

Consumables for battery research / in situ NMR probes In situ NMR cells – dis/assembly, sealing, and cleaning

<https://eprobe.tech/products/cells>

<https://eprobe.tech/products/tools>

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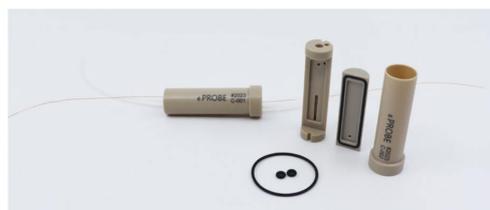
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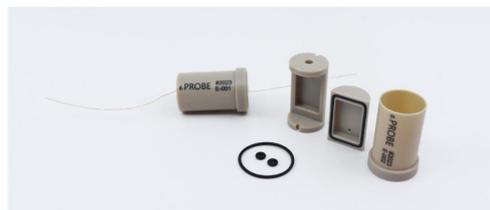
In-situ battery cell set, consisting of plastic cell capsules, an assembly and disassembly tool and various accessories



OD 8 mm / L 26 mm battery cell,
no flow option



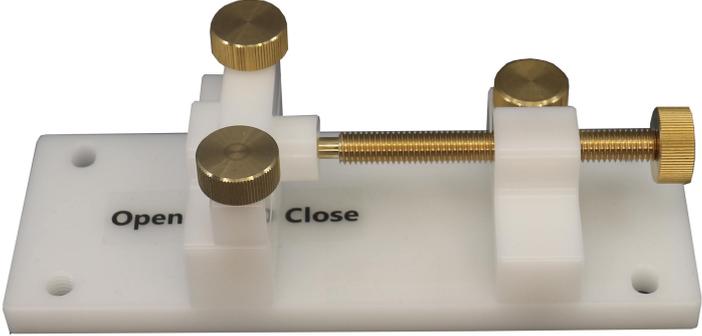
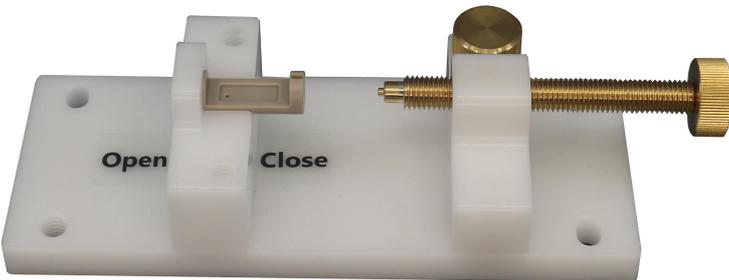
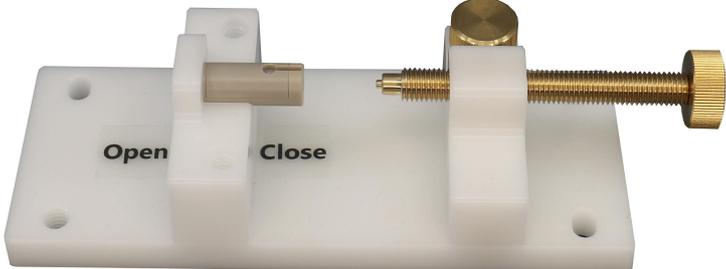
OD 11 mm / L 40 mm battery cell,
with flow option

