

Contact Us

Find out more: www.resuntech.com

For questions, email: NanoCoulter@resuntech.com

RESUN (SHENZHEN) TECHNOLOGY CO., LTD.

(+86) 400 660 7966

Room 1306
596 Dahe Road
Shenzhen 518110
China

NanoCoulter™

Particle Analyzer

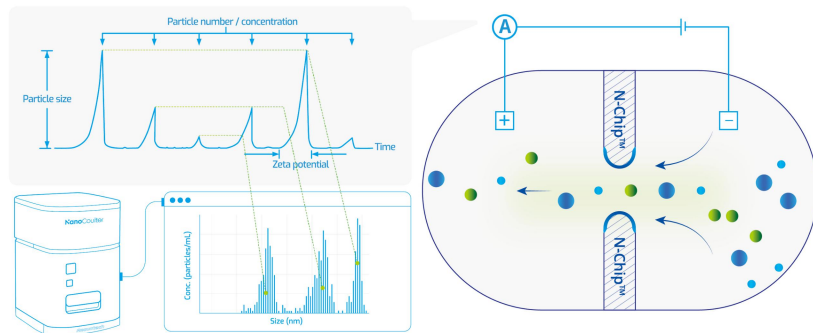
TEM-Comparable
Resistive Pulse Sensing Technology

Single-Nanoparticle Characterization Expert



What is NanoCoulter?

NanoCoulter™ employs the resistive pulse sensing (RPS, also known as Coulter) principle. When the voltage is applied in electrolyte, as each particle passes through the nano-aperture of the NanoCoulter™ N-Chip™, it causes a resistance change and generates a potential pulse. NanoCoulter™ accurately analyzes these pulses to obtain multi-dimensional data, including particle size, concentration, and zeta potential, etc.



Engineered for researchers and quality control professionals across diverse industries, NanoCoulter™ instruments offer unparalleled accuracy, precision, and reproducibility, delivering real-time insights into multidimensional particle analysis.



From biopharmaceuticals to advanced materials and environmental science, NanoCoulter™ empowers your lab with reliable, first-time results — eliminating uncertainty, removing the need for revalidation, and accelerating every discovery with data that reflects true reality.

How it Works



Why choose NanoCoulter?



Ture Particle-by-particle Detection

Precise analysis of polydisperse or heterogeneous samples as each particle passes through the nano-aperture.



Multifunctional

All-in-one high-resolution analysis of single-particle size, concentration, and zeta potential.



Super Accuracy and Precision

Highly linear concentration measurements ($R^2 > 0.999$) and consistently low CV% across all tests.



High Resolution and Sensitivity

1 nm particle size resolution for high-precision applications — comparable to TEM.



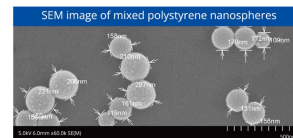
True-to-sample Results

Unaffected by optical properties of particles, delivering non-fitted, highly accurate data reflecting the true state of samples.



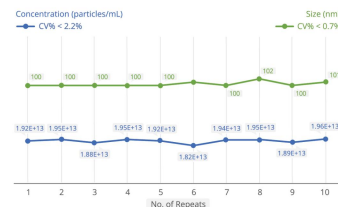
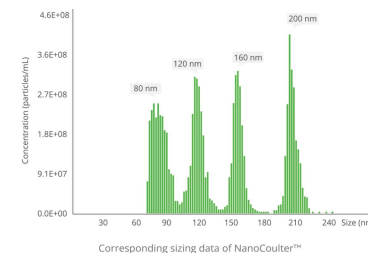
Easy to Use

Pre-calibrated chips with simple, maintenance-free operation and user-friendly software. No washing, clogging, or calibration needed.



Electron Microscopy-Comparable Particle Size Determination

NanoCoulter™ measures both the particle size and size distribution of polydisperse samples, delivering EM-consistent results with exceptional accuracy and precision.

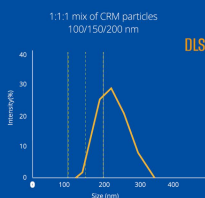


10 Repeated Tests of the 100 nm Standard Nanosphere

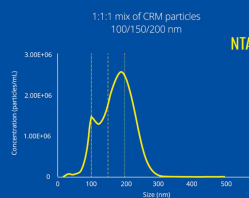
Highly Accurate and Repeatable Concentration Measurement

NanoCoulter™ demonstrates a strong linear correlation with theoretical concentration, with a CV% of < 5% across 10 repetitions.

