Technická zpráva – Funkční vzorek

Autoři: Miloš Svoboda, Jiří Lindner, Dalimil Šnita

Umístění: Vysoká škola chemicko-technologická v Praze

Název: **Mikrofluidní zařízení s vloženou membránou a mikro-elektrodovým polem pro měření veličin v okolí membrány**

Description

Microfluidic device with embedded membrane and integrated microelectrode array has been developed. PMMA wafers are used as the substrate. The device consists of two layers: (i) the upper layer containing microchannels for electrolyte inlet and outlet, and (ii) the bottom layer with integrated microelectrode array. The microchannels in the upper plate are fabricated by micromachining with a cross-section of 800 × 800 μm. The bottom plate with integrated microelectrode array with golden microelectrodes has been fabricated using sacrificed substrate technique as described in ref. [1]. Individual electrodes are 15 μm wide and the space between electrodes is 85 μm. In central part of both plates a notch for membrane has been fabricated by micro-milling and the membrane has been inserted (cf. Fig. 1). Both parts then have been connected using solvent activated low-temperature bonding to avoid problems with different thermal expansion properties of materials used.

The size of the membrane active surface is around 800 × 800 μm, the thickness of the membrane is about 600 μm in the dry state, in the solution it swells to a thickness of 780 μm approx.

Using a suitable multi-channel measuring device, potential profiles around the membrane can be evaluated either under stationary or dynamical conditions. The functionality of the device has been verified by measurements of current-voltage curves. Dynamical measurements has been also carried out in studies of effects of hydrodynamical conditions and variable current density, as described in our work [2].

In the future, further scaling-down of the device is planned to achieve measurement with higher spatial resolution.

References

[1] M. Svoboda, Z. Slouka, W. Schrott, P. Červenka, M. Přibyl, D. Šnita, *Microelectron. Eng.* **87** (2010), 1590–1593.

[2] M. Svoboda, J. Kratochvíla, J. Lindner, M, Přibyl, D. Šnita, *Microelectron. Eng.* **88** (2011), 1789–1791.

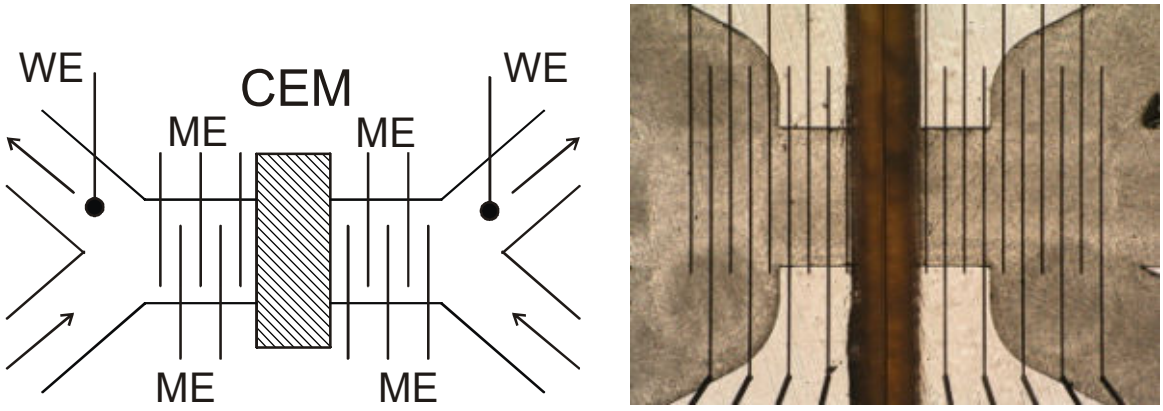

Fig. 1: Scheme (left) and photo (right) of the central part of the device: WE are working electrodes, ME are measuring electrodes, CEM is the membrane, arrows denote electrolyte inlets / outlets

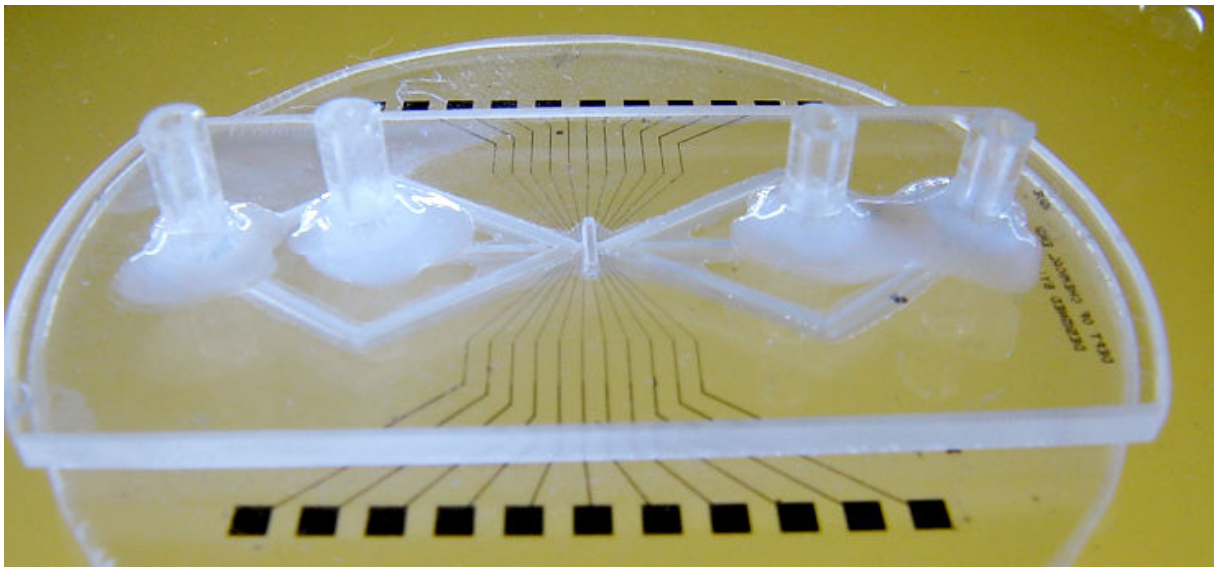

Fig. 2: Whole device

Acknovledgement

This work has been supported by Czech Science Foundation, project No. 203/07/1320.