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Effects of dilution on particle size measurement in dynamic light scattering

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Abstract

The purpose of this paper is to articulate the effects of sample dilution in particle size measurement using DLS technology, and how these effects may be minimized by using Photon Cross Correlation Spectroscopy (PCCS). Dynamic Light Scattering (DLS) is a non-invasive, fast and well established technique for characterizing submicron particle size and distribution. Generally, it requires significant sample dilution in order to achieve a correct result by avoiding multiple scattering phenomena. Sample dilution may change the chemical environment of the suspended particles in the sample. As a result, the measured size and distribution may deviate from its original value. PCCS is a subset of DLS, extending the range of sample concentrations that can be measured with DLS up to 10^6.A set of measurements for a series diluted NIST traceable monodispered polystyrene latex nanoparticles gives comparative results for using PCCS vs PCS. It enables the clarification and verification of concentration dependency in particle size measurements and eliminates many of the assumptions in DLS measurements which are inherent with sample dilutions that may lead to skewed conclusions in a real application.

Biography

Lily Zu is the manager of nanoparticle division for Sympatec GmbH, and a member of the ISO committee for particle characterization. She has 22 years of experience in dynamic and static laser light scattering as well as sedimentation instrumentation design. She specializes in physical characterization of nanoparticles and macromolecules, including submicron particle size and distribution; electrophoretic mobility and phase analysis on zeta potential and size exclusion chromatography on molecular weight analysis using multi-angle light scattering. She is the inventor of the Optical Ball Lens Light Scattering Apparatus and Method.