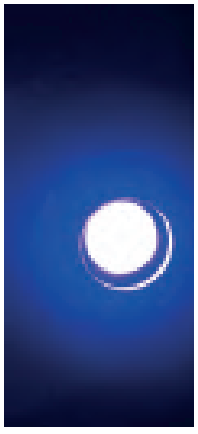
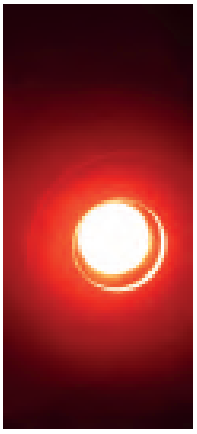
Leica
MICROSYSTEMS

LEICA EM ICE

High Pressure Freezer

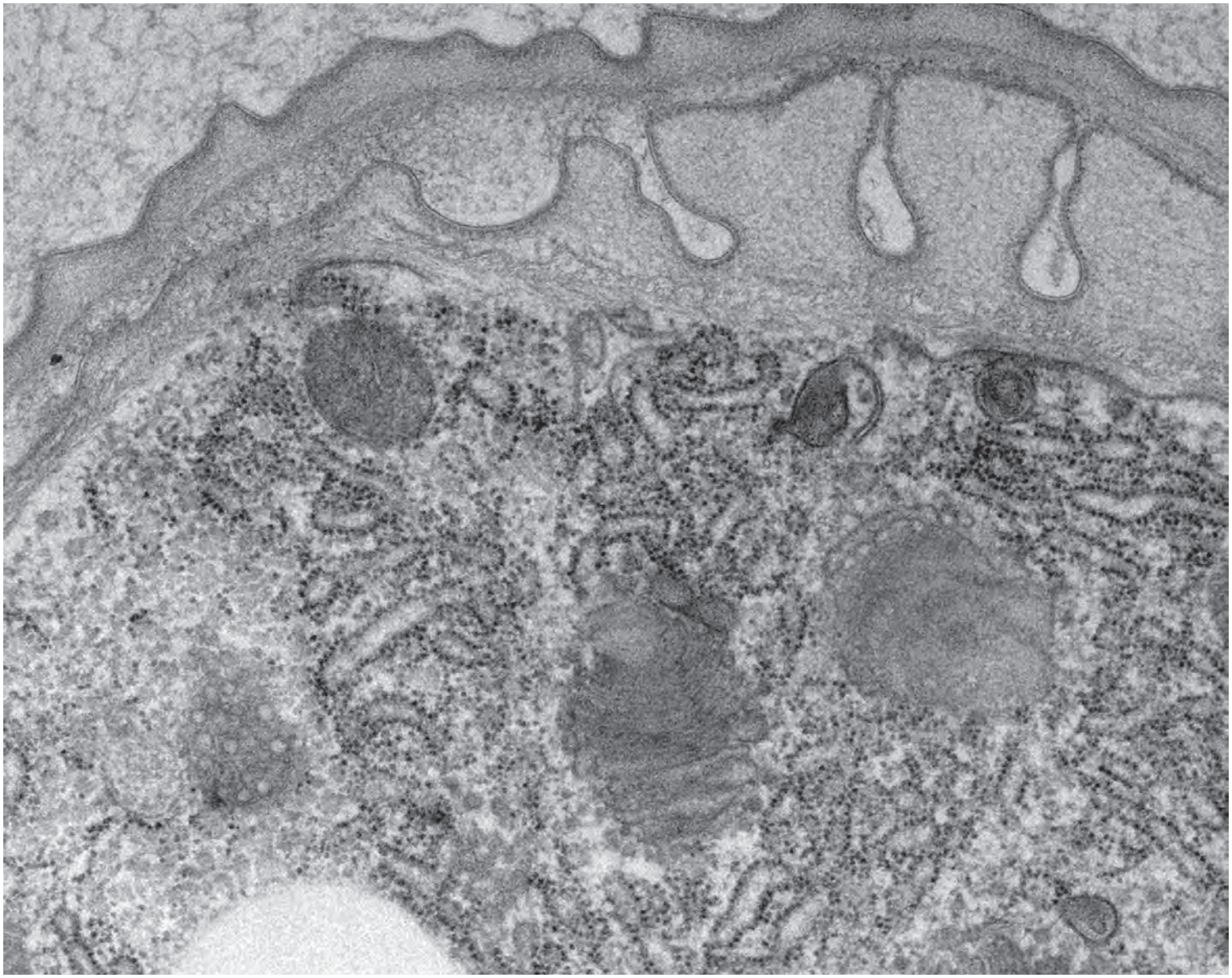
“Leica EM ICE is a platform for game-changing discoveries. It is the only high pressure freezer with fully integrated light stimulation. The only tool that can capture dynamic phenomenon on a millisecond scale. It opens new possibilities for researchers in life science and industry.“





