Particle Works

Automated Nanoparticle System

particle-works.com

Optimize your formulation and process development with the Automated Nanoparticle (ANP) System.

The ANP System is designed to speed up your process development through greater efficiency and precision when generating nanoparticles at small-scale with reduced amounts of precious cargo. Built around our reusable and robust microfluidic chips, you can reproducibly and reliably generate particles for a broad range of applications from 40 nm to 800 nm with ease.

Simple to set up and featuring walk-away automation, the System can run 15 experiments in less than 20 minutes, letting you get on with other tasks in the lab at the same time. Its flexibility means you can change critical parameters easily that are logged and can be exported in common formats for traceability.

Monodispersity
Excellent PDI and encapsulation efficiency.

Scalability
From 200 µl to continuous production.

Flexibility
Easy to set up and modify parameters.

Speed
Rapid optimization timeframes.

Cost saving
Reduced reagent use and reusable chips.

No IP Licensing
No tying in to licencing models.

We've seen what's possible when brilliant minds come together to focus and find the answers. You continue to inspire us with the incredible work you're doing and we champion your commitment to push the boundaries of science.

We care deeply about the revolutionary change our technology can bring and the powerful impact it will have. Let's shape the big picture together, one particle at a time.

System overview

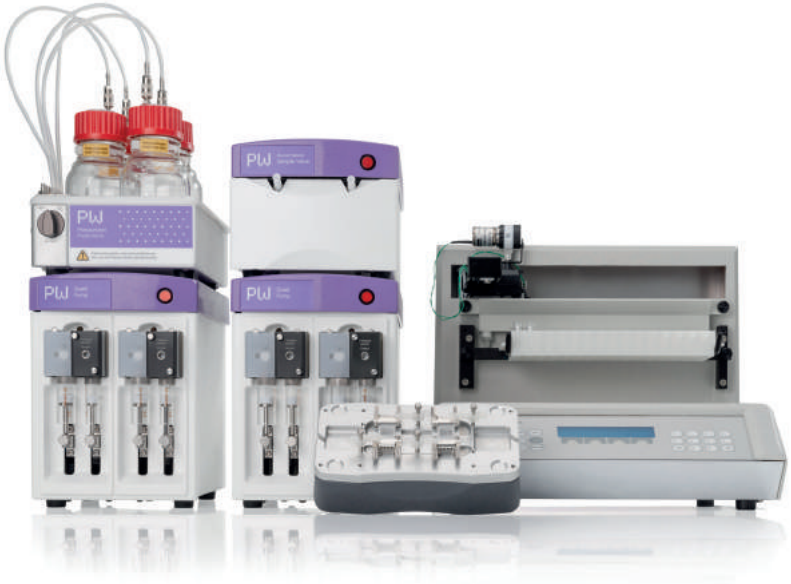
The ANP System has been designed for nanoparticle process development and pre-clinical production. It revolutionizes nanoparticle synthesis by providing reliable, reproducible and higher throughput production, whether you are making liposomes, lipid nanoparticles (LNPs) or polymer-based nanoparticles.

The platform is easy to use, automated, and highly modular, incorporating our precision engineered microfluidic technology and utilizing our in-house designed and fabricated, reusable microfluidic chips for controlled convergence of fluids within the pathway. It can automate dozens of experiments for screening and optimization, utilizing a fixed pair of reagents in sample loops up to 10 ml. It can also operate in continuous production mode, facilitating production of tens of liters per day.

