

Winter 2021

Product Catalogue

Streamline solid-state
nanopore research with NNI's
complete suite of tools



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About Us



NNi is accelerating research and development of applications of solid-state nanopores by making nanopores accessible to everyone.

NNi's tools are built by nanopore researchers, for nanopore researchers. They deal with all the challenges of nanopore fabrication automatically to get to the results faster.



Exploring innovative ideas requires novel tools and methods. NNi can customize solutions to enable unique nanopore research ideas on demand.



Spark-E2



The **Spark-E2** is a solid-state nanopore fabrication unit that uses the cutting-edge Controlled Breakdown method. By allowing for the fabrication of two nanopores, this compact tool provides users with the pores they need to perform a wide range of single-molecule experiments in a rapid, simple, and cost-effective manner.

- Automated fabrication of ready-to-use solid-state nanopores in liquid
- Wide and precise range of nanopore sizes (1 nm – 30 nm)
- On-demand nanopore enlargement
- Automatic characterization of low-frequency noise
- Dual-channel operation for fabricating two nanopores in parallel
- Interfaces with disposable millifluidic flow cell (25 μ L) with ease

Number of Channels	2
Current Range	$\pm 1 \mu\text{A}$ (Fabrication Mode) $\pm 50 \text{ nA}$ (Noise Measurement Mode)
Voltage Range	$\pm 17 \text{ V}$
Power Supply	110 V or 220 V AC
Size	172 mm x 80 mm x 48 mm
Weight	~2.5 kg
Optimal Conditions	10-30 nm SiNx

Sensing Cage



These **sensing cages** interface NNI **flow cells** with most commercial current amplifiers while protecting sensing experiments from electrical noise. Adaptations are available on demand for amplifiers not already supported.

- Noise isolation designed to interface flow cells to commercial amplifiers
- Support for most common high-bandwidth current amplifiers
- Heat generation is managed and shunted away from your sample
- Customization available to fit your sensing workflow

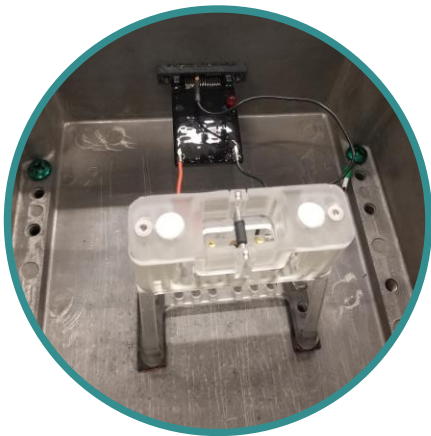
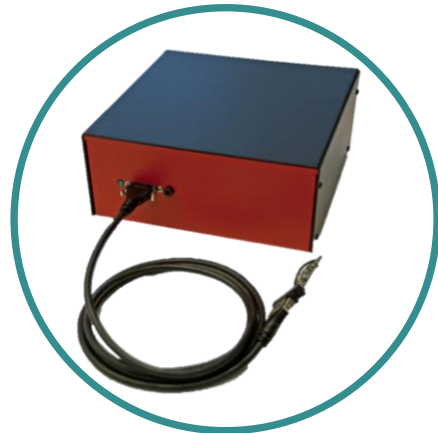
Compatible with the following commercial amplifier headstages:

Manufacturers	Models
Molecular Devices	Axopatch 200B; Multiclamp 700B
Elements srl	eONE
Chimera Instruments	see page 6 for adapter for VC100

Customizations available for other amplifiers on request.

Chimera VC100

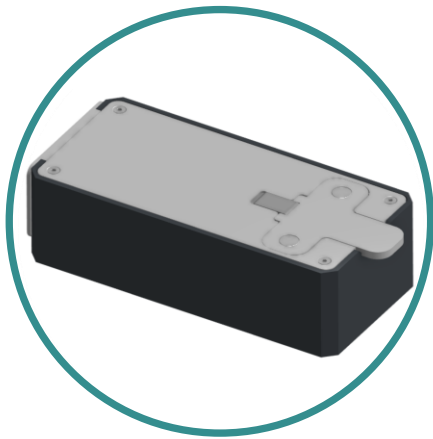
The **Chimera VC100** is the state of the art in commercial current amplification, allowing 1 MHz sensing. Best suited to small nanopores and target molecules where precision is key.



