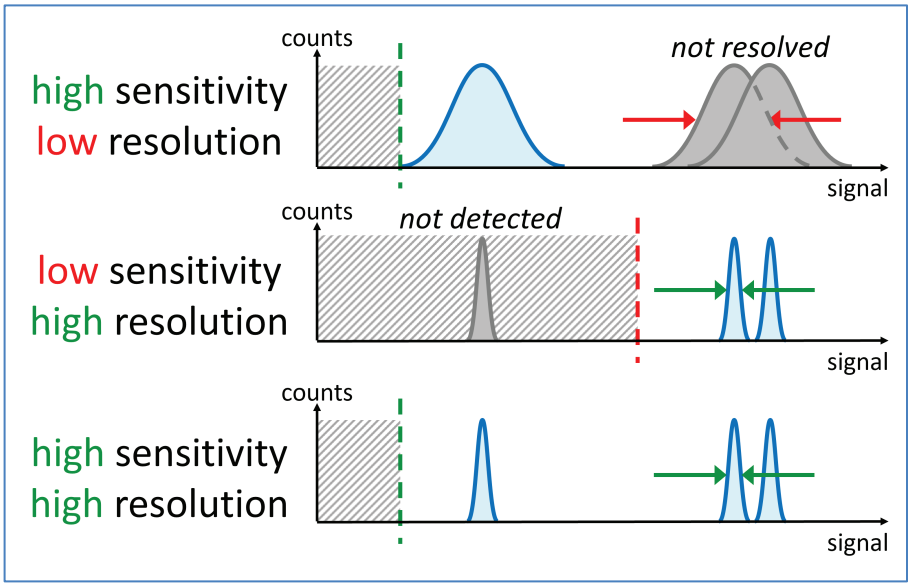
KINETIC RIVER® *Where Light Meets Life®*

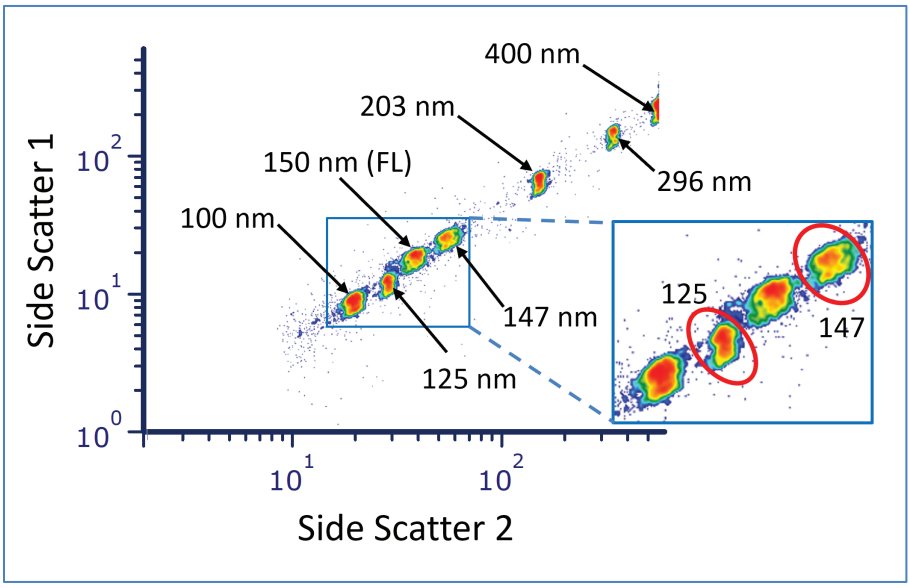
Delaware
Flow NanoCytometer™

Tech Note

When measuring heterogeneous nanoparticle samples, it's important not only to use an analyzer with a sufficiently high sensitivity, but one with a high resolution. The figure at right illustrates the relationship between the two: High sensitivity allows the measurements of *smaller* particles, while high resolution allows the measurement of particles with small size *differences* between them.



