



Meet The Pulsoid

A New Era of Nanoparticle Characterisation



HIGH-RESOLUTION NANOPARTICLE MEASUREMENT, WITHOUT THE COMPLEXITY

Designed to deliver exceptional accuracy and resolution in a fast, easy-to-use workflow, the Pulsoid is Izon Science's new nanoparticle measurement system. Powered by Nanopore Pulse Sensing (NPS), it removes the traditional trade-off between measurement performance and usability, enabling true single-particle analysis in minutes.

KEY CAPABILITIES

HIGH-RESOLUTION SIZE, CONCENTRATION & ZETA POTENTIAL MEASUREMENTS



Single-particle measurement enables direct insight into particle size, concentration, and surface charge, revealing subpopulations and heterogeneity hidden by averaged techniques.

CONSISTENT, HIGH-ACCURACY SIZE MEASUREMENT

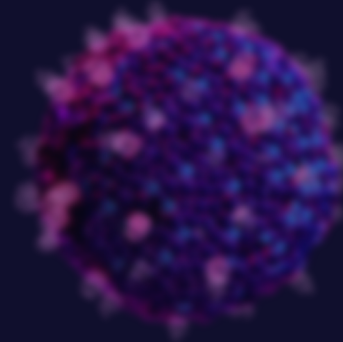
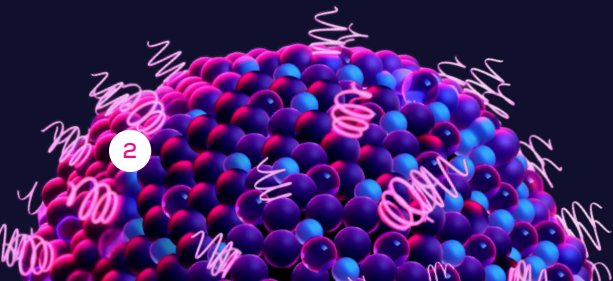


100% \pm 2%¹ size accuracy, enabled by a solid-state silicon nanopore that delivers precise, consistent measurements aligned with TEM standards.

EASY TO USE, DESIGNED FOR THROUGHPUT



An intuitive, low-setup workflow reduces calibration and handling, making it easy to generate reliable, high-resolution data quickly and consistently.



SINGLE-PARTICLE PRECISION, REDEFINED.

The Pulsoid measures particles individually as they pass through a solid-state nanopore, delivering high-resolution size distributions and true particle-count-based concentration measurements without relying on averaged bulk signals. This particle-by-particle approach reveals subpopulations and subtle distribution changes that are often hidden by ensemble techniques, providing clearer insight into formulation quality, stability, and process consistency.