An adapter provides seamless integration between NNI **flow cells** and the **Chimera VC100** headstage.

Gain	100M Ω
Bandwidth	DC – 1 MHz
Sample Rate	4.17 MHz
Dynamic Range	± 20 nA
Voltage Clamp	± 1000 mV
Open input (RMS) noise	0.5 pA @ 1kHz, 1.5pA @ 10 kHz, 8pA @ 100 kHz, 100pA @ 1MHz
Power Supply	110V or 220V

Amp-E



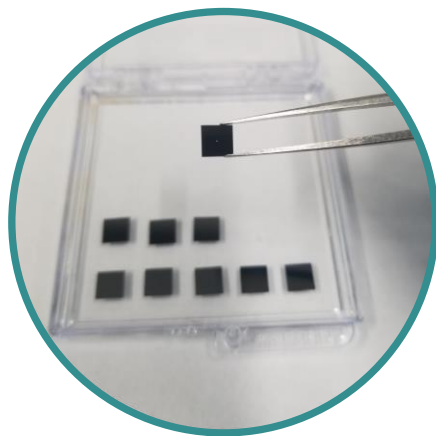
The **Amp-E** provides sensing capabilities compatible with larger current range requirements. Best suited to large nanopores and target molecules.

- Large dynamic range allows for use of larger nanopores
- Seamless integration with NNI flow cells
- Control software for data acquisition included with purchase

Gain	2.25 G Ω , 225M Ω , 22.5M Ω , 2.25M Ω
Bandwidth	DC – 100 kHz
Sample Rate	200 kHz (oversampling by 4 selectable)
Dynamic Range	± 200 pA (2.25G Ω), ± 2 nA (225M Ω), ± 20 nA (22.5M Ω), ± 200 nA (2.25M Ω)
Voltage Clamp	± 700 mV, ± 2000 mV
Open input (RMS) noise	± 700 mV: 70 fA @ 1 kHz, 244 fA @ 10 kHz, 2,29 pA @ 100 kHz ± 2000 mV: 100 fA @ 1 kHz, 415 fA @ 10 kHz, 3,51 pA @ 100 kHz
Power Supply	USB

Membranes

A high-quality nanopore starts with a high-quality **membrane**. These are the membranes we ourselves use to maximize our success with solid-state nanopores.



Basic Membranes

Membrane	10 nm, 20 or 30 nm low-stress SiNx
Support Chip	200 μm high-resistivity silicon
Form Factor Options	5 mm x 5 mm, 4 mm x 4 mm
Underlayer	None
Window Size	40 μm x 40 μm

Low-Noise Membranes

Membrane	10 nm, 20 or 30 nm low-stress SiNx
Support Chip	200 μm high-resistivity silicon
Form Factor Options	5 mm x 5 mm, 4 mm x 4 mm
Underlayer	100 nm thermal oxide
Window Size	40 μm x 40 μm

Custom Membranes available on request.

Flow Cells



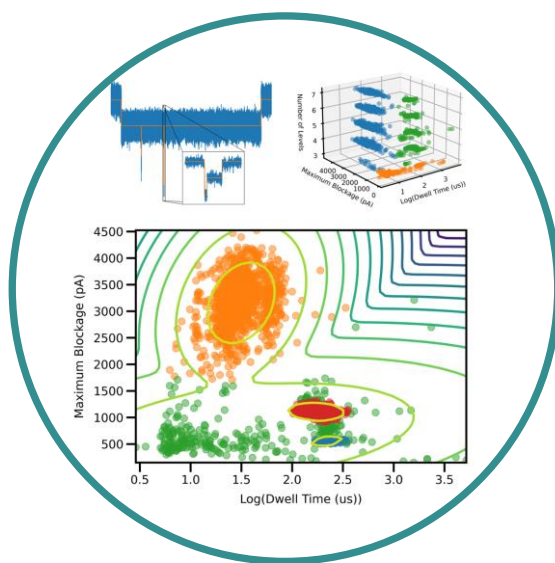
These disposable **flow cells** are specifically designed to be used with the **Spark-E2** nanopore fabrication unit and with **NNi sensing cages**. Flow-through design and small internal volumes facilitates buffer exchange and minimizes sample waste.

