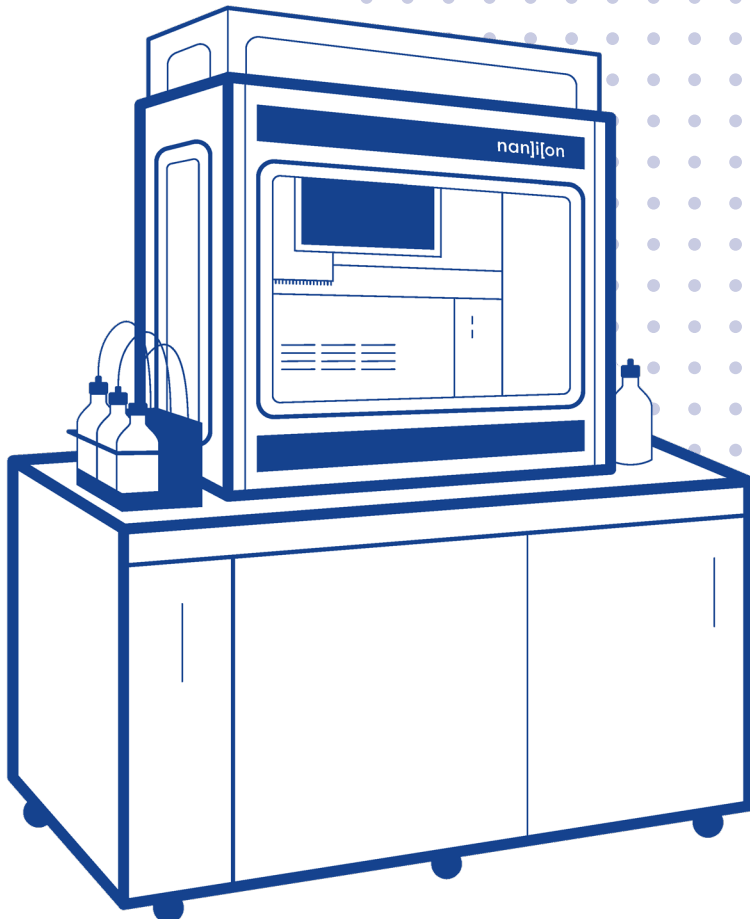




SyncroPatch 384

Technical specifications brochure
with interactive links



nanjion

**Accelerate
your research**

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For all your patch clamp needs

The SyncroPatch 384 takes the versatility and flexibility of automated patch clamping to new levels. All features of the previous SyncroPatch models are preserved or improved – and further updated with invaluable features.

Key features

32-well mode

- 32-well mode makes it possible to literally turn the system into a lower throughput system. In the 32-well mode it is possible to use just a small fraction of the chip at a time, and keep the remaining part for a later date – thus taking full advantage of the economical price of the NPC-384 chip.

Advanced temperature control

- An advanced temperature control system is standard, enabling precise control of the temperature (in the range of 10-37°C) at the measurement site and at 12 different deck positions.

Current clamp

- Current clamp now implemented as a standard feature enabling resting membrane potential and action potentials of excitable cells to be measured. Holding current can be set for each well individually using the low frequency voltage clamp feature.