HIGH PRESSURE FREEZER LEICA EM ICE

HIGH PRESSURE FREEZING WITH LIGHT STIMULATION AND/OR ELECTRICAL STIMULATION



C.elegans, courtesy of Elly van Donselaar, Martin Harterink and Karin Vocking, Utrecht University, Netherlands

WHY HIGH PRESSURE FREEZING?

High Pressure Freezing arrests aqueous samples in their native state to deliver the best possible sample preservation. Currently cryo-fixation is the only way to fix cellular constituents without introducing significant structural alterations.

PREPARATION WORKFLOW

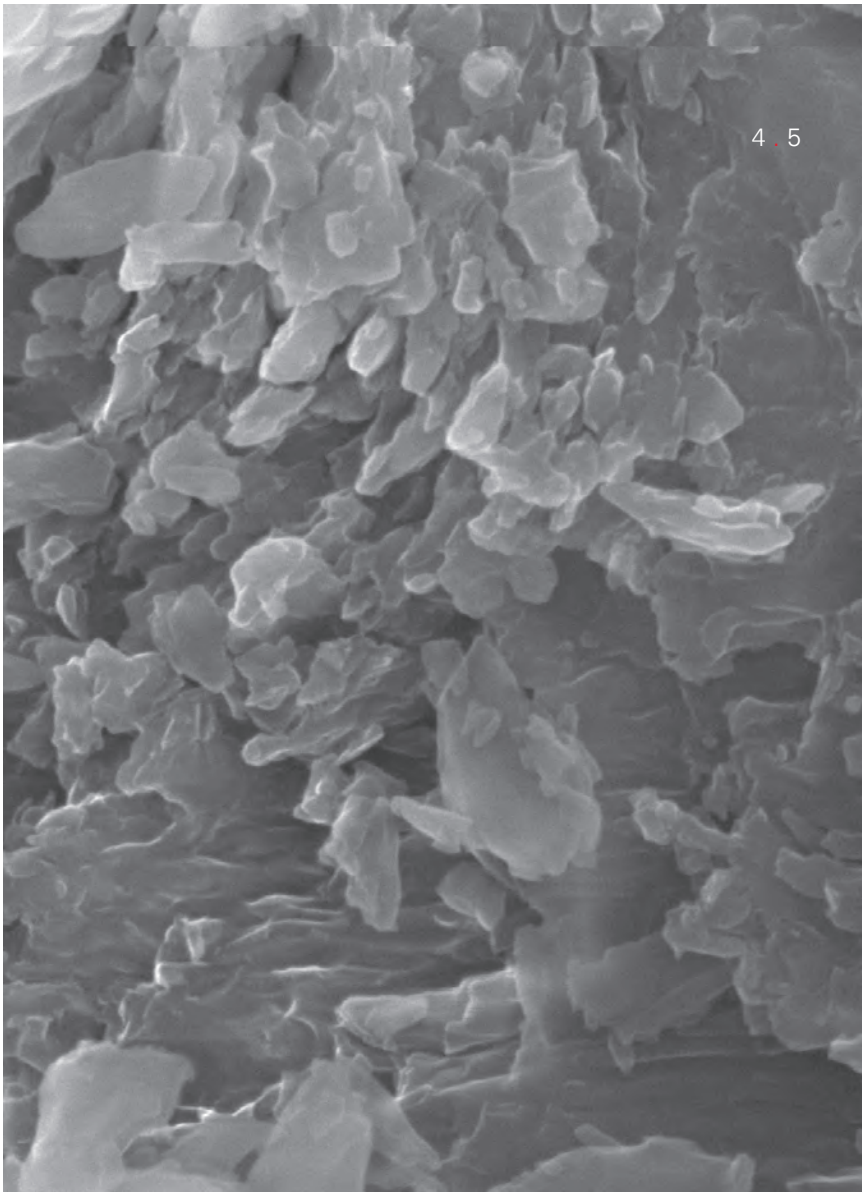
Leica EM ICE for high pressure freezing with light stimulation

Leica EM VCM for sample transfer to ...