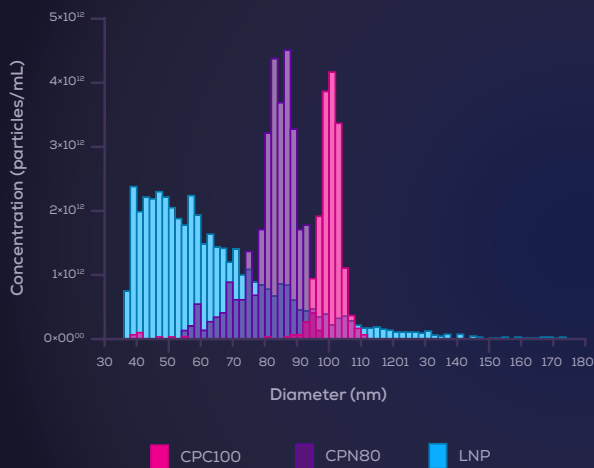


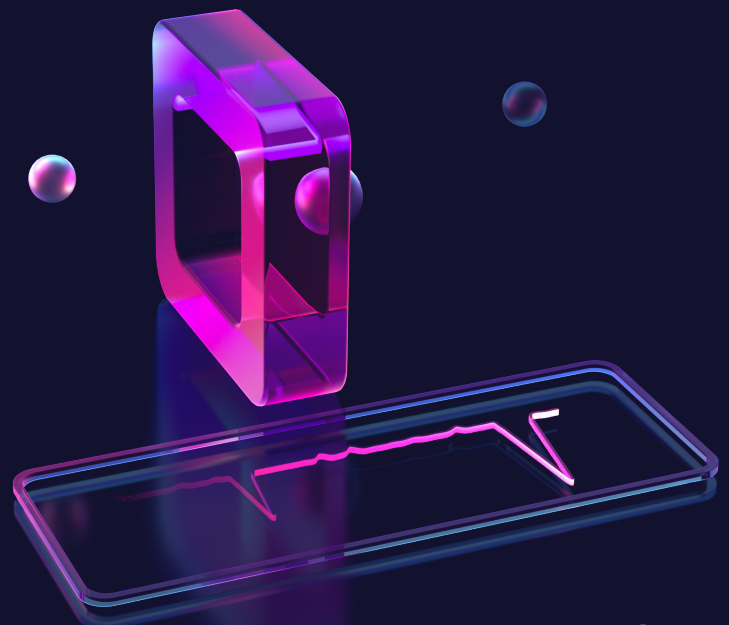
Figure 1.

Size distributions of three samples: an LNP sample, a NIST-traceable 80 nm polystyrene standard, and a 100 nm carboxylated polystyrene standard, all measured using the same chip.

A NEW SOLID-STATE NANOPORE CHIP AT THE CORE

At the heart of the Pulsoid is a new solid-state silicon nanopore chip manufactured with high precision and consistency. Fixed pore geometry enables reliable, repeatable single-particle measurements while maintaining the detail and resolution required for high-quality nanoparticle analysis.

As particles pass through the nanopore, brief changes in ionic current are measured. The magnitude of each signal correlates with particle size, the number of events reflects particle concentration, and the duration of each event enables measurement of zeta potential, allowing simultaneous, particle-by-particle analysis.



CONSISTENT, HIGH-ACCURACY SIZE MEASUREMENT

Highly accurate particle size measurements are enabled by a solid-state silicon nanopore manufactured with exceptional precision and consistency. Fixed pore geometry reduces variability associated with tunable systems, supporting reliable, repeatable measurements across samples.

Size accuracy of $100\% \pm 2\%$ ¹ has been demonstrated using NIST-traceable particle standards, with results closely aligned to TEM reference values. This accuracy is maintained for polydisperse samples, providing confidence that measured changes reflect real differences in particle size rather than measurement artefacts.

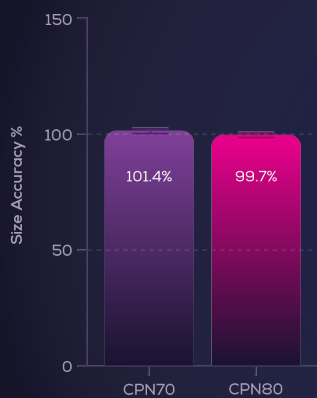


Figure 2.

NIST-traceable carboxylated polystyrene particles with nominal TEM sizes of 70 nm and 80 nm, as evaluated by the particle manufacturer, showed corresponding Pulsoid mean sizes of 101.4% and 99.7% of the TEM values, respectively ($n = 6$ for both, \pm s.e.m.).

TRUE PARTICLE-COUNT-BASED CONCENTRATION MEASUREMENT

Using direct particle counting, the Pulsoid delivers concentration measurements that scale linearly with dilution across a wide concentration range. This confirms accurate particle-by-particle concentration measurement, and contrasts with ensemble techniques that infer concentration from bulk signal intensity.

This predictable, linear response provides confidence that measured changes reflect real differences in particle number, supporting formulation development, process monitoring, and comparability studies.

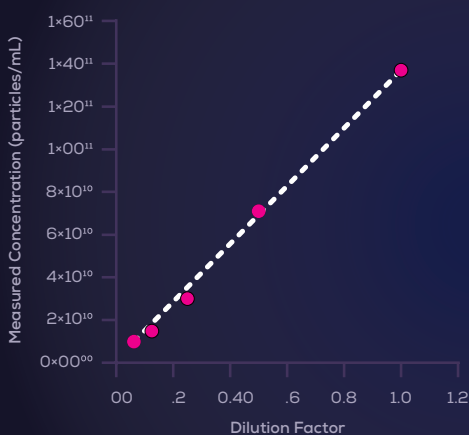


Figure 3.