On-board cameras

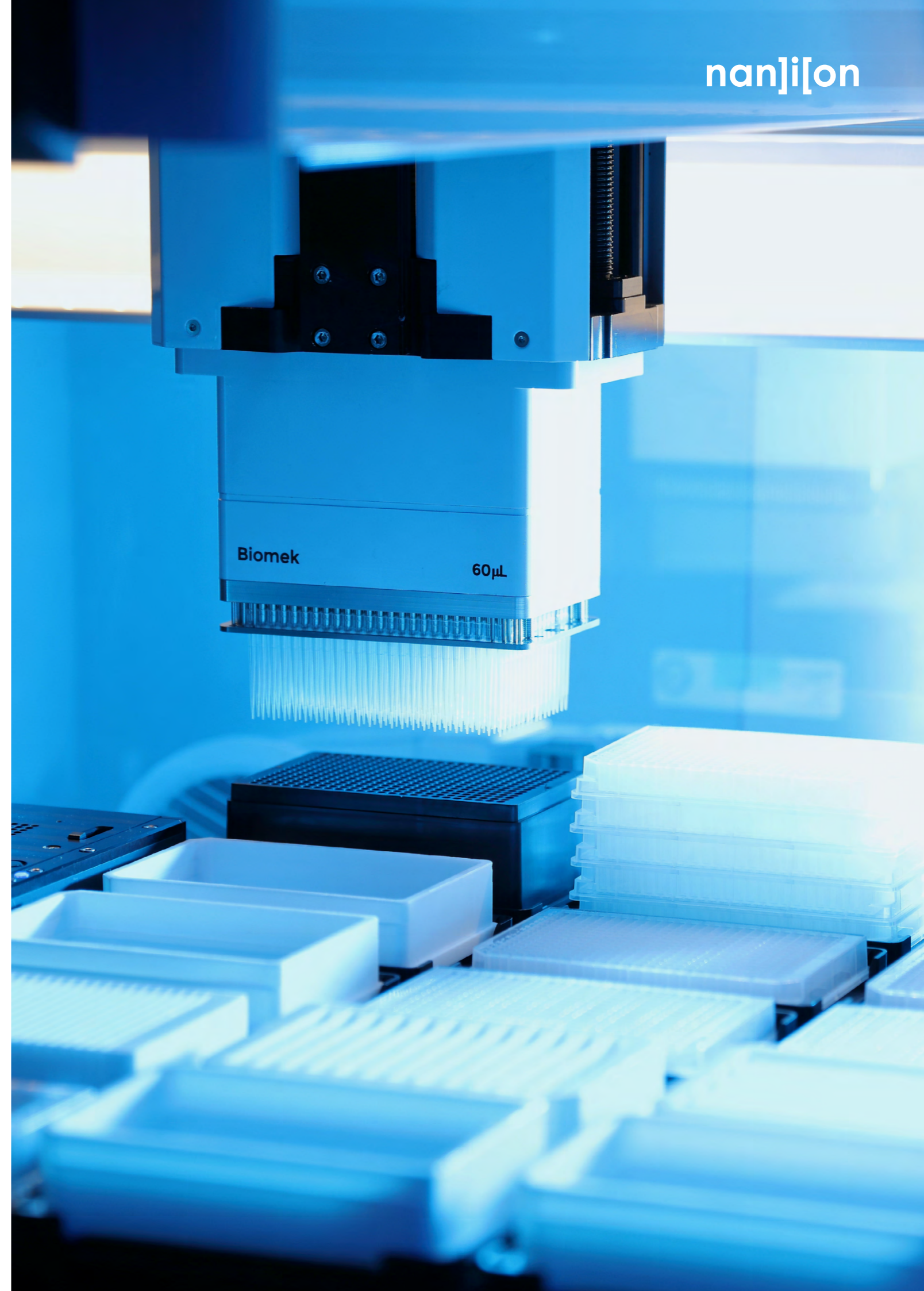
- On-board cameras enable live broadcast and remote service.

CiPA ready

- The SyncroPatch 384 is delivered fully compliant with the latest CiPA recommended guidelines.

Optogenetic Stimulation Tool

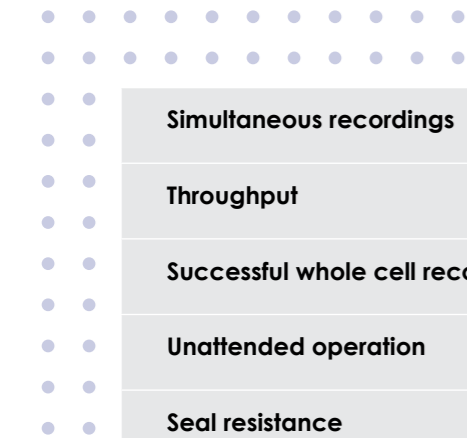
- Optional add-on for the SyncroPatch 384 for optical modulation of cells and compounds using diverse wavelengths, in up to 96 wells in parallel.



For all your patch clamp needs

The SyncroPatch 384 is equally well suited for large unattended high-throughput screening campaigns in the pharmaceutical industry, small compound screens and academic research.

Specifications at a glance



Simultaneous recordings	384
Throughput	Up to 20,000 data points per day
Successful whole cell recordings	Up to 95%
Unattended operation	Up to 8 hours
Seal resistance	>1 GΩ
Series resistance	<10 MΩ
Chip resistance	~3 MΩ (different ranges available)
Recording configuration	Whole cell and perforated patch
Cell types	Cell lines (e.g. CHO or HEK) Stem cells (e.g. cardiac, neuronal) Primary cells (e.g. red blood cells, immune cells, epithelial cells, cancer cell lines, cardiomyocytes)
Average whole cell stability	>30 minutes
Perfusion time constant	<50 ms
Minimum exposure time	<1 s
Required cell density	33,000 - 5,000,000 cells/ml
Cells required per well	333 - 10,000
Unlimited solution additions	Yes
Consumable shelf-life	>1 year
Optogenetic Simulation	Optional

Enclosed housing with vertical sliding door. The vertical sliding door doesn't impede aisle-ways.

