Introducing the new LS Spectrometer™

Webinar Q&A Transcript

1 What is the maximum concentration one can explore with the LS spectrometer?

The answer to this question depends on several factors such as the particle size and optical properties. A sample is too concentrated to be measured when no single scattering events are detected. This means that no signal will be obtained, as the Modulated 3D technology filters out all multiple scattering events. It is important to keep in mind that a standard DLS or SLS instrument would still produce a result, For systems such as protein solutions, there is practically no limit on the concentration.

2 Would it be possible to obtain information about high aspect ratio structures, such as nanofibers?

Absolutely! This is a typical application of Depolarized DLS. One could also measure the shape of particles using SLS. For more information, please refer to our webinar "Characterizing particle shape via Light Scattering" by Matthias Karg.

3 How many polarizers are built into the full configuration for Depolarized DLS measurements?

The Depolarized DLS technique uses two polarizers: an entrance polarizer is placed before the sample and is locked into a vertical position. A detection polarizer is installed between the sample and the detection optics. It can be switched from vertical to horizontal positions, in order to conduct measurements in VV or VH geometry. The switching is controlled by the software.

4 Is there any manual adjustment required on the LS Spectrometer?

The new version of the LS Spectrometer does not require any manual adjustment of instrument parts. All geometry changes (auto to cross-correlation, VV to VH) are done from the software.

5 Can the LS Spectrometer be used to measure Extracellular Vesicles, which are very polydisperse systems? What is the resolution one can obtain?

Extracellular Vesicles are straightforward to measure by means of DLS. The CORENN algorithm enables the characterization of such polydisperse with greatly improved resolution. At present, a size ratio of 1 to 3 between two peaks can be easily attained. A ratio of 1 to 2 could be possible depending on the particle size and polydispersity of each population.

6 How much time would it typically take to change the temperature by 10 °C?

This typically takes 10 minutes or less depending on the precision desired. Protocols can be constructed in the software to tune the heating rate and introduce wait times for temperature equilibration for example.

7 Why did you choose particle radius instead of diameter as a readout?

LS Instruments was founded on the initiative of two Physics professors, and the early adopters of the technology were typically physicists who would refer to the particle size as the radius, rather than the diameter. The next version of our software, LsLab, will implement the diameter as a readout.

8 Can one save a protocol and reload it for a future measurement?

Yes! The software has been designed to separately build and save a protocol, or directly run a saved protocol.

9 Is it possible to perform Diffusing Wave Spectroscopy experiments on this instrument?

Diffusing Wave Spectroscopy (DWS) is a light scattering technique different from Dynamic (DLS) and Static (SLS) light scattering. A DWS experiment is based on the measurement of multiple scattering and therefore requires highly turbid to opaque samples. DLS and SLS mandate the measurement of single scattering only. In the LS Spectrometer equipped with the Modulated 3D technology, multiple scattering events are filtered out to yield reliable data.

10 Are the raw data exported as an ASCII file?

All the raw data can be exported in an ASCII file under CSV format: it will contain not only the raw intensity correlation function, but also the count rate trace, particle size distribution, and all parameters of the measurement.

11 Can you plot the decay rate vs the scattering vector in your software?

At the measurement level, one can plot

- Scaled count rate
- Hydrodynamic radius
- Polydispersity index
- Intercept

Versus

- Angle
- Time
- Temperature
- Sample

Decay rate vs scattering vector may be implemented in a next version of the software. Presently, once can also display the particle size distribution weighted by the decay rate.

12 Do you see any trend to use the LS Spectrometer for process control in a more production-oriented environment? If so, do you see a next product development?

Modulated 3D Technology for dilution-free measurements is naturally predestined for use in industrial processes.

A stop-flow cell is now available for the NanoLab 3D, which can be connected to an external circuit and thus enable at-line measurements.

We also see future applications for the LS Spectrometer in industry, especially in the area of non-destructive characterization of products in their final container.