

# Particle sizing

Single particle measurement for accurate size distribution analysis of particle populations.

- Absolute sizing (50nm–10µm)
- Size distribution
- Resolve multiple populations
- Quantify aggregation
- Quantify fragmentation

## Introduction

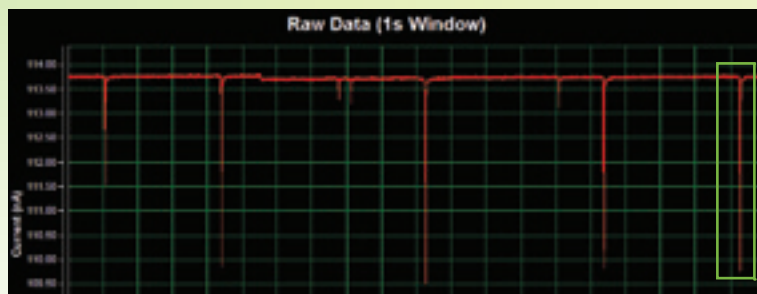
Izon offers a precise and rapid solution for accurate sizing and analysis of distribution for both nano- and micro-sized particle mixtures. The particle-by-particle methodology resolves polydispersed & multiple populations with single-particle resolution, ensuring a complete representation of complex mixtures. This is opposed to ensemble averaging biases and/or intensity-weighted averaging limitations inherent in other size analysis technologies.

A discrete electrical signal is registered by the system each time a particle passes through the nanopore. Each individual particle signal is analysed and the make-up of the constituent populations is built up for the sample.

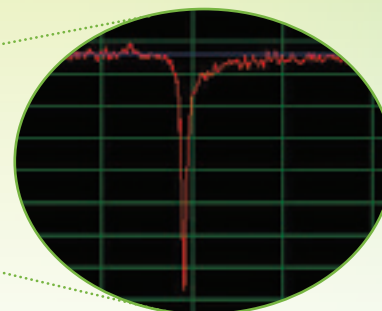
The magnitude of the electrical signal shows the volume of the particle (i.e. particle diameter).

This allows rapid quantification of:

- Absolute size
- Size distribution and volume fraction analysis
- Resolving distinct populations within a sample mixture
- Assessment of polydispersity
- Aggregation and/or fragmentation levels
- Number and concentration of differently sized particles



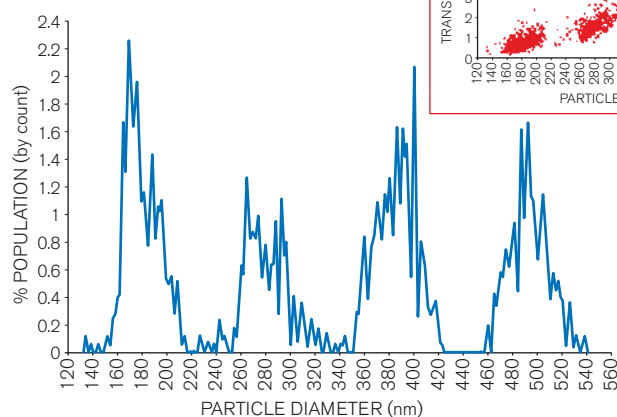
**FIGURE 1A:** Particles of different sizes produce distinctly different signals when measured using Izon's SIOS technology. Each event corresponds to the measurement of a single particle.



**FIGURE 1B:** The signal magnitude response measured by Izon's SIOS technology provides a direct correlation to the size of each particle.

## Size distribution and volume fraction analysis

Particle-by-particle collection & assessment of mixtures, allows highly accurate determination of size distribution within a sample.



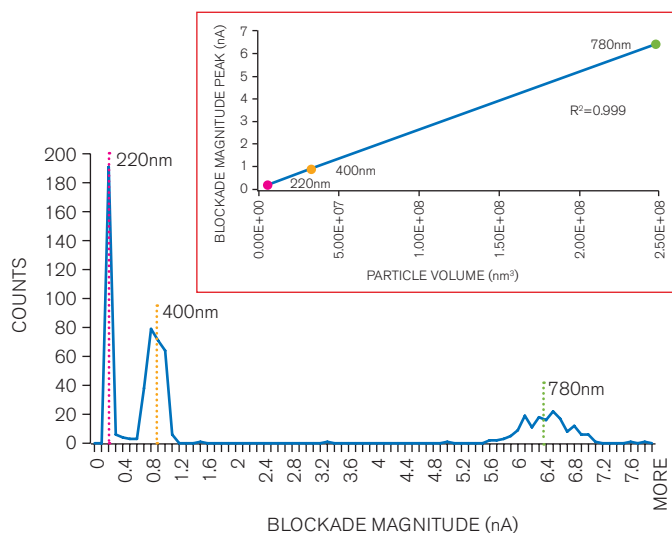
**FIGURE 2:** Size Distribution Histogram of a quad-modal mixture containing four different polymer populations, measured with Izon's SIOS nanopore platform (Inset shows particle diameter vs translocation duration).