Multi-color status light bars shows the system status (e.g. running, user interaction needed, finished) and allows simplified monitoring from a distance (5 modes, 360° visibility).

[▶ Play video](#)

RecoBox with simplified design for easy access to computer and robot functions.



Biomek i5 liquid handler with a 384-pipettor arm and gripper.

[▶ Play video](#)

Redesigned patch clamp module with easy access to electrodes, temperature control and more.

Fully HTS-compatible automated patch clamp

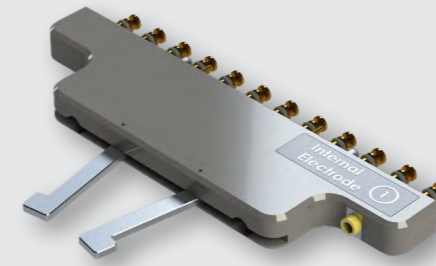
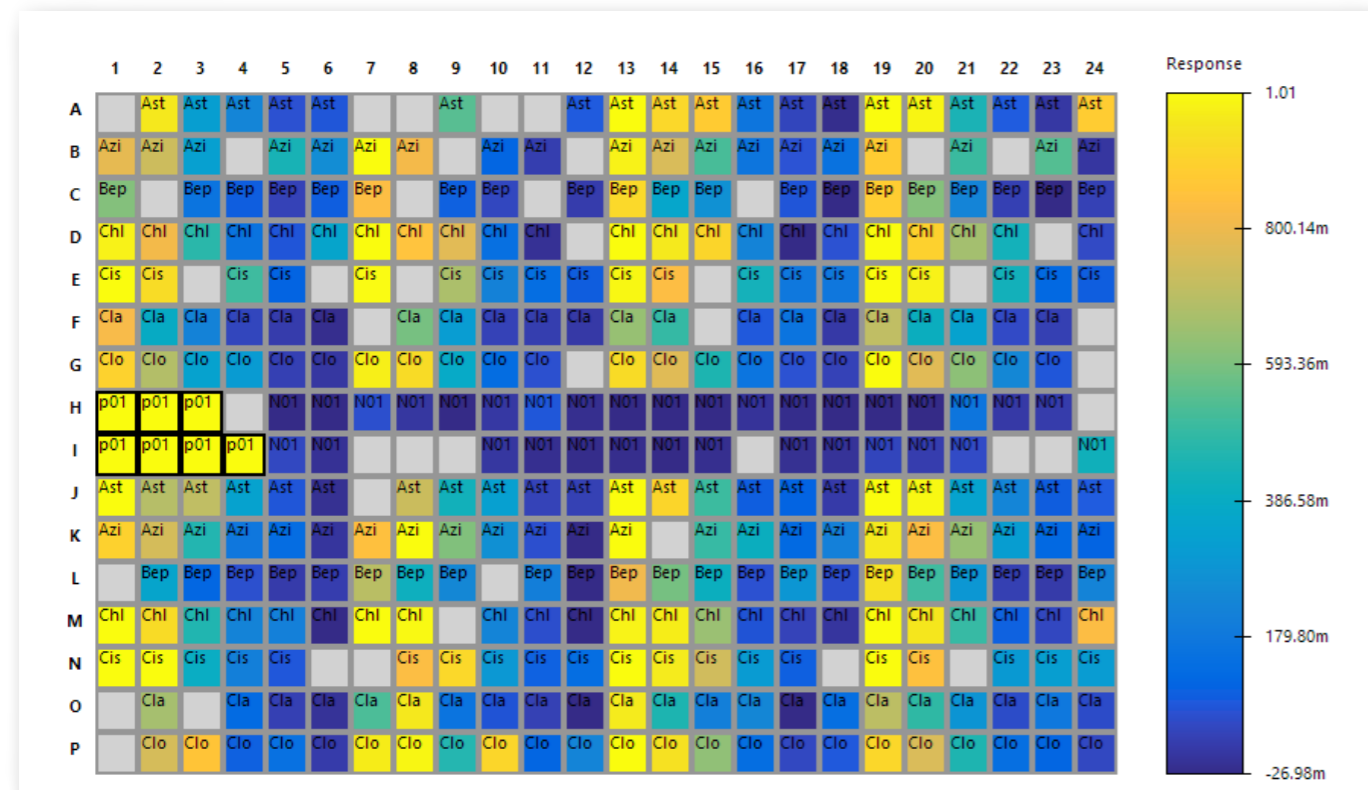
The SyncroPatch 384 is a revolutionary automated patch clamp system consisting of a patch clamp module integrated into the state-of-the-art pipetting robot Biomek i5.