Five dilutions of carboxylated polystyrene particles were measured, showing a linear relationship between measured concentration and dilution factor.

ZETA POTENTIAL AT THE SINGLE-PARTICLE LEVEL

The Pulsoid measures particle size and zeta potential simultaneously on a particle-by-particle basis, providing a more detailed view of surface charge than ensemble techniques. By analysing each particle individually, charge distributions and subpopulations can be resolved rather than averaged into a single value.

This direct, single-particle approach delivers clearer insight into formulation behaviour, stability, and process-related changes, particularly for heterogeneous samples where ensemble measurements can mask meaningful variation.

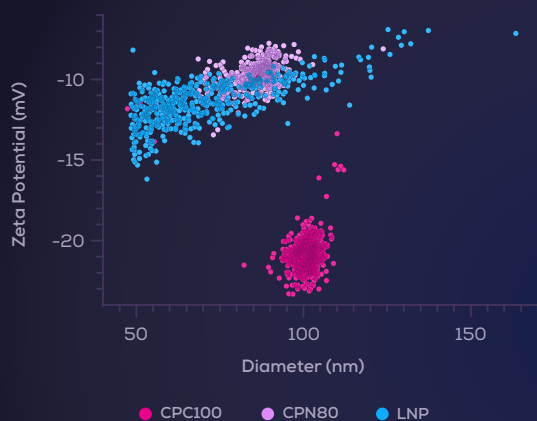


Figure 4.

Single-particle measurements of zeta potential and particle diameter reveal distinct subpopulations.

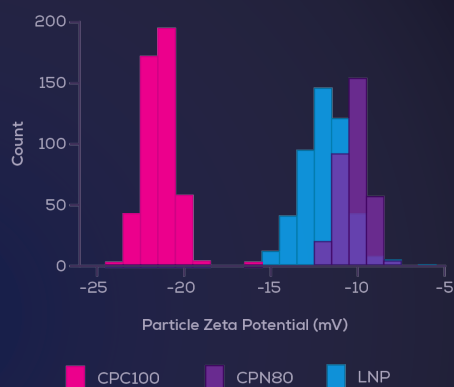


Figure 5.

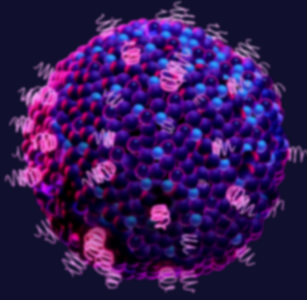
Zeta potential distributions for LNP and NIST-traceable polystyrene standards, showing clear separation and narrow charge distributions.

EASY TO USE, DESIGNED FOR THROUGHPUT

High-quality single-particle measurement is made straightforward and repeatable through a streamlined system design. Solid-state nanopore chips remove the need for recalibration across multiple measurements, while the simple fluid cell design and workflow minimise setup time, handling, and routine maintenance.

As a result, the Pulsoid enables users to generate reliable, high-resolution data in minutes², with a low learning curve and reduced between-user variability.





OPTIMISED FOR LIPID NANOPARTICLE APPLICATIONS

Developed to address the needs of researchers working with lipid nanoparticles in drug delivery and gene therapy, the Pulsoid enables detection of small but meaningful changes in particle populations. High-resolution, single-particle measurement allows subtle shifts in particle size distributions to be resolved, including changes arising from aggregation, instability, storage conditions, or processing effects. Crucially, this insight is not limited to size alone. By measuring particle size, concentration, and zeta potential, the Pulsoid provides a more complete picture of formulation behaviour and stability over time.