... Leica EM ACE600 to fracture and coat the sample to ...

... Leica EM VCT500 for shuttle transfer to the cryo SEM

Cryo-SEM analysis



Revealing changes in the fine structure of a suncream lotion frozen after millisecond UV light stimulation

WHY HIGH PRESSURE FREEZING WITH LIGHT STIMULATION?

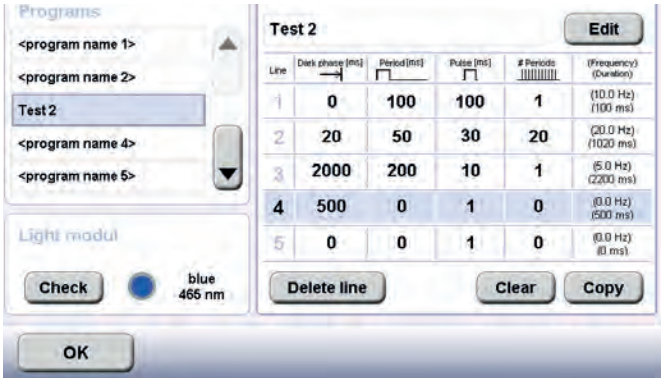
The synchronization of light stimulation and high pressure freezing allows the visualization of highly dynamic process such as synaptic vesicle fusion at a nanometer resolution and millisecond precision.

Discover new possibilities
in life science and industrial research!