With 384 amplifier channels and a 384-pipetting head, all 384 cells are recorded in parallel, resulting in a throughput of 20,000 data points per day.

With its ease-of-use and open design, the SyncroPatch 384 supports full automation and integration into HTS environments, a key factor in the hardware and software implementation of the system. Z prime values and a graphical user interface enable heat map displays of cell parameters, amongst other features, which allows screeners to finalize their job fast and effectively.

Heat maps

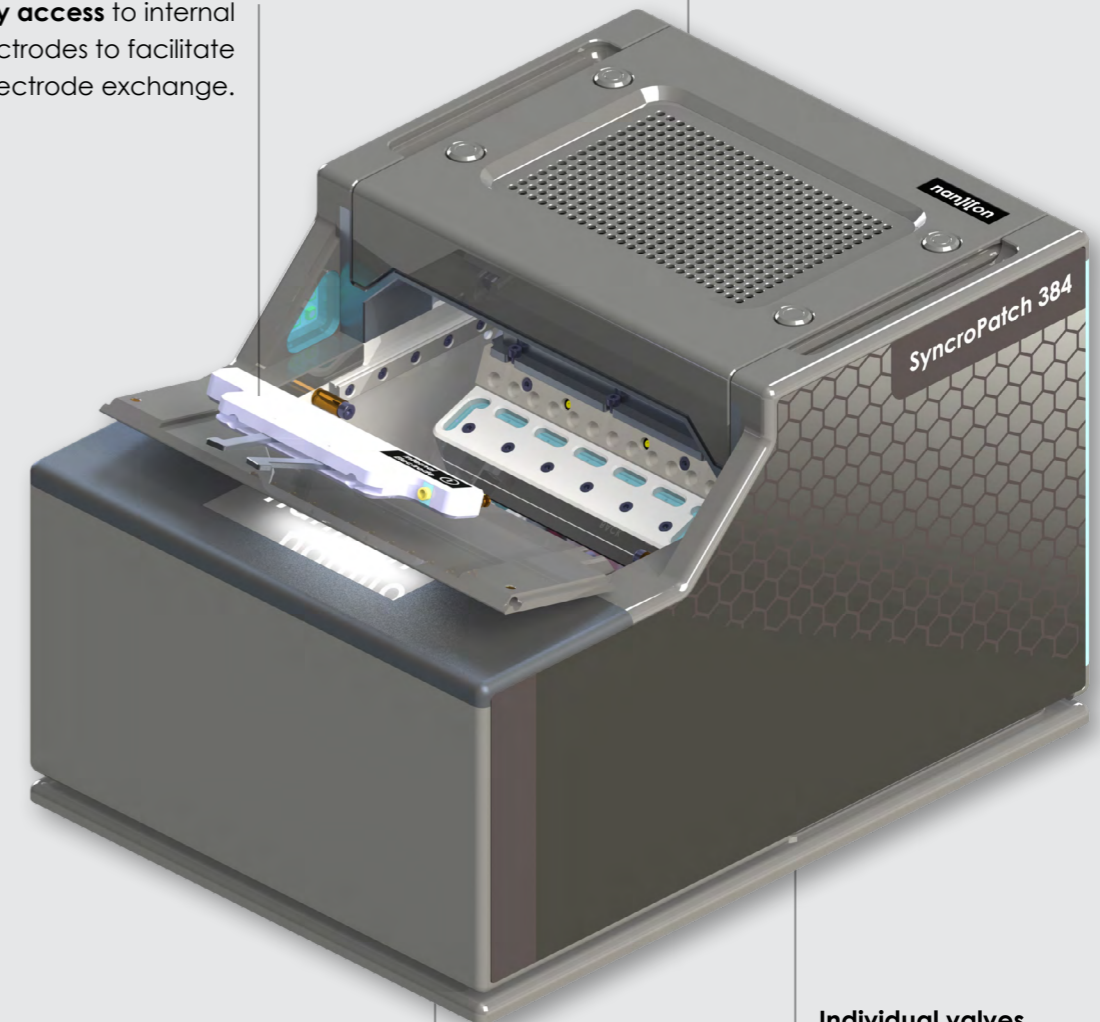
Get a quick overview – e.g. response (%) to compounds across 384 wells.



