

# NanoAssemblr<sup>®</sup> Benchtop

Develop Future Nanomedicines



**NanoAssemblr**

# Develop the Future of Medicine

## Overcome key challenges in advancing nanomedicines:

### Challenges with conventional production methods

### Solutions with the NanoAssemblr™ Benchtop

#### Inconsistent Results

Leads to poor quality particles, and unreliable data

#### Reproducibility

Computer control removes batch-to-batch and user variability

#### Inability to Control Size

Materials dictate size, making comparisons of activity between materials difficult

#### Controlled Assembly

Tune particle size with identical composition using precise control of fluid flow rates

#### Costly Scaling Redevelopment

Changing scale of formulations affects their properties, requiring expensive, time consuming process redevelopment

#### Scalability

Easily scale formulations up to 15 mL. Conserved microfluidic geometry allows direct scale-up to the Blaze™ and 8x Scale-Up systems

#### Limited Productivity

Long, complex processes lengthens the production time of formulations, and increase the risk of process error or failure

#### Speed and Efficiency

Formulation runs require less than a minute. 30 - 40 formulations can be completed in a day for rapid optimization

#### Process Requires Expertise

Projects require numerous experienced specialists, long training periods, and carry significant risk with staff turnover

#### Intuitive Work Flow

Advanced microfluidics are simplified with an intuitive software interface and no complex fluidic connections

**The NanoAssemblr platform is trusted by over 200 biopharmaceutical companies and research institutes**



# Accelerate Nanomedicine Development

The NanoAssemblr Benchtop is ideal for nanomedicine formulation development and optimization.



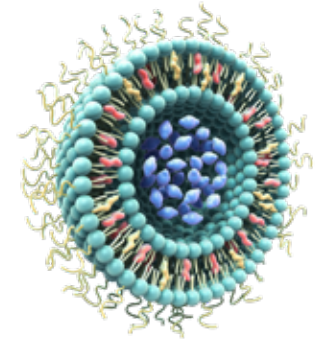
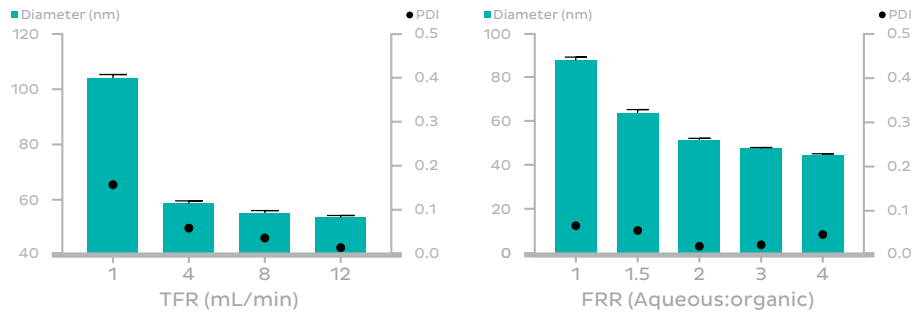
## Exceptional Versatility

The NanoAssemblr Benchtop has been used to advance the development of a wide variety of nanomedicines encapsulating diverse active materials.

PARTICLE TYPE	ACTIVE INGREDIENT	EXAMPLE APPLICATION	CARRIER MATERIALS
Nucleic acid Lipid Nanoparticles (LNP)	Nucleic Acids Peptides and Proteins Small Molecules Imaging Contrast Agents	<ul style="list-style-type: none"> <li>Rare genetic diseases</li> <li>mRNA protein replacement</li> <li>mRNA vaccines</li> <li>Gene and cell therapy</li> </ul>	<ul style="list-style-type: none"> <li>Ionizable lipids</li> <li>Phospholipids</li> <li>Cholesterol</li> <li>PEG-Lipids</li> </ul>
Liposomes		<ul style="list-style-type: none"> <li>Vaccine adjuvants</li> <li>Antimicrobials</li> <li>Cancer chemotherapy</li> <li>Diabetes combination therapy</li> </ul>	<ul style="list-style-type: none"> <li>Phospholipids</li> <li>Cholesterol</li> <li>PEG-Lipids</li> </ul>
Polymer NPs		<ul style="list-style-type: none"> <li>Cancer chemotherapy</li> <li>Targeted protein delivery</li> <li>Controlled release/biodistribution</li> <li>Immuno-oncology</li> </ul>	<ul style="list-style-type: none"> <li>Poly-lactides (ex: PLGA)</li> <li>Block copolymers (ex: PEG-b-PLGA)</li> <li>Polysaccharides (ex: chitosan, cellulose)</li> </ul>
Emulsions		<ul style="list-style-type: none"> <li>Cancer chemotherapy</li> <li>Drug formulation</li> <li>Controlled release/biodistribution</li> </ul>	<ul style="list-style-type: none"> <li>Triolein/POPC</li> <li>Oil/Surfactant</li> </ul>
Organic/Inorganic NPs		<ul style="list-style-type: none"> <li>Theranostics</li> <li>Imaging</li> </ul>	<ul style="list-style-type: none"> <li>Lipids</li> <li>Noble metal NPs</li> <li>Rare Earth Metals</li> <li>III-V semiconductors</li> </ul>