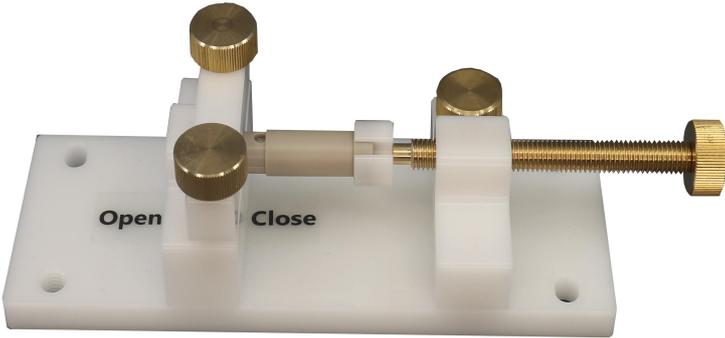


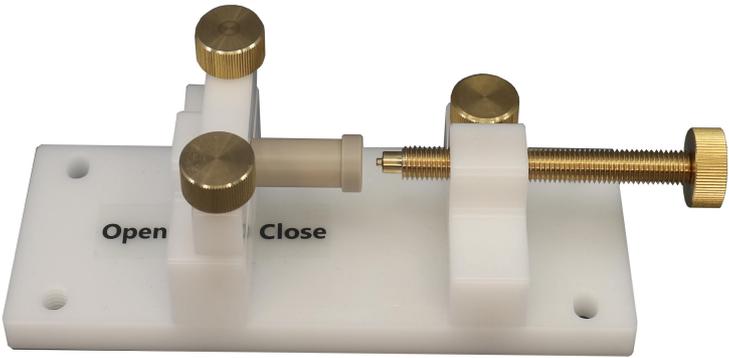
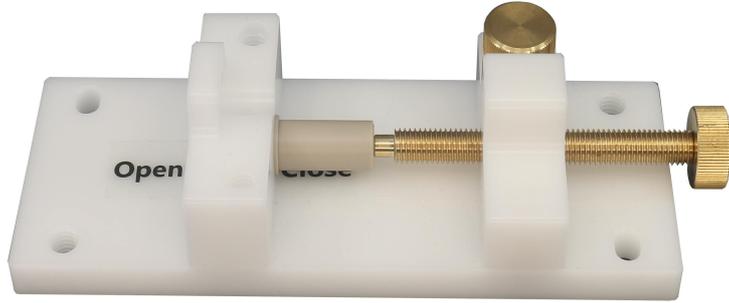
OD 15 mm / L 26 mm battery cell,
no flow option

Picture: courtesy of [Bruker Labscape Consumables, Filling Tools, and Reference Standards; Solid-State NMR; Order No. T189041; © 10/2023 Bruker BioSpin.](#)

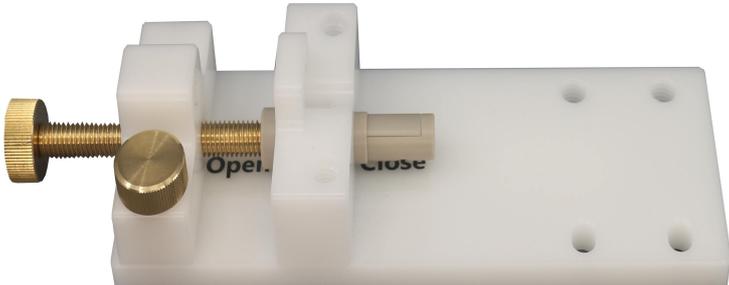
Close an in situ cell (plastic cell capsule) using ePROBE's dis/assembly tool

<p>1</p>		<ul style="list-style-type: none"> • Screw out the screw • Remove clamp • Remove Teflon cap and keep it for later
<p>2</p>		<ul style="list-style-type: none"> • Place bottom cavity of the cell inside the tool (block) • Make sure that the wire is not cut off while pulling it through the hole of the block
<p>3</p>		<ul style="list-style-type: none"> • Place top cavity on the cell and align the wire • Make sure that enough electrolyte is used • Use gentle pressure with your fingers to align both parts

<p>4</p>		<ul style="list-style-type: none"> • Use the clamp the press both cavities together • There must be no space left between both cavities
<p>5</p>		<ul style="list-style-type: none"> • Push the capsule over the cavities as far as possible by hand • Make sure to not cut off the wire • Place the Teflon cap on the cavity and align the screw inside the hole • Screw further to close the capsule
<p>6</p>		<ul style="list-style-type: none"> • Make sure to not cut off the wire and/or damage the sealing • Once the capsule hits the block stop screwing