Easy access to internal electrodes to facilitate electrode exchange.

Integrated temperature control comes as standard on the SyncroPatch 384.

[▶ Play video](#)



Individual valves for each double column (e.g. for individual pressure settings).

Current clamp and voltage clamp recording capability.

Both amplifier modes are integrated features in the SyncroPatch 384 platform.

Deck layout

LED illuminated deck

- For improved deck visibility making it easier to follow the robot steps.

Deck features

- On-board cameras enable remote monitoring of experiments and visual verification of labware setup.
- Easy to integrate external devices and accessories for additional capacity in high-throughput screening facilities.
- Plate gripper and pipetting head can move independently in z and y directions. The gripper can rotate, move and hold labware while tips are loaded. This optimizes access to high-density decks and enables more efficient workflows (e.g. tips don't have to be unloaded when gripper is active). As an example, the plate gripper allows the removal of compound plate lids right before addition. This avoids evaporation, especially during experiments at physiological temperature.

On-deck compound plate preparation

- On-deck compound plate preparation possible – no need for a separate pipetting robot for compound preparation or to prepare compound plates manually. Preparing compound plates immediately before the experiment will minimize the risk of losing compound due to adhesion to plastic surfaces. This is particularly important for sticky compounds.

Selective tip pipetting

- Multichannel head allows selective tip pipetting to be performed. The selection of individual rows, columns or even single tips of a tip box allows serial compound dilution. This enables more efficiency by having an integrated compound dilution scenario.