The ***Delaware*** Flow NanoCytometer combines high sensitivity with high resolution. One way to benchmark the resolution performance of a particle analyzer is with kits of size reference standards. We used Rosetta calibration beads from Exometry, a set of polystyrene nanoparticles with closely spaced size differences spanning a wide dynamic range. The graph below, from a calibration run on the ***Delaware***, shows scattering signals from 100-, 125-, 147-, 203-, 296-, and 400-nm particles, in addition to fluorescent 150-nm particles. (Fluorescent particles have a different refractive index than nonfluorescent ones, causing them to fall out of order in the scattering sequence.) The tight distributions around each of the clusters of the respective particle populations demonstrate the high scattering resolution capabilities of the ***Delaware***. In particular, particles as closely spaced as 125 and 147 nm are clearly resolved, even in the presence of an intervening population (fluorescent 150 nm).



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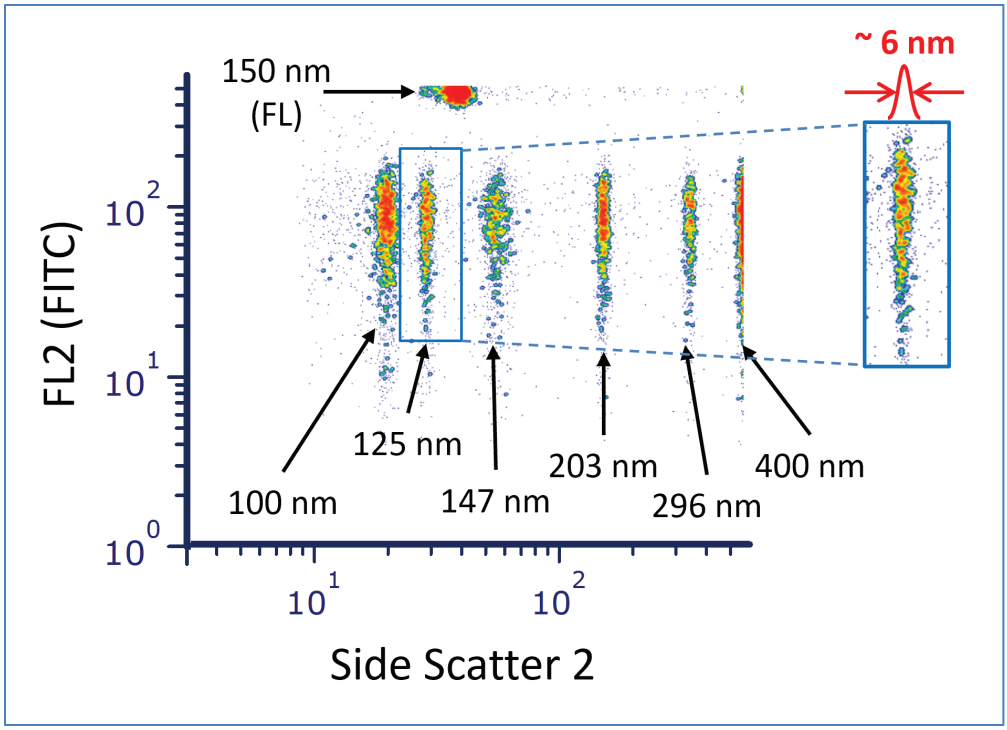

Another look at these results from a different perspective further illustrates the resolution performance of the ***Delaware***. The clusters shown at left are the same as those on the previous page, but here fluorescence is plotted against scattering–which makes the 150-nm fluorescent particles stand out. The remaining clusters show an excellent degree of separation. In particular, the width of the 125-nm cluster is estimated to be around 6 nm–to our knowledge, the highest resolution ever reported on a flow cytometer.

The ***Delaware*** Flow NanoCytometer was designed from the ground up as a flow cytometer for analyzing nanoparticles, such as exosomes and other extracellular vesicles (EVs). It combines superior sensitivity (≤ 58 nm liposomes; ≤ 28 nm gold) with the ability to measure fluorescence on up to six channels, high throughput, and ease of use. It is not limited to EVs; it can just as easily measure whole cells and other particles, up to sizes of tens of microns, by simply loading a different settings file. As this Tech Note shows, the analytical performance includes resolution to about 6 nm. This makes it uniquely suited to the demanding needs of exosome biology research and vaccine research and development, as well as quality control in production of nanotherapeutics, pharmaceuticals, and other nanoparticles.

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