dispersions can be measured due to the ability to selectively analyze single scattered from multiple scattered photons

ii. Intensity decorrelation due to flow can be quantified and compensated for during size characterization enabling measurement **in flow** conditions

iii. Ability for real-time measurement resulting in a **better understanding of process dynamics**, higher state of control, and opens possibilities for active process control.

iv. High data-information content allow **very fast** measurements (seconds).

v. The backscatter geometry and optics allows for easy integration as aw non-invasive process monitoring **PAT tool**.

For more detailed information or a quotation please contact:

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