COMPLETELY INTEGRATED LIGHT STIMULATION

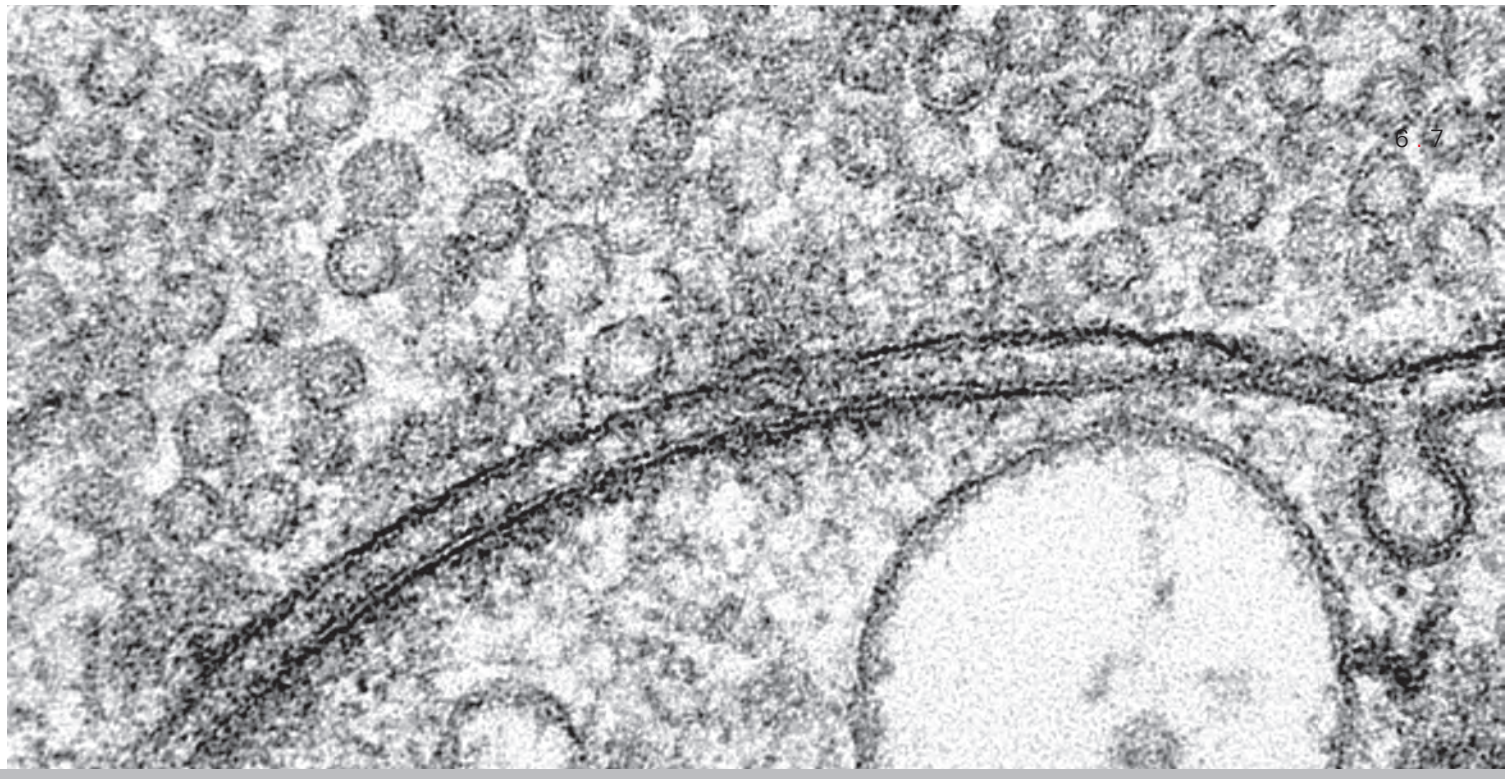
Light source

> LED light modules with 5 different wave lengths (red, blue, green, UV, amber).
> Automatic recognition of the connected LED module by the instrument software.
> Easy one-click connection.



Experiment parameters

> Software-integrated programming offers a range of parameters to enable the design of your experiment.
> All details of a light stimulation experiment are incorporated in the log file.



