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Three in One: Concentration, Size & Zeta Potential measured on sub-visible protein suspensions

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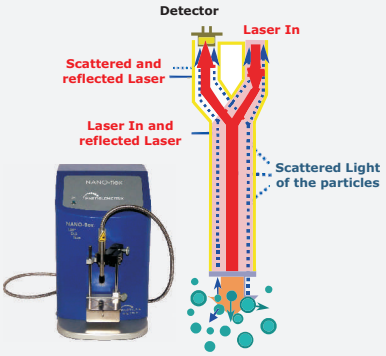
Introduction

The preparation of high-value biological material, such as proteins, requires a multi-step procedure of separation and purification. Each step must be optimized to reach full efficiency of yield. Two key parameters for monitoring yield are protein size distribution and aggregate concentration. Both measures must be monitored over wide ranges. The combination of two powerful techniques, DLS & NTA, gives valuable information for biological formulation.

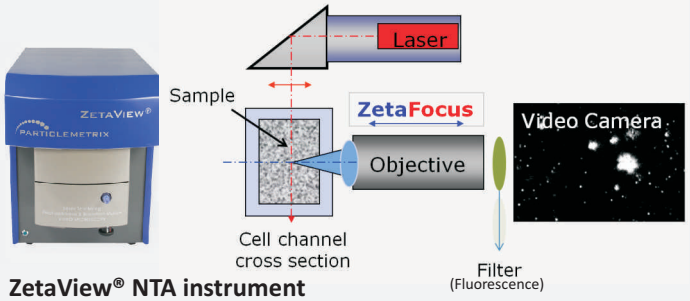
NANO-flex® Dynamic Light Scattering (DLS)



NANO-flex® Heterodyne Sensor

DLS is an established method for measuring the particle size distribution (PSD) of proteins suspensions. A novel heterodyne probe allows sampling either by dipping our probe sensor directly into batch protein suspensions, undiluted, or by placing a 10 – 30 µl droplet of sample directly onto the DLS probe sensor window, saving cost with precious samples.

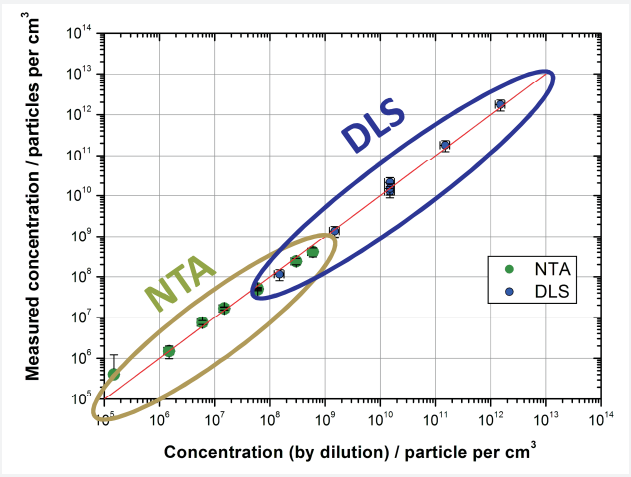
ZetaView® Nanoparticle Tracking Analysis (NTA)



ZetaView® NTA instrument

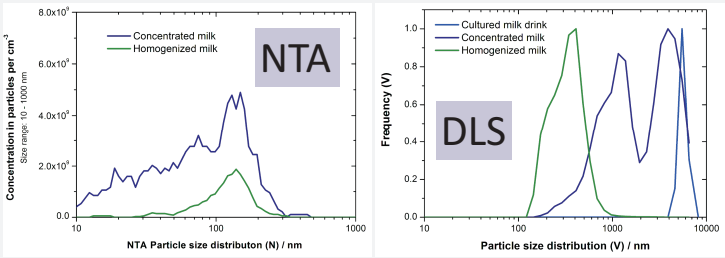
The ZetaView® Nanoparticle Tracking Analysis (NTA) system allows for direct visualization, counting and sizing of sub-micron particles as well as Zeta potential measurements. Depending on particle properties, NTA covers a size range between 15 nm and 2 µm. Zeta potential can be measured on particles up to 50 µm in size.

Ultra-wide concentration range

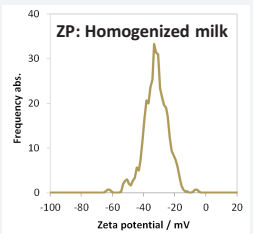


The combination of DLS and NTA fully covers the critical concentration range from 10^5 to 10^{12} particles/cm³.

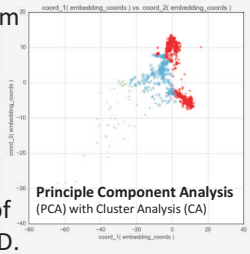
NTA: Number-based PSD measurement



NTA directly measures number concentration, it can accurately measure polydisperse and aggregated suspensions, and allows measurement at much lower particle concentrations than DLS.



The ZetaView® system provides quick zeta potential measures. New multivariate statistical tools offer unique information of sub-populations of particles within a PSD.



Conclusions

- **The combination of DLS and NTA allows for measurement of particle size across an ultra-wide range of concentrations**
- NTA directly measures a number-based PSD of aggregated protein suspensions, where tracking of particles is counting the particles
- The NANO-flex® DLS system is a versatile tool for measuring high-concentration suspensions of proteins, both N-mers & aggregates