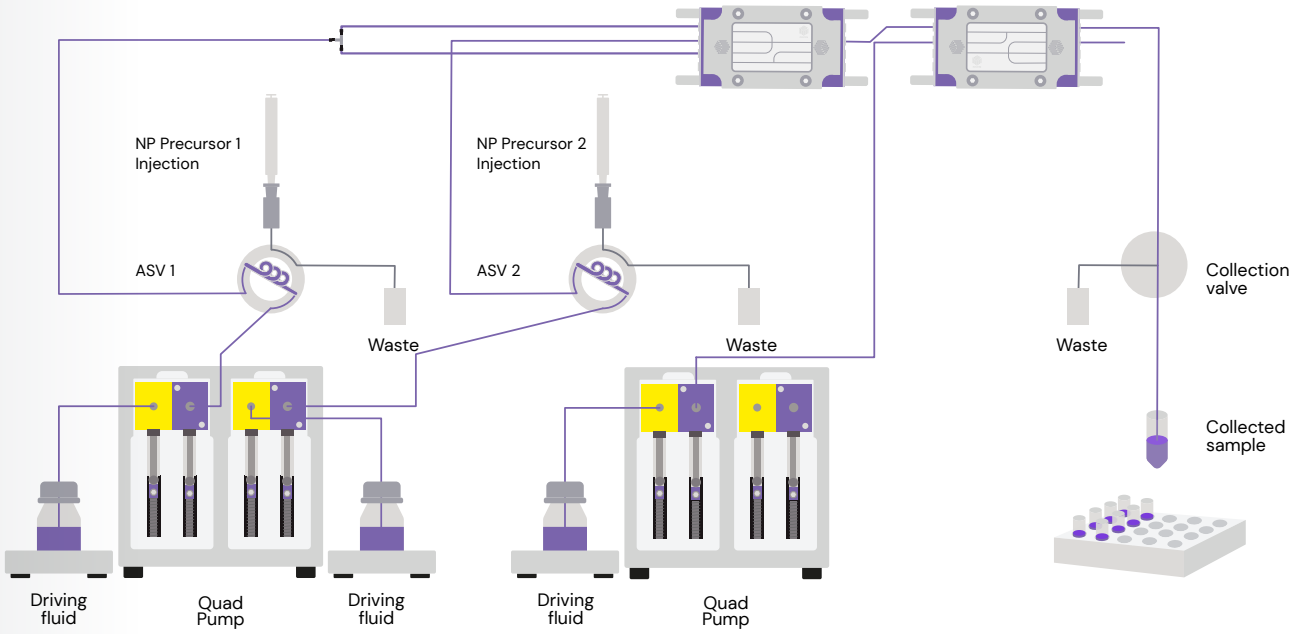
System modules:

- **Quad Pump** – an automated two-channel syringe pump designed to aspirate fluids from a source bottle and dispense into the system, ensuring accurate dosing, continuous flow and consistent nanoparticle generation.
- **Automated Sample Valve (ASV)** – chemically resistant valves (6 port, 2 position) enabling direct injection of fluids into interchangeable sample loops.
- **Pressurized Fluid Store (PFS)** – to facilitate operation at high flow rates in continuous production mode.
- **Automated Collector** – for automatic sample collection, supplied with 2 ml and 8 ml vial racks.

Particle size	Particles ranging from 40 nm to 800 nm.
Particle monodispersity	Extremely monodisperse with PDI ~0.1 - 0.2.
Sample volume	200 µl to continuous production.
Speed	10 samples collected within 15 minutes.
Automation	The system software allows easy creation of protocols to automatically process many different experiments from a single sample loading which will be run without human interference.
Flexibility	The modular system can be paired with a range of glass chips and sample loops tailored to your specific application. Can be used to manufacture a wide range of nanoparticles from LNPs to polymers.
Scalability	From screening to production using same chip allowing production volumes from µl to liters per day.
Budget-friendly	Excellent encapsulation efficiency coupled with very low sample use and reusable glass microfluidic chips provide a very cost effective and environmentally responsible solution.

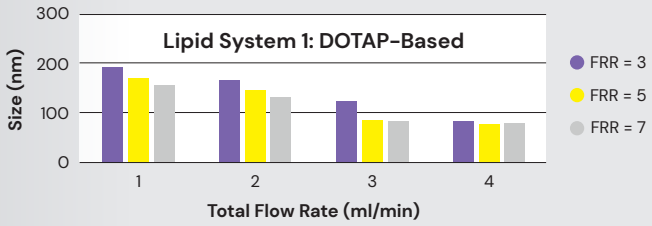


How the ANP System works:



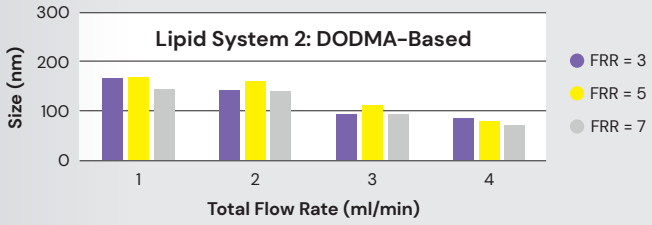
Let the data speak for itself:

The ANP System enables control over LNP size and Encapsulation Efficiency. Particle size can be controlled by total flow rate (TFR) and flow rate ratio (FRR), maintaining high encapsulation efficiency throughout, as shown in the data below.*



Encapsulation Efficiency (%)

		TFR (ml/min)			
		1	2	3	4
FRR	3	98	98	98	97
	5	97	97	97	97
	7	97	97	96	96

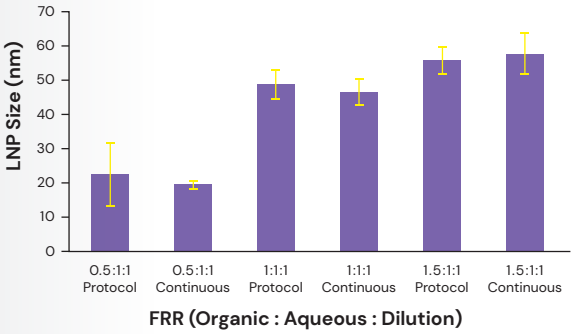


Encapsulation Efficiency (%)