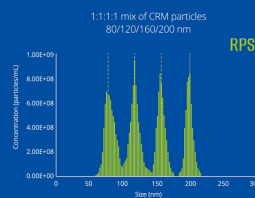
Beyond the Limits of Optical DLS and NTA



DLS cannot accurately measure polydisperse samples, causing size deviations and failing to determine particle concentration.



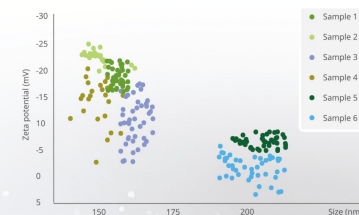
NTA could discern the bimodal mixture but not the trimodal or quadrimodal mixture.



RPS differentiates multimodal mixtures with high resolution, measuring actual diameter without prior particle knowledge.

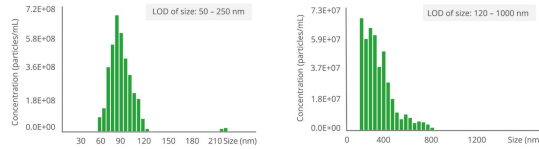
Single-Particle Zeta Potential Analysis

NanoCoulter™ records particle passage time through the nanopore to obtain zeta potential data, making RPS the only technology to date that simultaneously measures single-particle size, zeta potential, and their interrelationship as well.

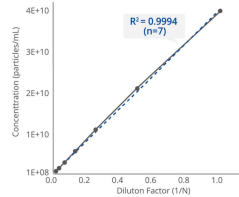


"RPS measurements do have very high concordance with TEM data." — MISEV 2023

RPS technology, a non-optical method, is ideal for orthogonal validating TEM and flow cytometry. NanoCoulter™ offers accurate size distribution analysis with a defined size LOD (50 nm) and a broad linear concentration range (5×10^7 – 2×10^{11} particles/mL), making it indispensable for EV research.

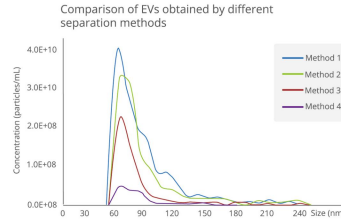


Serial dilution EVs concentration range measured by NanoCoulter



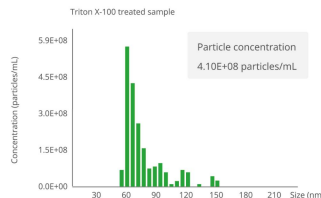
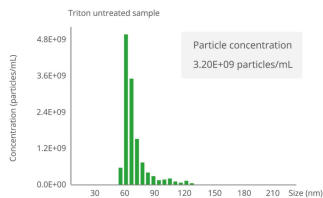
Investigation of EV Isolation Methods

EVs purification often requires multiple steps. NanoCoulter™ quickly and accurately evaluates the impact of different methods on EV size and concentration.



Purity Assessment of EVs

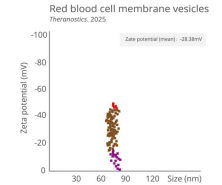
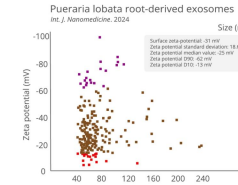
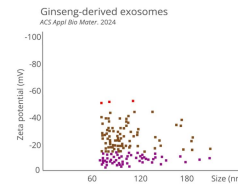
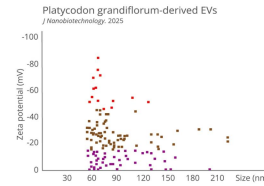
Rapid quantitative assessment of EV or exosome purity by measuring the particle concentration of treated and untreated samples by detergent-lysis. Purity = $(1 - \text{post-lysis concentration} / \text{pre-lysis concentration}) \times 100\% = 87.2\%$



Extracellular Vesicles (EVs) and Exosomes

EV Zeta Potential Characterization

Zeta potential is a key parameter for evaluating EV stability, surface charge characteristics, and in vivo interactions. It directly influences adsorption, targeted delivery, and circulation time within biological systems. Traditional optical methods (DLS/NTA) can only provide an ensemble-averaged potential, failing to capture sample heterogeneity. NanoCoulter™ enables single-particle zeta potential measurement, offering precise insights into EV population heterogeneity—advancing research and applications in EV-based therapeutics.