- 25 μ L volume and flow-through for easy buffer loading and exchange
- Pre-treated electrodes ensure minimal user time and effort
- Disposable flow cells and electrodes eliminate cross-contamination
- Caps prevent buffer evaporation, keeping pores wet for months at a time
- Designed for 4 to 5 mm x 4 to 5 mm chips but adaptable to other dimensions
- Clipping mechanism allows for fluid-tight seal without any tools
- Adapters available to interface with most commercial current amplifiers

Volume (clipping part)	25 μ L
Volume (socket part)	40 μ L
Assembled Size	27 mm x 16 mm x 23 mm
Fastener	Built-in clip

Data Analysis

Powerful **analysis tools** simplify and accelerate post-processing of nanopore data. NNI's suite of tools is designed specifically with nanopore research in mind, with an ever-growing list of features driven by feedback from our users



- Lightning-fast event segmentation and detection
- High-fidelity multi-level event fitting
- Walks you through analysis setup to optimally characterize results
- Powerful visualization tools provide an immediate overview of results
- Machine learning support for segmentation of multiplexed samples
- User guides and support for statistical handling of complex analysis
- Actively growing feature list driven by user feedback

Operating System

Windows 10, Linux support available

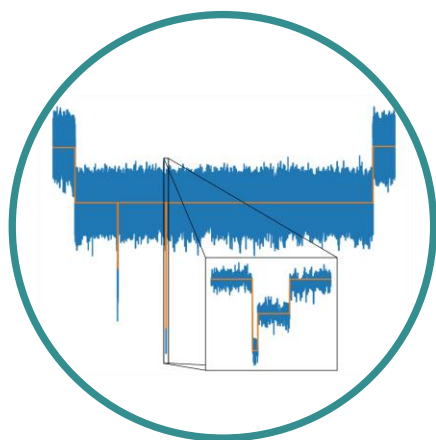
Data Format

.bin (NNi software) and .log (Chimera VC100)

Output Format

.csv

Data Acquisition



Easy to use **data acquisition software** with powerful real-time experimental control features compatible with most common commercial current amplifiers to help integrate NNI tools into existing workflows.

- Simple intuitive interface allows real-time viewing of data
- Bessel filters for viewing and post-processing
- Post-collection visualization and power spectrum measurements
- Real-time voltage control in response to current state
- Automatically unclog pores when samples get stuck
- Support for NI DAQ cards for simple integration with existing workflows
- Actively growing feature list driven by user feedback

Operating System	Windows 10
Supported Hardware	NI DAQmx cards
Output Format	.bin

Accessories

This tough **PTFE** jig holds up to 19 chips and fits in a 100mL beaker for easy cleaning with Piranha or other solvents.



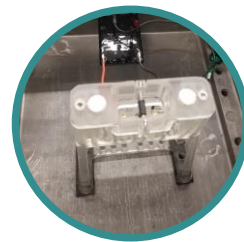
High quality **tweezers** facilitate handling of **membrane** chips and efficient flow cell assembly.



Unique **single-bristle brushes** make high-precision painting of PDMS simple and easy.



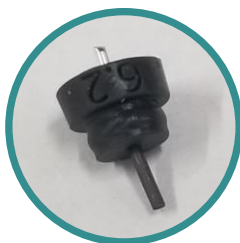
NNi can **customize instrumentation solutions** for unique experimental requirements on demand.