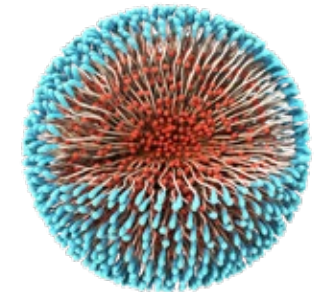
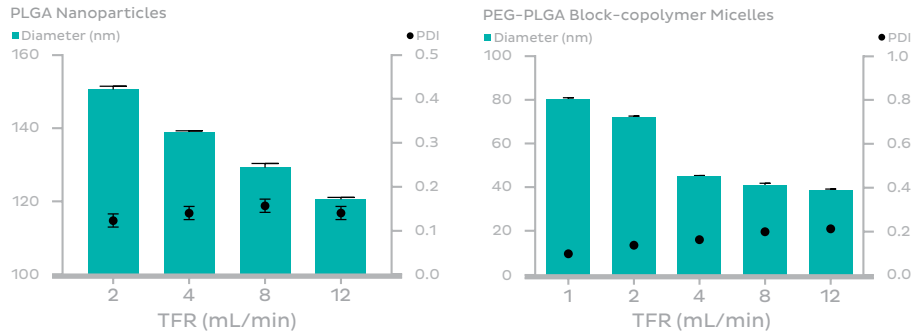
# Versatile, Reproducible, and Scalable Formulation

## Optimize liposomal drug delivery systems



Easily tune liposome size by changing Total Flow Rate (TFR) and Flow Rate Ratio (FRR).

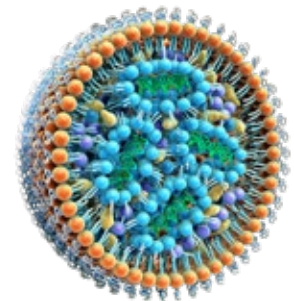
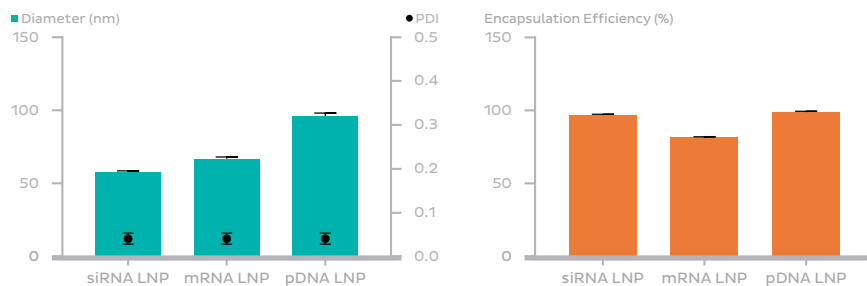
## Develop polymeric drug delivery systems



Easily tune size by changing Total Flow Rate (TFR). Control polymer nanoparticle size with instrument parameters.

Control block-copolymer micelle size with instrument parameters.

## Advance genetic medicine formulations



Optimize lipid nanoparticles (LNPs) for encapsulation and delivery of diverse nucleic acid therapeutics.

# NanoAssemblr Users are Transforming Medicine

## The NanoAssemblr platform has been featured in over 100 scientific publications

### Cell Reports Report

#### Dual drug-loaded liposomes for combination therapy

Yvonne Perrie's lab at Strathclyde University have demonstrated simultaneous liposome formation and loading with 2 small molecules. This dramatically reduces complexity of liposome production, while allowing combination therapies.

Jonathan G. Price, Amy Mendenhall Smith, Miles C. Fisher, Lucinda Brown, James Shields, Craig Cook, Philipp Lippman, James Bellon, Alexander Green, Melissa Pyle, Alan Kitchin, Wang H. Wang, William George Goodwin, Walter H. Bragan, Yong Chang, and David J. Cole. Therapeutics, Cambridge, MA 02142, USA.

Abstract

View Article Online

### Targeted Therapy

Dan Peer's lab at Tel Aviv University have developed antibody-targeted nanoparticles for delivery of RNA to specific immune cells following systemic administration.

Abstract: We report on the development of a novel targeted RNA delivery system for the treatment of cancer. The system consists of a lipid nanoparticle (LN) that is targeted to specific immune cells via an antibody. The LN is loaded with a small interfering RNA (siRNA) that targets a specific gene. The antibody is conjugated to the LN surface via a linker that allows for the LN to be internalized by the target cell. The siRNA is then released from the LN and targets the gene, leading to a reduction in gene expression. This system shows promise for the treatment of cancer and other diseases.