"NTA is known to be very inaccurate to size and assess concentration of EVs. I strongly suggest performing more accurate EV sizing in the relevant <100 nm range like resistive pulse sensing, cryo-electron microscopy, single particle interferometric imaging, or super resolution microscopy."

— A peer reviewer of *Nature Communications Journal*
Nat Commun. (2024) 15:2292



NanoCoulter™ models for EV research

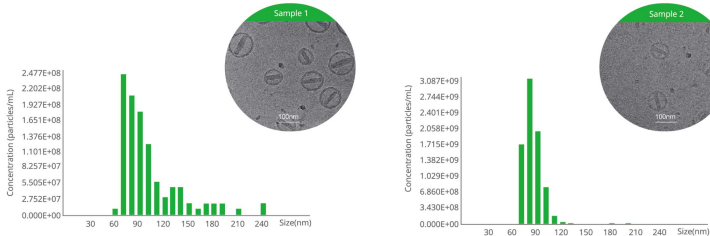
	Scale	Exact	Gauge
Size	50 – 400 nm	50 – 2000 nm	50 – 2000 nm
Concentration	●	●	●
Zeta Potential	○	○	●

Liposome and Lipid Nanoparticles (LNPs)



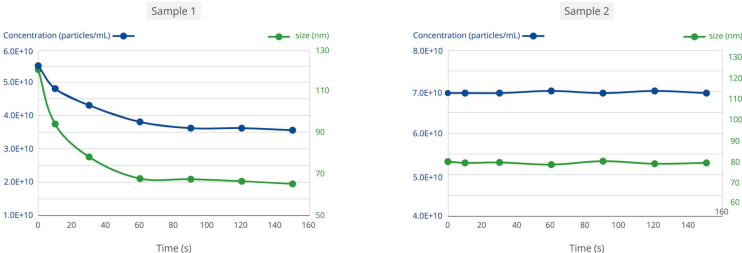
Sizing with TEM Accuracy. No TEM Required.

TEM data from different batches of liposome samples visually demonstrate the high precision, resolution, and accuracy of NanoCoulter™ detection.



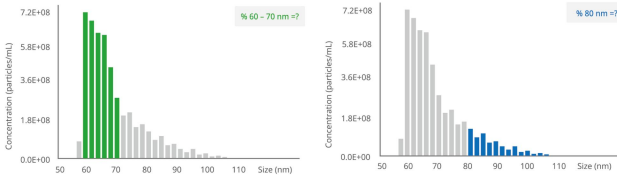
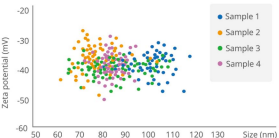
Stability Study of Lipid-based Drugs

NanoCoulter™ precisely evaluates lipid-based drug delivery systems stability which varies and impacts the drug usage. Minimal changes in size and concentration after vortexing over varying durations reveal the superior stability of Sample 2.

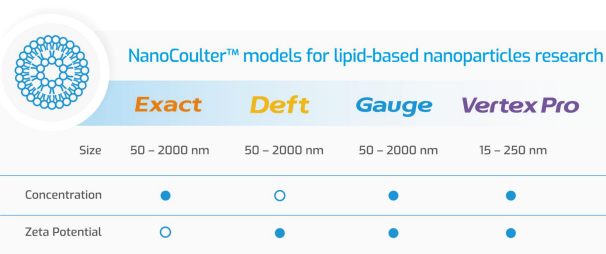


Particle Size Composition & Zeta Potential Analysis of LNPs

Particle size and distribution are CQA for LNP drugs, varying with preparation methods and these differences are often misrepresented by DLS. NanoCoulter™ accurately analyzes size distribution, concentration, and percentage of custom-gated size fractions, while precisely correlating individual particle size with zeta potential across various LNP formulations.