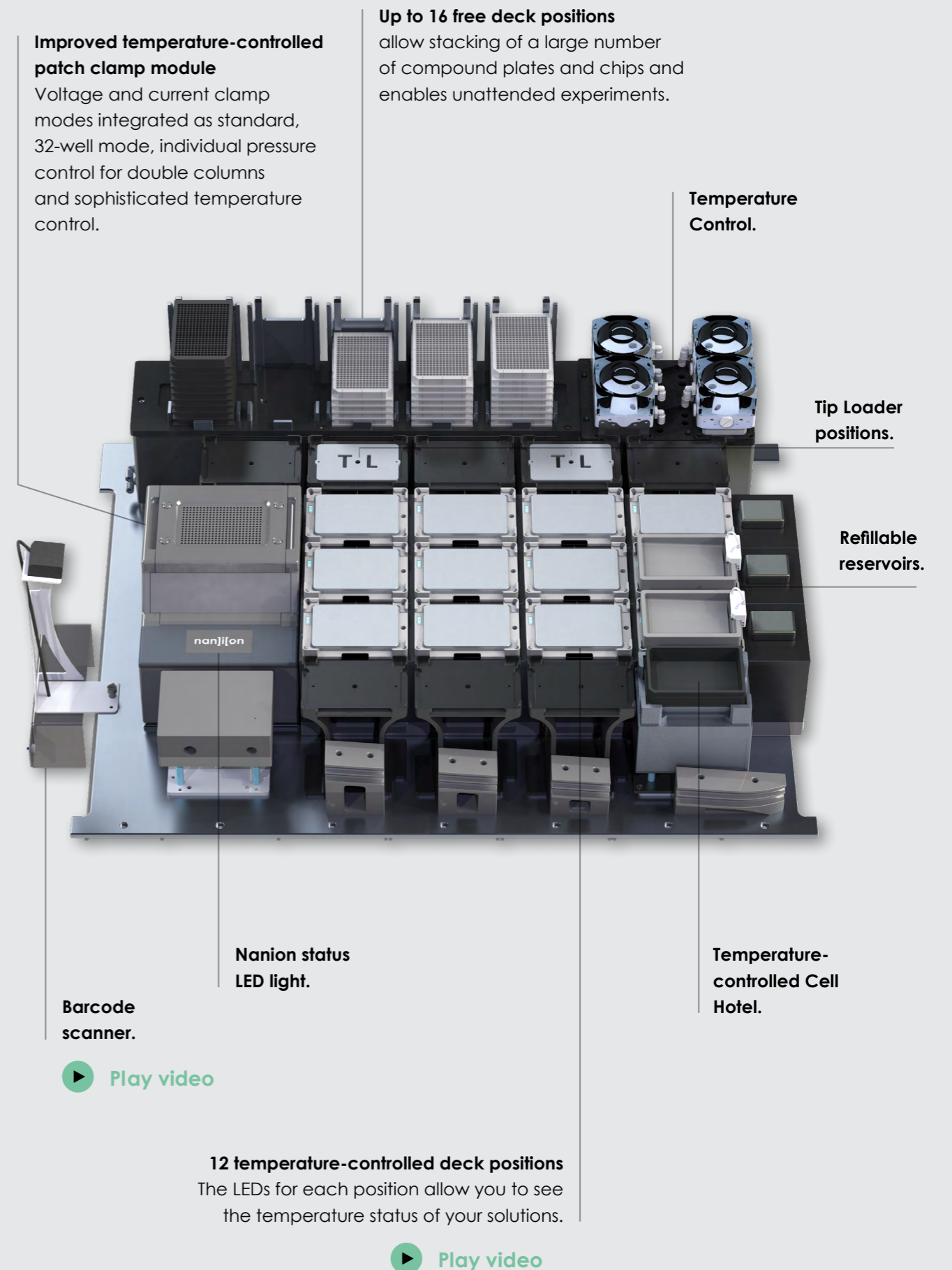
Force loading of pipettes

- Two tip loading positions allow an easy change of tips within the experiment, e.g. it is possible to use separate tips for full block application.

Fast pipette dispense speed

- Very fast dispense speed (110 $\mu\text{l/s}$) enables measuring kinetics of very fast desensitizing ligand-gated ion channels and mechanical activation of ion channels such as Piezo.

Deck layout



RecoBox

- The sleek design ensures easiest access to most commonly used functions.
- Control robot and experimental functions at the touch of a button.
- Access drain and fill functions for refillable reservoirs.
- USB connectors for Biomek and Nanion computers are easy to reach.
- Cell hotel status is clearly displayed.



Ergonomic orientation of control element.

[▶ Play video](#)



NPC-384 Chip

Different types of [NPC-384 chips](#), including a range of resistances, multi-hole and fluoride-free chips (NPC-384FF), are available. Actual type should be chosen depending on cell size and application to optimize performance. All **NPC-384 chips are made in-house** at our headquarters and are subject to strict quality control.

Substrate for patch clamp experiments

- Borosilicate glass – the material used for pipettes for manual patch clamping. Benefits of borosilicate are: low capacitance, low compound adsorption and excellent patch/seal properties.

32-well mode

- The 32-well mode makes it possible to literally turn the system into a lower throughput system – ideal for smaller compound screens and academic research. In the 32-well mode it is possible to use just a small fraction of the chip at a time, thus taking even more advantage of the economical price of the NPC-384 chip. The price per well of the 384-channel consumable is only ~10% of the price per well of consumables for lower throughput alternative systems. In the 32-well mode the unused parts of the chip can be used at a later date. See an [exemplary experiment here](#).

External and internal solution exchange

- External and internal solution can be exchanged while recording. This gives a precise and measurable activation of e.g. calcium activated K⁺-channels.