7		<ul style="list-style-type: none">• Remove the screw and put it back into the hole on the bottom• Remove the Teflon cap• Remove the clamp• Take out the cell
8		<ul style="list-style-type: none">• Insert the cell into the lower hole of the block• Screw in the screw and align it with the cell
9		<ul style="list-style-type: none">• Screw in the cavities into the capsule until it is completely closed

Open an in situ cell (plastic cell capsule) using ePROBE's dis/assembly tool

<p>1</p>		<ul style="list-style-type: none"> • Insert the cell into the lower hole of the block coming from the left side • Move the holder for the screw on the left side of the tool • Screw in the screw and align it with the cell
<p>2</p>		<ul style="list-style-type: none"> • Start screwing in the screw to push out the cavities
<p>3</p>		<ul style="list-style-type: none"> • Screw until the cavities are out • Remove the screw and capsule

Sealing strategies for in situ cells

a) Two-Component Epoxy Adhesives

- Firstly, fix the O-ring to the current collector wire using the two-component epoxy provided. Please wait for at least 8 hours until the sealing became a hard plastic solid.
- Then, insert the O-ring into the gap of the cell cavity so that the short end of the wire ends inside the cell cavity.
- Subsequently, bend the longer end of the wire along the small lining outside the cell.
- Once you applied this procedure on both cell cavities, please push the capsule over the cell cavities. The capsule press the wires strongly onto the O-ring, so that the O-ring seals the cell by itself.
- Dry the sealed cell parts in a vacuum oven before assembling a cell.
- The wire-O-ring assembly is often times re-useable. Clean before with Isopropanol or Ethanol.

b) Superglue

- Insert the O-rings and the current collector wires into the gaps of the cell cavities, as usual.
- Seal the cavities holes/gapes with a tiny amount of superglue.
- Make sure, that the applied superglue stays on the surface outside of the cell cavities and it does not penetrate inside of the cell cavities.
- Press the short end of the wire inside of the cell cavity. Simultaneously, pull the longer end of the wire bent along the small lining outside the cell. Keep pressing and pulling of the wire for few minutes to fix it in place.
- Please wait for at least 30 minutes to allow the superglue to dry.
- After drying the glue, transfer the cell parts to vacuum oven.
- To remove superglue, soak the cell parts in Acetone for 10 minutes.

c) Blu-Tack (or similar) as Sealant Material

- Fit the sealing O-rings and the current collectors in the gaps/holes inside of the cell cavities.
- Apply a small amount of the Blu-Tack to close the gaps in the cavities as well as to fix the current collector wires inside of the cavities.
- Please note, the temporary sealing solution with Blu-Tack is recommended in case the electrode materials are not highly sensitive to air moisture.
- After the experiment, use tweezers to remove the Blu-Tack.

Cleaning of in situ cell parts

- After disassembling a cell, please first remove all electrodes from the cell.
- Wash/rinse the cell parts (i.e. top, bottom, capsule, Teflon sheets, sealing rings) with Ethanol.
- Detach all used Teflon sheets, wires/current collectors and all Viton O-rings from the cell.
- Please note, Acetone will help you to remove two-component (epoxy) glue/ superglue if this has been used for fixing the Viton O-ring to the current collector to seal the cell.
- We do not recommend soaking of the Viton O-rings in Acetone overnight, since the rubber otherwise swells, and you can not re-use it properly.
- Clean the PEEK parts of the cell (i.e. top, bottom, and capsule) using Ethanol and/or Acetone.
- The PEEK cell parts can be soaked in Ethanol and/or Acetone overnight.
- Alternative use a sonicator to clean the PEEK parts; e.g. three times 10 min with fresh Ethanol/Acetone after each step.
- The PEEK parts can be re-used without limitations.
- Please properly dry the cell parts (i.e. top, bottom, capsule, Teflon sheets, sealing rings) after cleaning and before re-using it; e.g. vacuum oven (not above 100°C).