Accessories



Disposable **Ag/AgCl electrodes** provide low-noise current sensing with no maintenance requirements



Caps compatible with NNI **electrodes** form an air-tight seal that prevents evaporation for months



Precisely cut **gaskets** seal the membrane in the flow cell and direct the flow of sample solution



Salt solutions optimized for nanopore fabrication, conditioning, and sensing to speed up high quality nanopore production



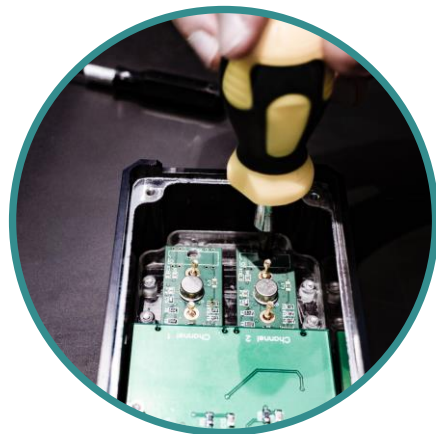
Lab Setup



Get in touch to discuss how NNI can facilitate **setting up a new nanopore lab** with the tools, workflows, and training needed to start generating data quickly and easily.

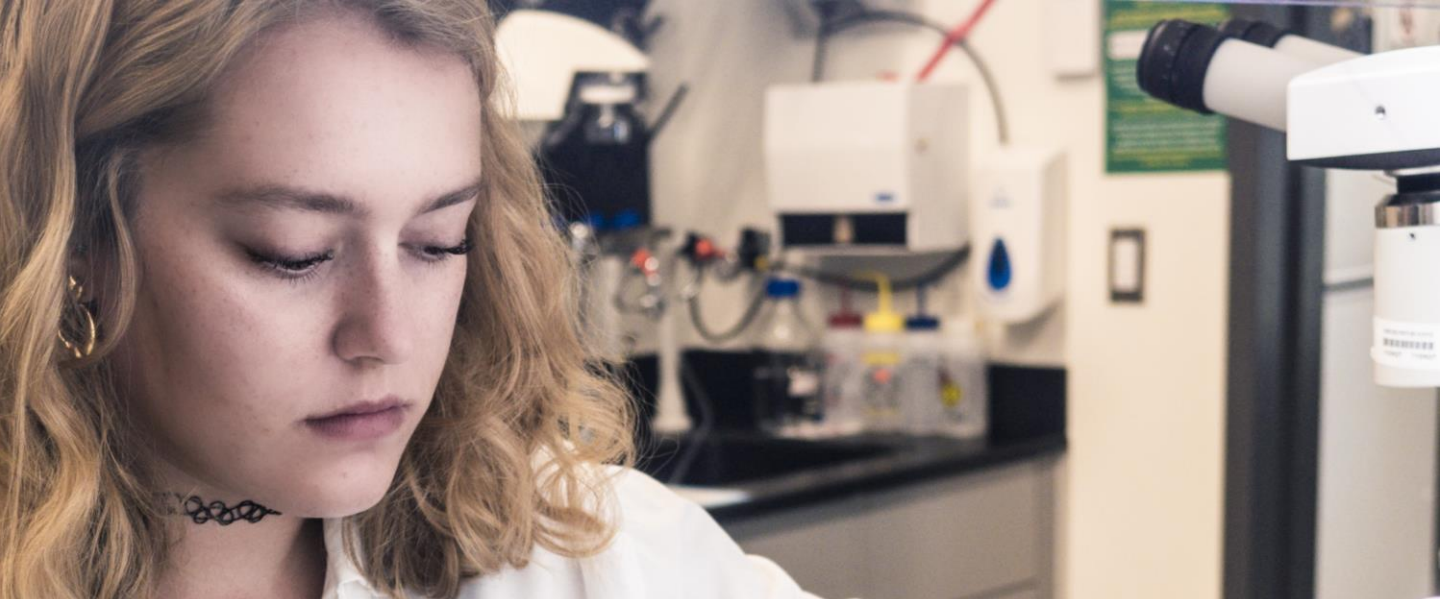
Custom Solutions

NNi excels at **custom instrument design** to enable unique research programs. Reach out to discuss design of novel instrumentation to accelerate innovation.