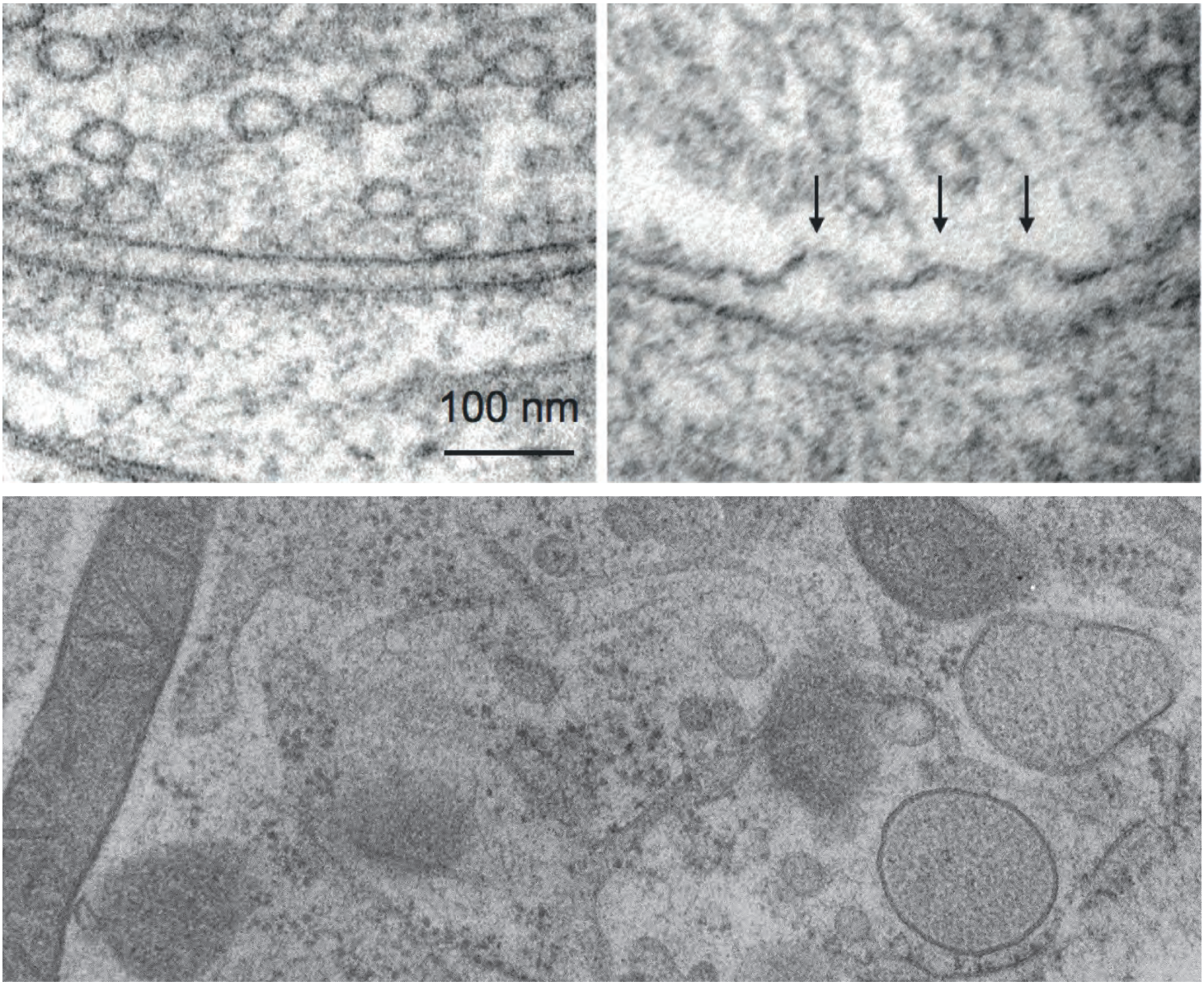
HOLDS THE PROMISE FOR A BRIGHTER FUTURE

Symmetric synapse. Dr. Shuwen Chang, Charité Universitätsmedizin, Berlin, Germany

"Electron microscopy only captures a static image of a cell. What is the cell doing? What is the true sequence of events in a cellular process? We can make flip books from our micrographs that tell a story, but their arrangement can be influenced by the story we want to tell. With the advent of optogenetic tools a flash of light can trigger dynamic cellular events such as neurotransmission. By coupling a flash of light with rapid high-pressure freezing, regulated vesicle fusion and subsequent vesicle recycling at synapses can be visualized."

Shigeki Watanabe, PhD, Erik M. Joergensen,
University of Utah, Salt Lake City, UT, USA

Join our vision and obtain excellent results, capturing scientific phenomenon with a temporal resolution of milliseconds!

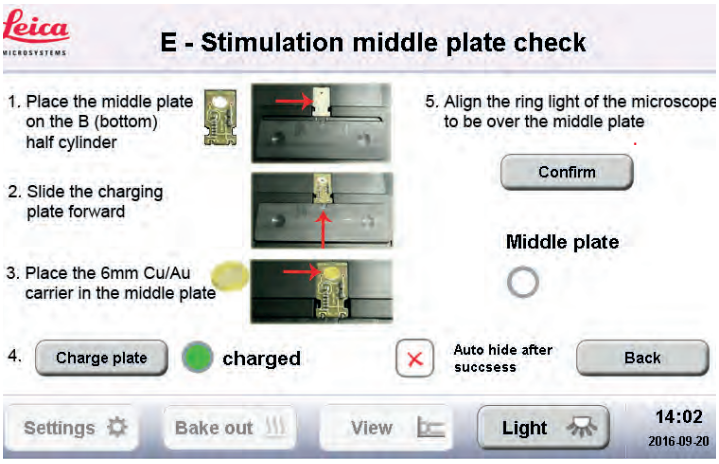


Mouse Hippocampal Neurons, Dr. Shigeki Watanabe, Johns Hopkins University

WHY HIGH PRESSURE FREEZING WITH ELECTRICAL STIMULATION?

Membrane trafficking events at neuronal synapses are the basis of every memory, every emotion. Understanding this highly dynamic event is anything but trivial. The combination of well-established electrophysiology research methods and the technology that allows for millisecond precision in sample preservation is the only tool that may bring the revelation of many unanswered questions such as “How are synaptic vesicles recycled?”

Freeze the moment of your discovery!



PREPARATION WORKFLOW

- Assemble the Electrical Stimulation components
- Program your experiment
- Load the samples
- Charge the Middle plate/PSP print
- Freeze