Sample	60 nm – 70 nm			> 80 nm		
	Size	Conc.	%	Size	Conc.	%
1#	64	3.4E+13	61.2%	84	2.9E+12	5.2%
2#	63	3.0E+13	59.5%	84	2.5E+12	5.0%

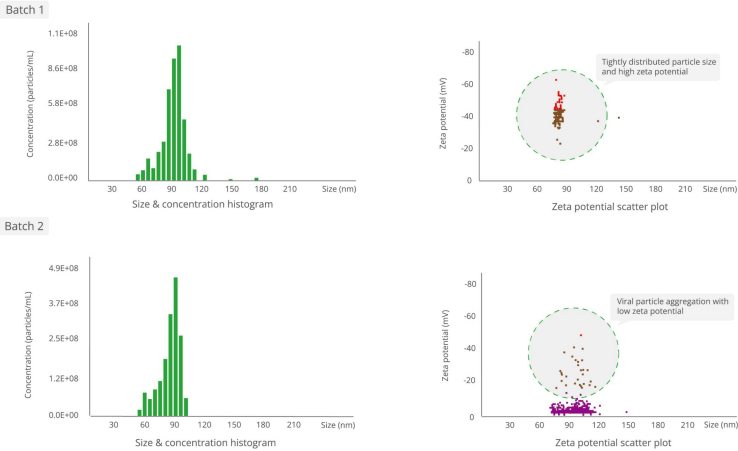


"This RPS-based instrument measures individual particles and gives us the actual particle sizes. That means we can track how LNPs change throughout the process—seeing which ones increase or decrease, whether the overall size shifts, or if some particles get bigger while others get smaller. We've validated NanoCoulter using a standardized method, and it consistently achieves a very low CV."

— Dr. Chason Liu
Senior R&D Manager
mRNA Vaccine Program
SINOVAC

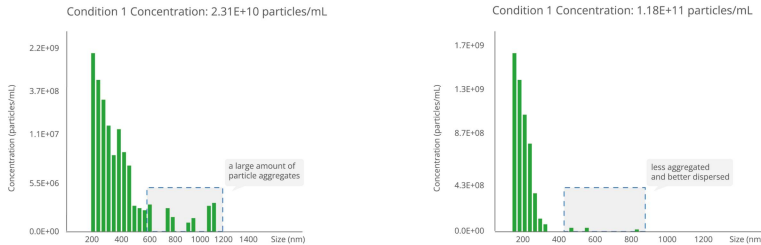
Batch-to-Batch Quality Control in Adenovirus Production

Cell culture conditions, including medium composition, temperature, and pH, influence adenovirus production efficiency. NanoCoulter™ enables real-time monitoring of virus concentration, size distribution, and zeta potential, facilitating rapid batch assessment and process optimization.



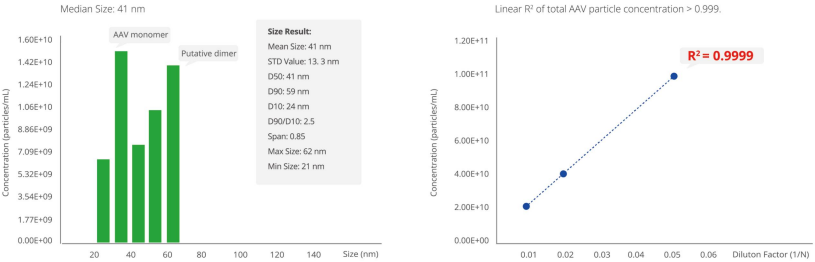
Aggregation Analysis of Poxvirus

The virus's storage conditions impact aggregation, with increased aggregates reducing infectivity. NanoCoulter™, with its high particle size resolution, is one of the best methods, aside from TEM, for quickly and accurately assessing aggregation. Viral particles in Condition 2 display significantly greater dispersion than those in Condition 1.