## Absolute size analysis

The relationship between peak magnitude (nA) and particle volume allows highly accurate absolute size determination of particles. The peak signal magnitude (inset to Figure 3A) is linearly proportional to particle volume.

The example on the right demonstrates detailed measurement of a complex polymer mixture containing 3 distinct size populations. The histogram at the top right (Figure 3A) shows the histogram counts of the measured electrical peak magnitude from this sample. 3 distinct populations are visible with the larger peak signal magnitudes corresponding to larger particles. The peak of each population corresponds to the mean particle volume (i.e. diameter) of particles. The SEM image below (Figure 3B) shows the presence of the 3 populations at 220nm, 400nm and 780nm diameter.

Particle count and concentration (in particles/mL) of each size fraction is also simultaneously determined.



**FIGURE 3A:** Histogram of blockade event magnitude values recorded from a polystyrene particle sample demonstrates a trimodal response, indicative of three particle populations distinguished by size.

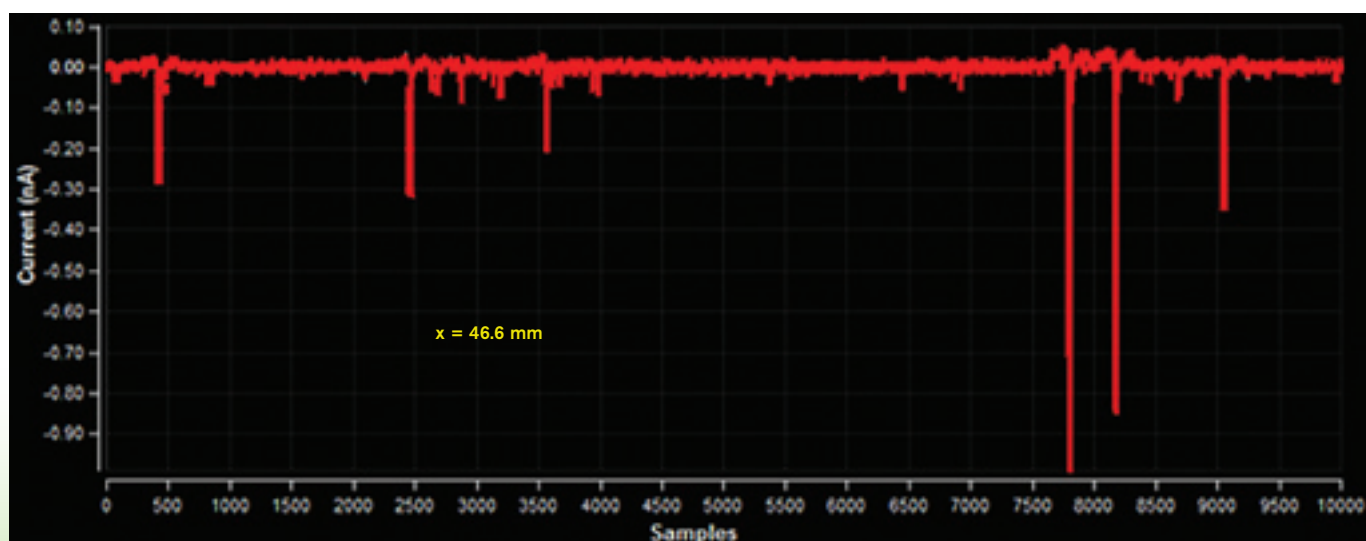
**INSERT:** The blockade magnitude scales linearly in response to increased particle volume across the full range of particle sizes present in the sample.



**FIGURE 3B:** SEM image of the polystyrene particle sample confirms the presence of three populations at around 220nm, 400nm and 780nm in diameter.

## Aggregation dynamics

The ability to count particles one-at-a-time enables users to observe and quantify the number particle aggregates or fragments in the sample. This allows the mapping of dynamics of particle suspensions as a function of different conditions, i.e. reaction time, pH, ionic strength, reagent concentrations. The nanopore is able to detect widely polydispersed particle mixtures (below) with smaller sized particles showing small electrical signals and aggregates showing larger electrical signals.



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