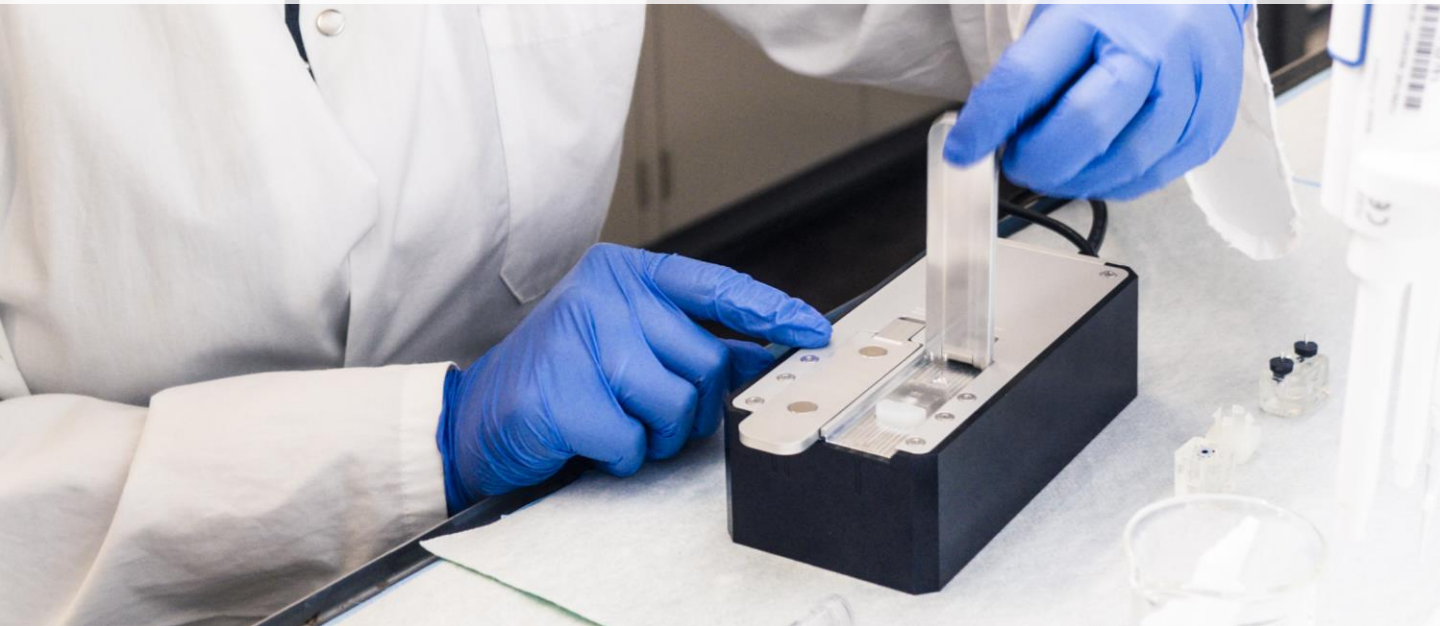


Product List

Category	Product	Part Number
Nanopore Fabrication	Spark-E2	SPARKE2
Nanopore Sensing	Sensing Cage	SENSEPAGE
	Chimera VC100	VC100
	Amp-E	AMPE
Flow Cells	Consumables Pack (20 sets)	FLOWCELL-PACK
	Flow Cell Pairs (20 pairs)	FLOWCELL
	Gaskets (20 pairs)	GASKETS
	Ag/AgCl Electrodes (10 pairs)	ELECTRODES
	Caps (10 pairs)	CAPS
SiN_x Membranes	Standard Membrane	MEM-STANDARD
	Low-Noise Membrane	MEM-LOWNOISE
	Piranha Cleaning Jig	PIRANHA
Accessories	Metal Tweezers	TWEEZERS-METAL
	Plastic Tweezers	TWEEZERS-PLASTIC
	PDMS Brush	PDMSBRUSH
	Chimera VC100 Adapter	VC100-ADAPTER
	Fabrication Solution (500mL)	SALT-FAB-500
	Growth Solution (500mL)	SALT-GROW-500
	Sensing Solution (500mL)	SALT-SENSE-500
Software	Data Analysis Package	SW-ANALYSIS
	Data Acquisition Package	SW-ACQUISITION
Custom	Lab Setup	SETUP
	Equipment	CUSTOM



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solid-state nanopore research
& technologies



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