Virus and Virus-like Particles (VLPs)

Quantification of AAV Particle Concentration



AAV Aggregation Analysis and Inter-batch QC



NanoCoulter™ models for virus research

	Vertex	Exact	Gauge	Vertex Pro
Size	15 – 60 nm	50 – 2000 nm	50 – 2000 nm	15 – 250 nm
Concentration	●	●	●	●
Zeta Potential	○	○	●	●

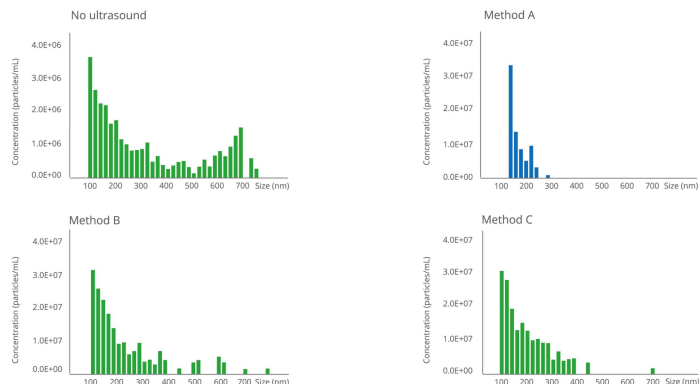
“Unlike nano-flow cytometry, which requires daily calibration with reference standards, NanoCoulter comes pre-calibrated from the manufactory. For critical QC processes such as concentration for release testing, I would choose NanoCoulter for its reliability and consistency.”

– The CTO of a pioneering CGT enterprise

Nanomaterials

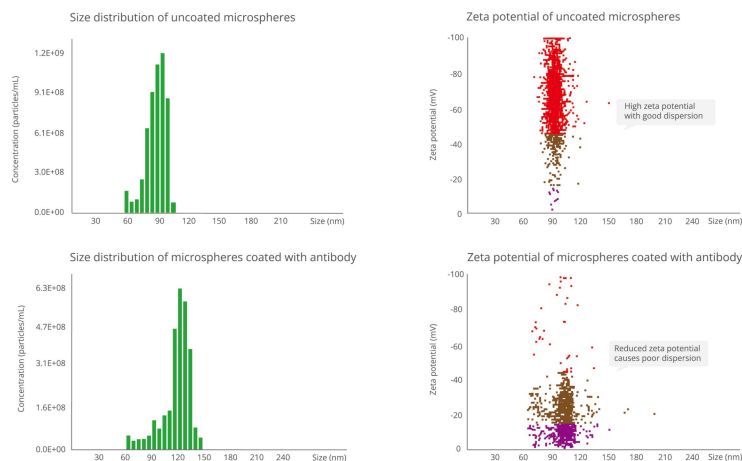
Magnetic Nanoparticles

The uniformity of magnetic nanobeads is crucial due to their tendency to aggregate. NanoCoulter™ accurately measuring particle size and distribution, revealing that ultrasonic Method A offers the best dispersion.



Latex Nanospheres

NanoCoulter™ enables precise analysis of nanosphere size and zeta potential changes before and after antibody coating, effectively monitoring aggregation. Ultrasonication or other treatments can be used to address this issue.



Intelligent Software

NanoCoulter™ instruments are equipped with user-friendly software that simplifies data collection and analysis.

User-Friendly Operation

Designed with an intuitive interface, it simplifies workflows, making particle analysis accessible even for non-expert users.

FDA 21 CFR Part 11 Compliance

Meets regulatory requirements with secure data management and audit trails, ensuring compliance in pharmaceutical and biopharmaceutical applications.

Real-Time Monitoring

Real-time monitoring of single-particle size, zeta potential, and number concentration, providing clear and accurate experimental results.

Universal Compatibility

A single software platform supports all NanoCoulter family. Forward-looking design enables continuous updates and improvements, with the flexibility to add new features based on user requirements.

Consumables

Cat#	Description
Chips	
A6	NanoCoulter™ Size-concentration N-Chip™ C1
X03	NanoCoulter™ Size-concentration N-Chip™ C5
GX03	NanoCoulter™ Size-concentration N-Chip™ GC5
X01	NanoCoulter™ Size-concentration N-Chip™ C10
X06	NanoCoulter™ Size-concentration N-Chip™ C20
E14	NanoCoulter™ Size-concentration N-Chip™ C30
Z03	NanoCoulter™ Size-zeta potential N-Chip™ P5
Z06	NanoCoulter™ Size-zeta potential N-Chip™ P20

Cartridge	TC02	NanoCoulter™ Sample Loading N-Cartridge™
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Free with any chip