Advantageous surface to volume ratio at measurement site

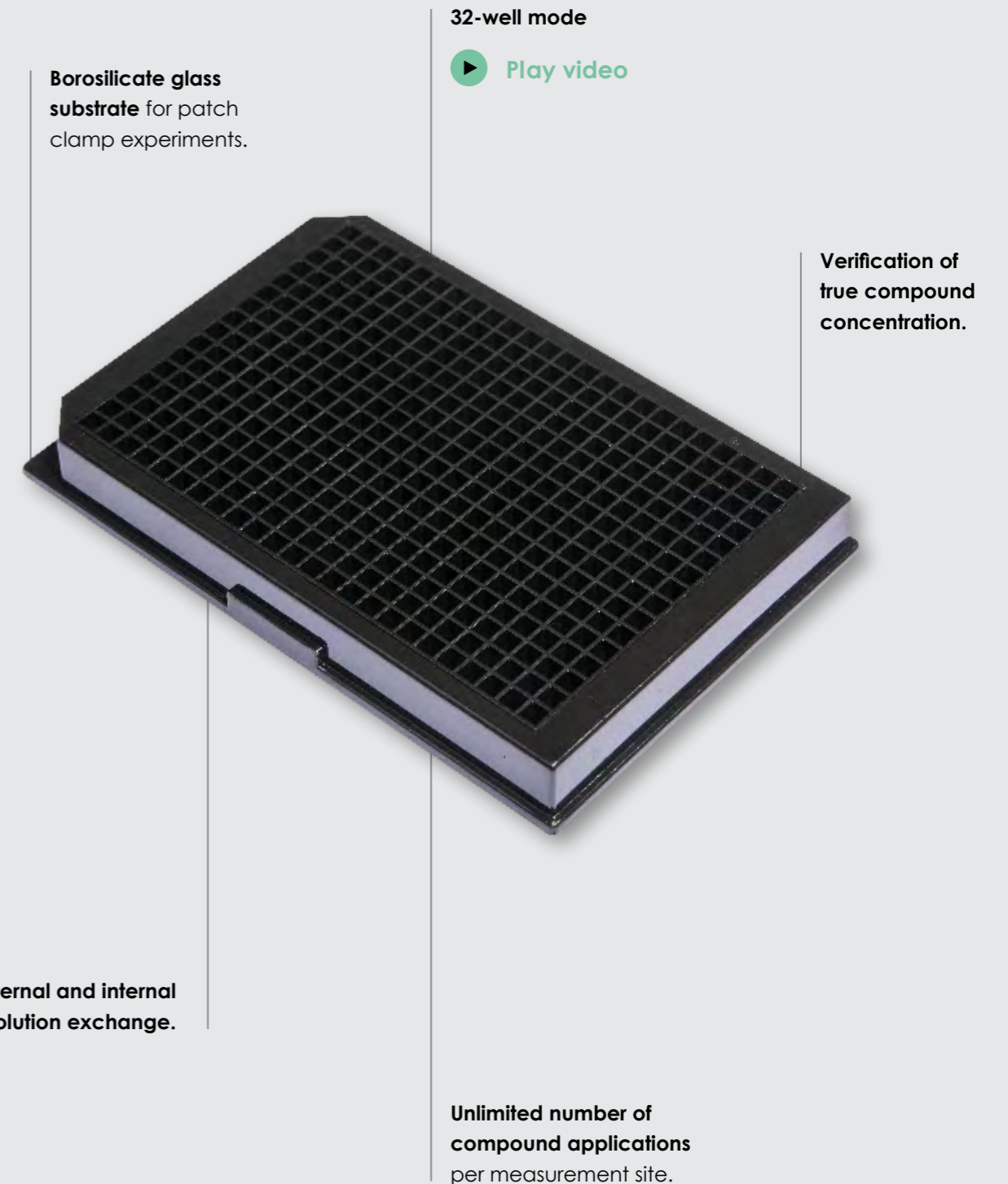
- This prevents loss of sticky compounds to non-specific binding, hence ensuring accurate compound concentrations.
- The open well design of the NPC-384 chip provides a much lower surface to volume ratio compared to flow-channel systems. This means lower potential for loss of lipophilic compounds that can adhere to surfaces – hence ensuring accurate compound concentrations.

Unlimited number of compound applications

- Unlimited number of compound applications per measurement site due to liquid removal by the robot. This allows recording of full concentration response curves from one measurement site.

Verification of true compound concentration

- Sample collection method from measurement site is possible. A key feature for e.g. cardiac safety screening labs since both nominal and measured concentration are to be reported (as recommend by the new S7B best practice considerations for *in vitro* studies).



Software

PatchControl 384 and DataControl 384 are Nanion's proprietary software for easy data recording and analysis. Furthermore, the software enables the user to pause and modify and repeat recording protocols during the experiment in Assay Development Mode. Both software packages have a very powerful and easy-to-learn graphical user interface.

Windows 10 operating system

- Future proof well-supported operating system. Fast and robust communication between liquid handler software and PatchControl software.

Standard and advanced modes of operation

- The standard mode of operation is designed for routine experiments to be performed by non-experts. In the advanced mode, electrophysiologists can access extended functions and tools for highly sophisticated assay design.

Method Launcher with milestones

- The Method Launcher is a simple point-and-click interface to launch methods. The progress within a method can easily be monitored by working with milestones. Simplified interface for operators, easy for non-experts.

Guided Labware Setup

- Intuitive step-by-step software tool for setting up the labware on the deck space. The interface will walk the user through the different labware and visually instruct where to place them on the deck. Detailed information can be given on what solution/compound and amount to place inside the labware. Finally, on-board cameras can be used for verification and would alert the user if the deck doesn't match the reference image.

