TECHNICAL NOTE

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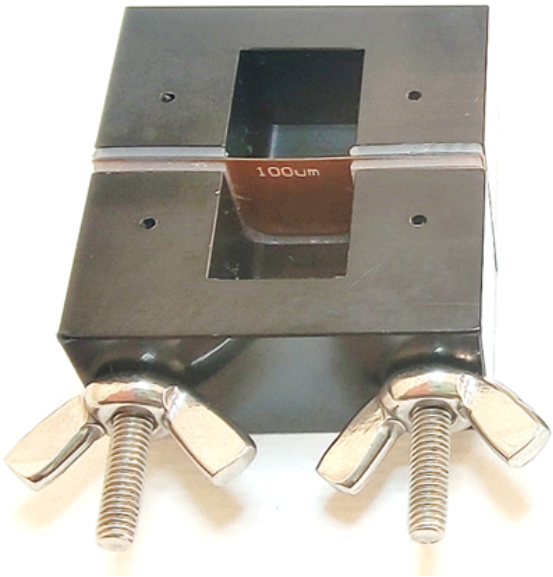
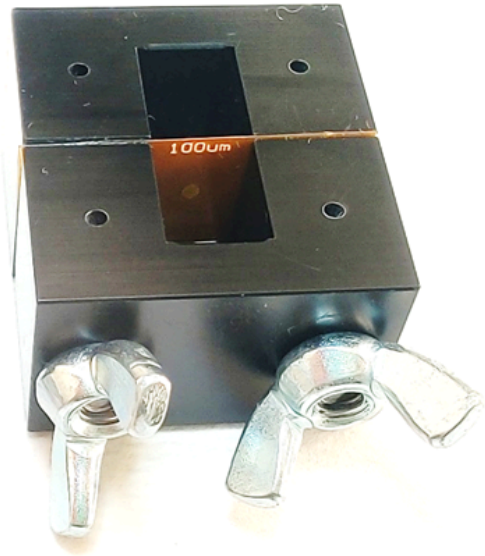
Structural and functional details of the “std” and “MM” BLM cuvettes

BLM cuvette_std



BLM cuvette_MM



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Revision History

Date	Version	Description
16/01/2024	1.1	Insert new entries on top
16/01/2024	1.0	First version of document

This document aims to provide a brief comparison of the std and MM BLM cuvettes characteristics.

The new chamber has been developed in response to the demand to greatly reduce the training time needed to obtain high quality lipid membranes as well as to prevent the occurrence of leaks in the chamber due to improper assemblies. The table below shows the main characteristics of the two chambers.

The volume of the two compartments has remained almost unchanged, leaving the advantage of reducing the amount of material (e.g. lipids, proteins, molecules), but their geometry has been modified to promote the development in height and reduce the wideness. This way, it was possible to place the micro-sized aperture higher in the compartment, thus making the chamber compatible with the Montal-Müller painting technique or the pseudo-air bubble method which allows to obtain membranes of better quality compared to the std version in less time.

Note: you may still use the paintbrush method to create lipid bilayer membranes in the BLM cuvette_MM, but we recommend using the Montal-Müller to obtain higher quality membranes in less time.

Finally, the use of the silicon grease to seal the Delrin parts with the Kapton foil significantly reduces the possibility of incurring leakage in the chamber and removes the need to replace silicone seals. Out of a total of 20 assemblies, a leakage has been observed in the BLM cuvette_std within 15 min after the beginning of the experiment 10 times. Out of the same number of trials, no leakage has been observed in the BLM cuvette_MM.

	BLM cuvette_std	**BLM cuvette_MM**
Material of the two semi-compartments	Delrin	Delrin
Size of the assembled chamber (l x w x h)	32 x 30 x 15 mm	30 x 28 x 18 mm
Size of the compartments	10 x 11 x 10 mm	10 x 8 x 13 mm
Type of septa available and aperture diameters	Kapton: 100 -- 150 – 200 µm Teflon: 50 – 80 – 110 µm	Kapton: 100 -- 150 – 200 µm Teflon: 50 – 75 µm

Sealing agent	Silicon gaskets	Silicon grease (not provided)
Distance between the micro aperture center and the base of the compartment	2 mm	6 mm

In the table below are reported the mean values of DPhPC-made bilayer membrane capacitance obtained in either the std or the MM BLM cuvette. The values obtained in the BLM cuvette_MM version are significantly higher, indicative of an increase in membrane quality that results in easier protein insertion .

Septum (aperture diameter within brackets)	Membrane capacitance in BLM cuvette_std painted with the paintbrush	Membrane capacitance in BLM cuvette_std painted with the Montal-Müller method
Teflon 50um	7 - 9 pF	30 - 40 pF
Teflon 80um	18 - 28 pF	50 - 60 pF
Kapton 100um	20 - 40 pF	70-90 pF
Kapton 150um	35 - 90 pF	120-150 pF