Reagents	001	NanoCoulter™ N-1™ Sample Dilution Buffer: 0.5X PBS (for N-Chip™ C30)
	002	NanoCoulter™ N-2™ Sample Dilution Buffer: 0.5X PBS with surfactants (for N-Chip™ C30)
	003	NanoCoulter™ N-3™ Sample Dilution Buffer: 1X PBS (for N-Chip™ C5/GC5/C10/C20/P5/P20)
	004	NanoCoulter™ N-4™ Sample Dilution Buffer: 1X PBS with surfactants (for N-Chip™ C5/GC5/C10/C20/P5/P20)
	013	NanoCoulter™ N-13™ Sample Dilution Buffer: 10X PBS (for N-Chip™ C1)
	014	NanoCoulter™ N-14™ Sample Dilution Buffer: 10X PBS with surfactants (for N-Chip™ C1)



Stop wasting time
questioning your data.
Trust reliable results
— first time, every time!

Which NanoCoulter is Right for Me?



NanoCoulter™
Vertex



NanoCoulter™
Scale



NanoCoulter™
Exact



NanoCoulter™
Deft



NanoCoulter™
Gauge



NanoCoulter™
Vertex Pro

Number of Channels		1	1	2	2	2	2
Particle Size	Range (Compatible N-Chip™)	15 - 60 nm (C1)	50 - 250 nm (C5) 75 - 400 nm (C10)	50 - 250 nm (C5) 120 - 1000 nm (C20) 250 - 2000 nm (C30)	50 - 250 nm (GC5) 120 - 1000 nm (C20) 250 - 2000 nm (C30)	50 - 250 nm (GC5) 120 - 1000 nm (C20) 250 - 2000 nm (C30)	15 - 60 nm (C1) 50 - 250 nm (GC5)
	Accuracy (Recovery%)	100 ±6%	100 ±6%	100 ±6%	100 ±6%	100 ±6%	100 ±6%
	Precision (CV%)	< 3%	< 3%	< 3%	< 3%	< 3%	< 3%
Concentration	Range (particles/mL)	$1 \times 10^{10} - 1 \times 10^{12}$	$1 \times 10^7 - 3 \times 10^{11}$	$2 \times 10^6 - 3 \times 10^{11}$	—	$2 \times 10^6 - 3 \times 10^{11}$	$1 \times 10^7 - 1 \times 10^{12}$
	Accuracy (Recovery%)	100 ±10%	100 ±10%	100 ±10%	—	100 ±10%	100 ±10%
	Precision (CV%)	< 5%	< 5%	< 5%	—	< 5%	< 5%
Zeta Potential	Range (Compatible N-Chip™)	—	—	—	0 - ±100 mV (P5/P20)	0 - ±100 mV (P5/P20)	0 - ±100 mV (P5)
	Accuracy	—	—	—	±3 mV	±3 mV	±3 mV
	Precision (CV%)	—	—	—	< 5%	< 5%	< 5%
Testing Speed per Sample		2 - 3 (up to 15) min	2 - 3 (up to 15) min	2 - 3 (up to 15) min	2 - 3 (up to 15) min	2 - 3 (up to 15) min	2 - 3 (up to 15) min
Volume per Sample		200 µL after dilution	200 µL after dilution	200 µL after dilution	200 µL after dilution	200 µL after dilution	200 µL after dilution
Operating System		Windows 7+ Pro/Ent	Windows 7+ Pro/Ent	Windows 7+ Pro/Ent	Windows 7+ Pro/Ent	Windows 7+ Pro/Ent	Windows 7+ Pro/Ent
IQ/OQ Option		Yes	Yes	Yes	Yes	Yes	Yes
21 CFR Part 11 Option		Yes	Yes	Yes	Yes	Yes	Yes
Dimensions - W × D × H		11 in × 14 in × 17 in	11 in × 14 in × 17 in	11 in × 14 in × 17 in	11 in × 14 in × 17 in	11 in × 14 in × 17 in	11 in × 14 in × 17 in
		28 cm × 36 cm × 44 cm	28 cm × 36 cm × 44 cm	28 cm × 36 cm × 44 cm	28 cm × 36 cm × 44 cm	28 cm × 36 cm × 44 cm	28 cm × 36 cm × 44 cm
Weight		26 lbs (12 kg)	26 lbs (12 kg)	26 lbs (12 kg)	26 lbs (12 kg)	26 lbs (12 kg)	26 lbs (12 kg)