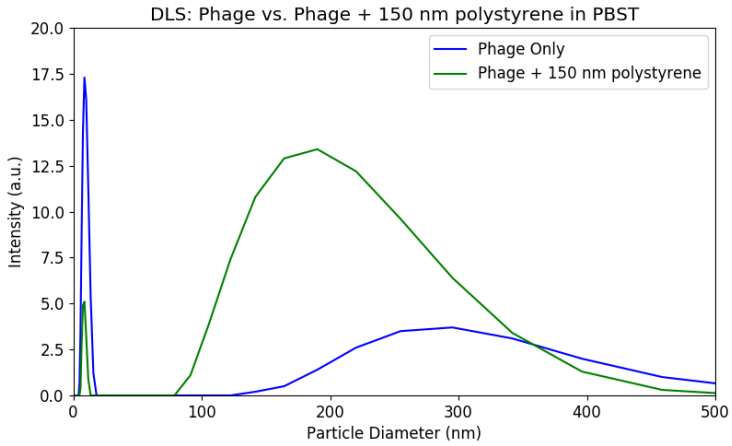
DLS results strongly dependent on particle material

Dynamic light scattering (DLS) is a technique commonly used to obtain size information about particles suspended in a liquid. A sample is illuminated by a laser and the light scattered from particles in the sample is analyzed. Brownian motion of the particles causes changes in the scattered light signal over time that are analyzed to extract information about the size distribution of particles in the sample.

While DLS is ubiquitous, its measurements depend strongly on a complex convolution of particle size, material, and concentration. The below example illustrates this dependence.

Two particle mixtures were prepared and analyzed with DLS and Spectradyne's nCS1:

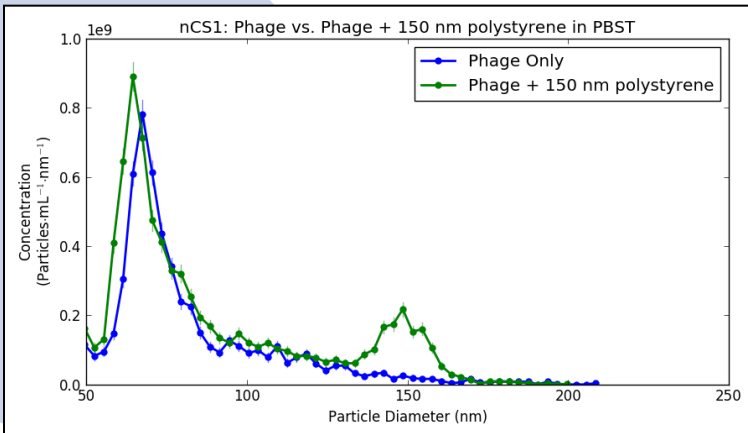
1) Bacteriophage, approximately 62 nm diameter in phosphate-buffered saline with 1% polysorbate 20.
2) Bacteriophage at the same concentration as above, with 150 nm diameter polystyrene beads added, in phosphate-buffered saline with 1% polysorbate 20



DLS measurements of bacteriophage and bacteriophage mixed with 150 nm polystyrene particles. Scattering from micelles and polystyrene particles dominate the signal, making the phage invisible.

DLS measurements of each sample are shown in Figure 1. In each case, a peak in the scattering intensity is seen near 8 nm diameter resulting from the polysorbate micelles in solution. The 150 nm diameter polystyrene beads in sample 2 are detected by DLS, with measured diameter near 190 nm. **DLS fails to detect the phage in either sample.**

The samples were also measured using Spectradyne's nCS1 (Figure 2). Measurements of each sample agree very well, and the phage are clearly detected in both measurements, making possible the accurate quantification of the phage particles. The addition of polystyrene particles to the second sample is clearly reflected in the data: a well-defined peak emerges in the distribution centered at 150 nm as expected.



nCS1 measurements of the same samples as shown in Figure 1. The bacteriophage is measured accurately in both samples.

In summary, the nCS1's unique implementation of microfluidics-based resistive pulse sensing demonstrates consistent and high resolution measurements of particle size and concentration *independent* of the particle material. All materials can thus be measured equally well.

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