Unprecedented flexibility for assay development

- Enhanced flexibility for assay development purposes. For example, the system can be paused at any time during an experiment allowing for manual control of pressure settings such as applying additional whole-cell suction pulses or on-demand internal perfusion.
- Voltage protocols can be modified and repeated at any point allowing the user to quickly test out a range of protocols with the ability to interpret and adapt protocols in real time without waiting for post-run analysis.
- 32-well mode feature offers further cost saving during assay development.

Unattended run

- The new Standard Method facilitates unattended runs of more than 25 NPC-384 chips. The deck space is optimized for single dose experiments, but also sufficient for three cumulative additions plus full block application. Nanion provides a Quick Start Guide for customizing these assays.

Heatmap tool

- The heatmap tool implemented in DataControl 384 offers a 384-well heatmap format to display various parameters such as QC or OA values for every sweep (raw data and normalized data).

IV curve analysis

- Full concentration response analysis of IV curves/IV parameters in DataControl 384.

Open Data Format

- PatchControl 384 writes all relevant experimental data in an open data format to disc. This allows data analysis with external tools without the need for prior export of the data. In particular, Genedata has developed an interface and analysis routines in their Screener software utilizing the Nanion open data format. This is commercially available and is especially interesting to customers already using Genedata Screener.

Export of data in Excel format

- Tables from DataControl 384 can be exported in true Excel format. This eases transition to external analysis software and integration into company internal data storage.

Reports in both pdf and Word format

- Data reports can be generated in editable Word format. This eases customization of reports.

Z-prime calculation

- This feature enables easy calculation of the screening window coefficient Z' as well as the coefficient of variation (CV) from the control wells. It allows an easy judgement of the assay quality.



Service and Support

Every SyncroPatch 384 is covered by a one-year warranty. Service of all parts and components are undertaken by Nanion engineers and technical experts.

Service plans

- **Two service plans are available** – Premium Service Plan with full all-covered repairs, priority callout response time and premium application support and Basic Service Plan with reduced coverage.
- Professional application support from more than 30 application scientists (most of which are PhD level) is available.

On-board cameras

- These enable remote monitoring of experiments. In the event of an error message, the cameras record 30 seconds of video prior to, and 30 seconds after, the instrument is interrupted.

 [Play video](#)

Remote support option

- The system can be supported remotely. This can significantly reduce instrument down-time for unparalleled support. This remote support feature is only available if the customer's IT-policy allows it.

“We originally acquired a SyncroPatch 384PE in 2014 (later upgraded to 768PE) and enjoyed amazing success using it for a variety of *in vitro* studies of human ion channel variants. The Nanion team provided amazing support during these early years who operated more like a scientific collaborator than an instrument supplier.”

Prof. Al George, Northwestern University, Chicago, IL, USA

“Using a high-throughput platform such as the SyncroPatch 384 has greatly facilitated our research, as it allows probing many different variants simultaneously... I would like to highlight the exceptional level of support from Nanion scientists and engineers throughout the entire period of our use of their equipment, which has been indispensable for the success of our studies.”

Dr. Elena G. Govorunova, UTHealth McGovern Medical School
Houston TX, USA

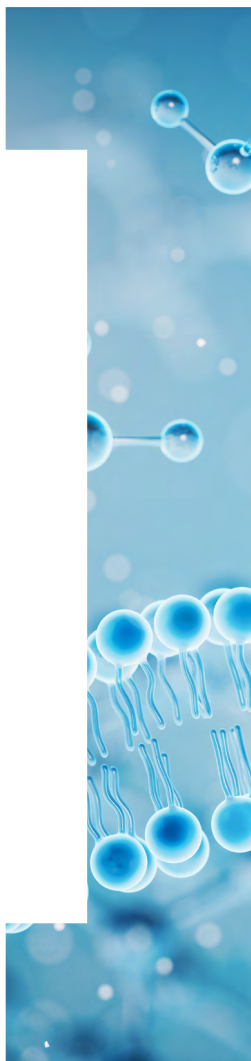
“The SyncroPatch has proven to be a crucial addition to SB's ion channel capabilities and in partnership with expert advice from Nanion's support team has enabled SB to advance its ion channel capabilities to the forefront of ion channel drug discovery research.”

Dr. David Dalrymple, SB Drug Discovery, Glasgow, UK

“We have listened to our customers and the latest demands from industry and implemented these in our newest instrument, the SyncroPatch 384. We go out of our way to ensure you can get the most out of your ion channel and drug discovery projects. Our unprecedented service & support ensures you to will maximize your research.”

Søren Friis, Director Global Customer Relations
at Nanion Technologies

accelerate your research



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