### mRNA Vaccines

Moderna Therapeutics are revolutionizing vaccine development. Delivering mRNA instead of live or attenuated viruses reduces vaccine development time potentially allowing rapid response to new or changing pandemics.

There are the plasmids to construct mRNA vaccines that are defined only by the nucleotide sequence and do not depend on natural processes. Plasmids are the readily generated, but they appear to a variety of transport systems, including the genetic. Half after we achieved another new generation, and the way into the genome, it's a thing.

We have studied several potential pathways to mRNA vaccines. The first pathway is to use a live virus. The second pathway is to use a virus-like particle (VLP). The third pathway is to use a lipid nanoparticle (LN). The LN pathway is the most promising.

### Controlling Biodistribution

Shyhdar Li's lab at the University of British Columbia demonstrated size dependent control over the biodistribution of a drug-conjugated polymer nanoparticle. They observed differences in the biodistribution of 20nm and 30nm diameter particles.



### CRISPR/Cas9 gene editing

Intellia Therapeutics have developed a biodegradable nanoparticle to deliver CRISPR/Cas9 gene-editing components that achieved 97% target protein knockdown for at least 12 months with a single treatment in animal models.

Abstract: CRISPR/Cas9 gene editing systems have emerged as a powerful tool for genome editing. However, the current CRISPR/Cas9 systems require the co-delivery of both Cas9 and crRNA to the target site. This is a major barrier to the clinical application of CRISPR/Cas9. We have developed a biodegradable nanoparticle that can co-deliver Cas9 and crRNA to the target site. This nanoparticle is composed of a lipid bilayer and a polymer shell. The lipid bilayer is used to encapsulate Cas9 and crRNA, while the polymer shell is used to target the nanoparticle to the target site. This nanoparticle shows promise for the treatment of cancer and other diseases.

Abstract: We report on the development of a novel targeted RNA delivery system for the treatment of cancer. The system consists of a lipid nanoparticle (LN) that is targeted to specific immune cells via an antibody. The LN is loaded with a small interfering RNA (siRNA) that targets a specific gene. The antibody is conjugated to the LN surface via a linker that allows for the LN to be internalized by the target cell. The siRNA is then released from the LN and targets the gene, leading to a reduction in gene expression. This system shows promise for the treatment of cancer and other diseases.

# Ordering Information

	NAME	PRODUCT CODE	INCLUDES
	<b>NanoAssemblr™ Benchtop Instrument Cartridge Bundle</b>	NIT0055	<ul style="list-style-type: none"> <li>1 NanoAssemblr Benchtop</li> <li>1 Power supply (worldwide)</li> <li>1 NanoAssemblr Control Laptop</li> <li>50 NanoAssemblr Benchtop Cartridges</li> <li>1 1 year warranty</li> <li>1 Installation and initial training</li> </ul>
	<b>NA BT Heating Controller Package - 3 and 1 mL*</b>	NIT0026	<ul style="list-style-type: none"> <li>1 Heating Block (3 and 1 mL)*</li> <li>1 Heating Controller</li> </ul>

\*Other configurations for different combinations of syringe sizes also available

To learn more about the NanoAssemblr Benchtop, see a demo video, or request a quote, visit [precisionnanosystems.com/benchtop](http://precisionnanosystems.com/benchtop)

Or to learn more about the NanoAssemblr Platform, visit [precisionnanosystems.com/systems](http://precisionnanosystems.com/systems)

## About Precision NanoSystems

Precision NanoSystems Inc. (PNI) creates innovative solutions for the discovery, development and manufacture of novel nanoparticles for use as medicines and in medical research. PNI's proprietary NanoAssemblr Platform enables the rapid, reproducible, and scalable manufacture of next generation nanoparticle formulations for the targeted delivery of therapeutic and diagnostic agents to cells and tissues in the body. PNI provides instruments, reagents and services to life sciences researchers, including pharmaceutical companies, and builds strategic collaborations to revolutionize healthcare through nanotechnology.

Contact  
[info@precision-nano.com](mailto:info@precision-nano.com)  
 1-888-618-0031

Headquarters:  
 50 - 655 West Kent Ave. N.,  
 Vancouver, BC, V6P 6T7  
 Canada

Global Sales:  
 395 Oyster Point Boulevard, Suite 145  
 South San Francisco, CA 94080  
 USA

[www.precisionnanosystems.com](http://www.precisionnanosystems.com)

Document ID: nabenchtop-BR-0918

For Research Use or Further Manufacturing. Not for direct administration into humans. Copyright © Precision NanoSystems Inc. 2017 All rights reserved. Create Transformative Medicines™ and NanoAssemblr™ are trademarks of Precision NanoSystems Inc.