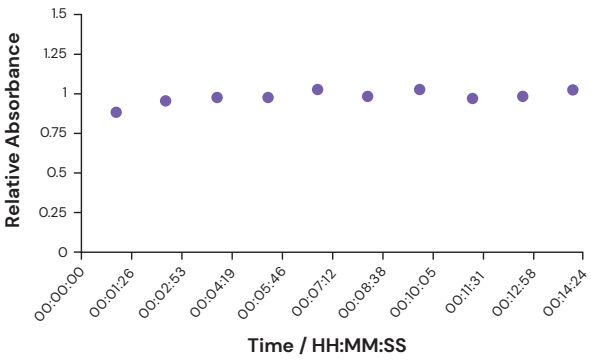
		TFR (ml/min)			
		1	2	3	4
FRR	3	85	90	94	94
	5	86	89	95	97
	7	91	93	94	94

*Data courtesy of Phosphorex

LNPs produced using a range of FRRs from either protocol (2 ml sample) or continuous production mode (> 20 ml sample), using a 3 ml/min TFR. The LNP sizes differed by < 7 nm between protocol and continuous mode, PDI < 0.2, with S.D. = 0.01 (represented by error bars).



The graph below shows 10 samples collected within 15 minutes, from a single protocol on the ANP System, with high sample concentration consistency between experiments.



Rooted in microfluidics

Under Dolomite Microfluidics (part of Blacktrace Holdings Ltd), we've been at the forefront of microfluidics and working with particles for nearly two decades. We've listened to our customers and launched a dedicated particles brand, designing and building game-changing particle engineering platforms which will allow you to produce nanoparticles with unrivalled precision, consistency, & control, whilst reducing your development time and cost.

What makes us unique is our combined capabilities: a strong history of particle engineering, scientific knowledge, microfluidic expertise, and in-house chip design and fabrication. We also offer a proof of principle service, offering you the opportunity to test your protocol and Active Pharmaceutical Ingredients (APIs) prior to purchase.

We pave the way for particle perfection - delivering unrivalled accuracy, quality, consistency, and efficiency: from our technology and custom studies to our customer support.

Advantages of microfluidics

Continuous flow process provides a small and consistent reaction window as fluids converge precisely providing:

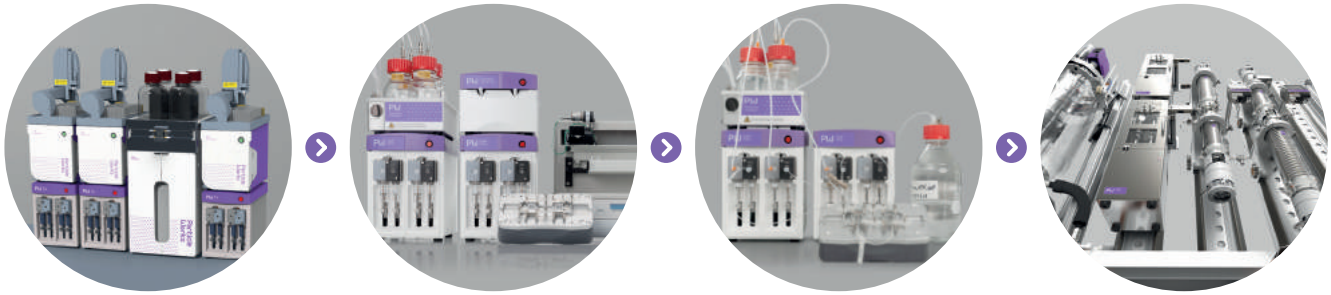
- Unparalleled consistency of particle size and monodispersity.
- Higher encapsulation efficiency with controlled payload release.
- Higher reproducibility and linearly scalable processes.
- Lower sample volumes and reduced waste, ideal for screening and development.
- Negates particle damage caused by mechanical mixing.
- Faster, easier to optimize protocols.
- Scalability – produce µl to liters with the same chip.

Engineering a future worth experimenting for together

As we look to the future, we have more exciting platforms in our product pipeline that will take you all the way from formulation screening, and protocol development to GMP scale-up and large-scale production.

Let's zoom in to make big change, one particle at a time.

Your pathway to particle perfection



Screening | Protocol development | Initial scale-up | Production

Contact us

info@particle-works.com
particle-works.com

So, if you are interested in what we do, please do come and talk to one of the experts in our team. We'd love to tell you more about our technology, and demonstrate how you can revolutionize your workflow.