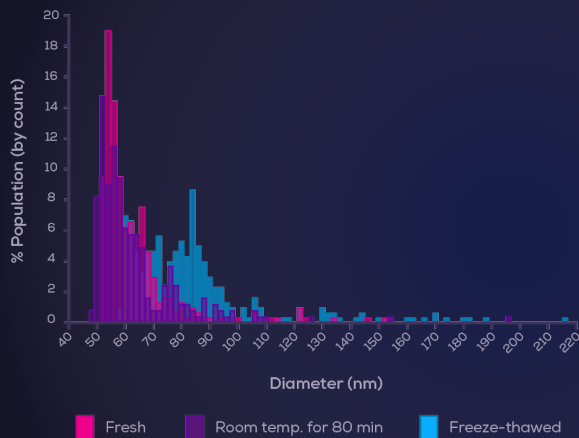
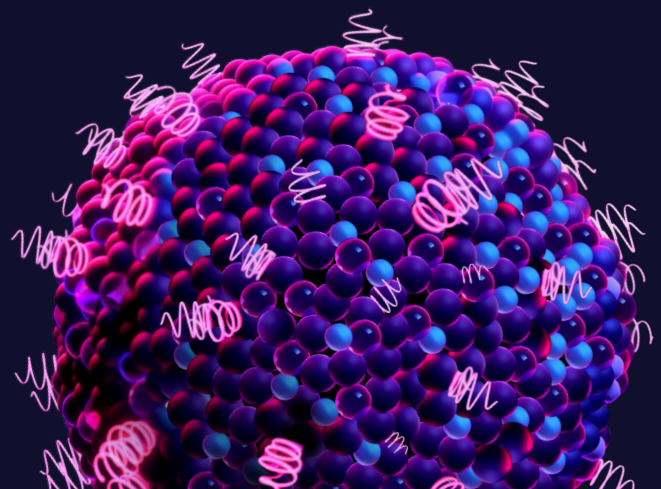
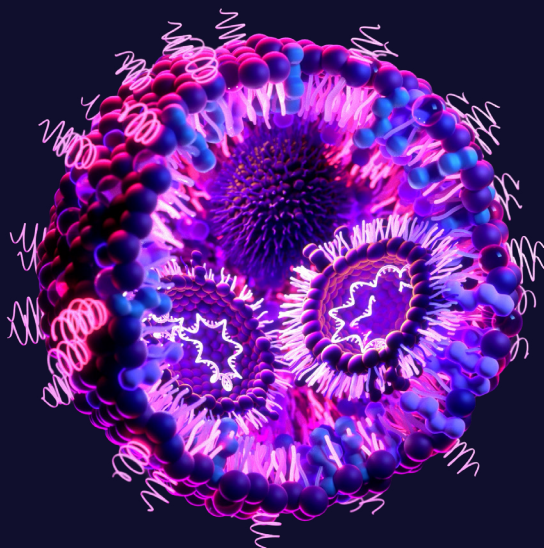


Figure 6.

Particle size distributions of lipid nanoparticle samples stored under different conditions.



CURRENT SPECIFICATIONS:

*subject to continuous improvement

- ▶ **Measurement Capabilities**
Single-particle size, concentration, and zeta potential
- ▶ **Testing Speed Per Sample**
2–5 minutes²
- ▶ **Sample Loading Volume**
70 μ L
- ▶ **Size Accuracy**
100% \pm 2%¹
- ▶ **Measurable Size Range**
40 nm – 140 nm, additional sizes coming
- ▶ **Concentration Range**
 1×10^9 to 1×10^{12} particles/mL

¹Size accuracy demonstrated using NIST-traceable particle standards within the validated measurement range. Accuracy varies across the measurable size range.

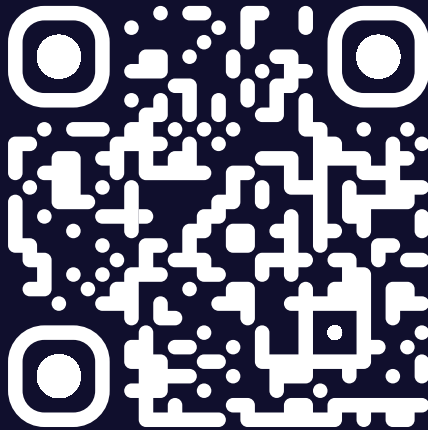
²Measurement time and ease of use vary based on sample characteristics. A measurement time of 2 to 5 minutes assumes multiple samples are measured within a single session.

LOOKING AHEAD

Ongoing nanopore, fluid cell, and software enhancements are expected to expand performance specifications, including:

- ▶ Additional pore sizes to support a broader particle size range
- ▶ Development of calibration-free protocols
- ▶ Simplified chip loading through a fully disposable fluid cell consumable

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