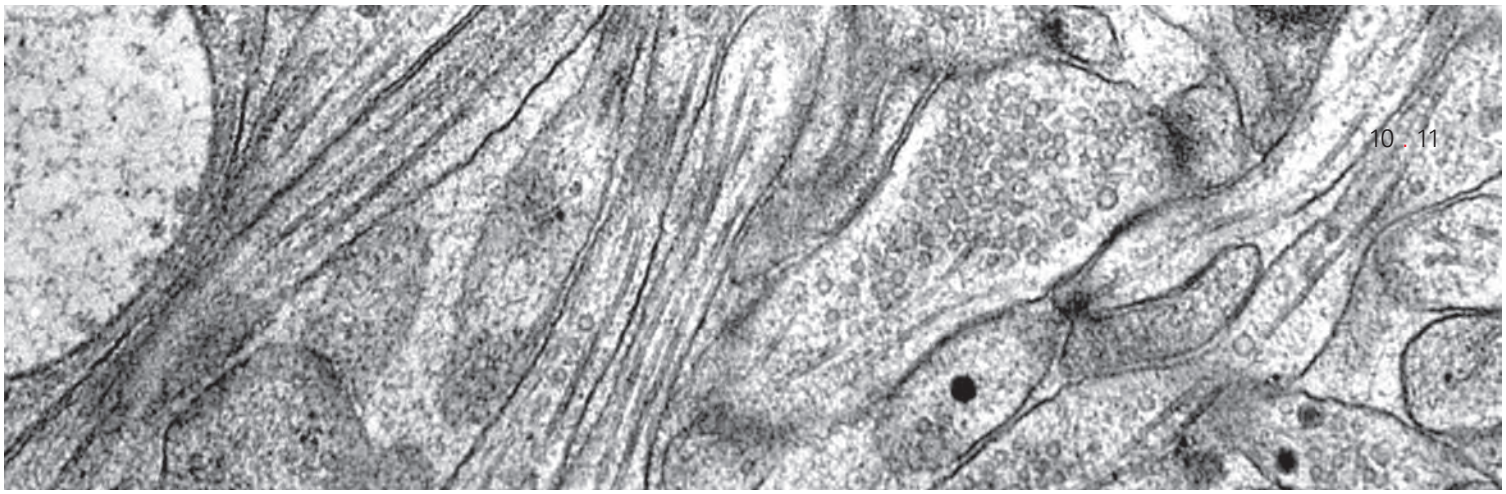
HOW DOES HIGH PRESSURE FREEZING WITH ELECTRICAL STIMULATION WORK?

The secret to our success is in the specially designed middle plate for ES experiments. It is a PCB (printed circuit board) which can be charged with electricity. This electricity is stored in capacitors and can only be released inside of the high pressure chamber. The release of electrical current is induced by a light-sensitive switch incorporated in the middle plate. The switch is activated by the integrated blue light module and controlled by the software.

The plate holds capacity of 50µF and 10V that can be discharged to the sample completely or in pulses with millisecond accuracy. The actual voltage will depend on the duration of the experiment, as the reduction of voltage follows the exponential “decay curve” for capacitor discharge.

DISCOVER LEICA EM ICE UNIQUE FEATURES

- Only 1 second from loading the sample in the carrier to frozen
- Only 1 minute recovery time between freezing cycles
- Only 20 minutes to cool down and ready to use
- Only 30 liters LN_2 daily consumption, including cooling down
- No alcohol or additional synchronization fluids used
- Upgradable to light stimulation mode at any time at your work place
- Upgradable to electrical stimulation mode at any time at your work place



Neuron, courtesy of Elly van Donselaar, Martin Harterink and Karin Vocking, Utrecht University, Netherlands

FOCUS ON YOUR SAMPLE

One move, fully automated specimen loading

> The cartridge assembly and the freezing process is triggered automatically by closing the cover of the loading station. Concentrate on the sample, not on the instrument.

ONE SAMPLE DEWAR – MANY POSSIBILITIES

Work quickly and efficiently with the Leica EM ICE

> **Programmed rotation:** Software integrated programming of sample position, name and number in the specimen Dewar.

> **Three separate positions:** Allows for three different samples to be frozen subsequently. Or three different conditions of the same sample.

> **Nine consecutive freezing cycles:** Your time and your sample are critical. Concentrate on what is really important.

> **Sample safety:** Automated re-filling of the sample storage Dewar with LN2 through out the freezing session.

MODULARITY TO MEET USER PREFERENCES

Flexible & ready for upgrade

> Integrated workstation with configurable microscope selection.

> Temperature control options for the loading station and table.

> Environmental chamber for optimal sample preparation.

> Software integrated tutorials.

> Timeless value: Upgradeable to light stimulation and/or electrical stimulation mode at any time at customer site.

Leica
MICROSYSTEMS

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