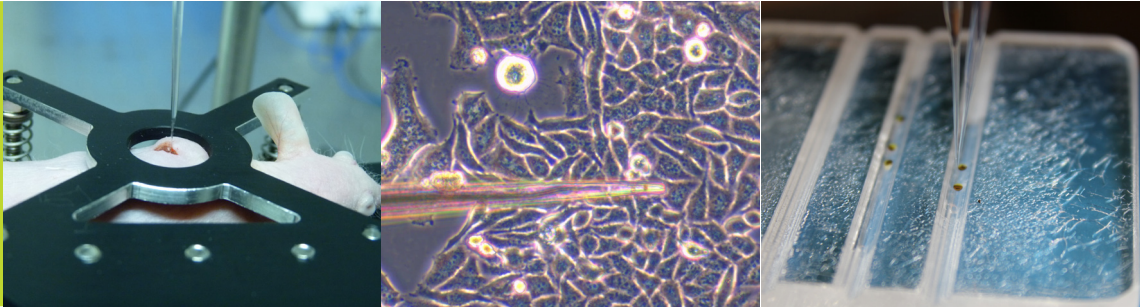


ENABLING
SCIENTIFIC
RESEARCH



Unisense microsensors in biomedical research

Real time monitoring of H_2S , O_2 , NO , pH , Redox, H_2 , N_2O or temperature in your sample.

- Real-time H_2S measurements in your sample
- Determine and monitor dose-dependent H_2S production
- Map local H_2S distribution in a biofilm
- Perform kinetic analyses and study enzymatic processes
- Measure H_2S production in different cell types
- Evaluate NO production, pH gradients, redox potential etc.

Take advantage of sensor tips with diameters less than 10 μm and complete real time measurements directly in your sample. Regardless whether you are measuring effects of H_2S on smooth muscle tissue, NO metabolism in tissue samples or oxygen consumption in brain slice cultures, the Unisense microsensors will provide you with an accurate and reliable research tool.

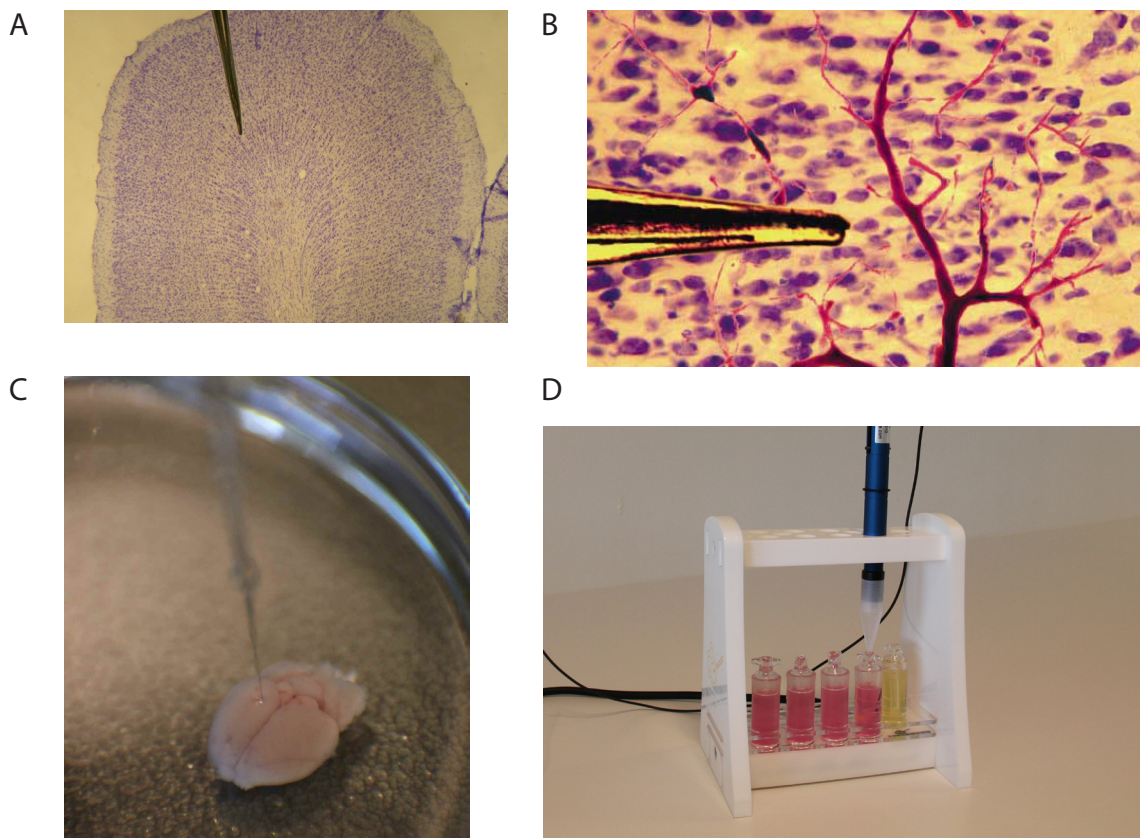
Use the Unisense MicroRespiration System to monitor H_2S production in your sample. The chambers of the MicroRespiration system is gas tight and you can measure the H_2S concentration while adding sulfide precursors, enzymes, inhibitors ect. Double chambers enable measurements of two parameters such as pH and H_2S simultaneously. SensorTrace Suite software keeps track of your samples and measured values and allows you to analyse your data while logging or to post process obtained data.

Using the MicroProfiling System you can complete microprofiles with extreme positioning accuracy and high spatial resolution. The microprofiles can be performed manually operating the micromanipulator by hand, or automatically controlling a motorstage via your PC. The sensor signal is logged using SensorTrace Suite software, a software solution that also allows you to visualize and analyse your obtained data. The MicroProfiling System can be build into a glove box for experiments that require specific gas compositions and you can get the analog sensor signal for integration with existing data logging instruments.



The MicroProfiling System consists of a Unisense amplifier, here the Microsensor Multimeter, a micromanipulator mounted on a laboratory stand and SensorTrace Suite software. The MicroProfiling System comes in a manual or automatic version and it enables you to perform high resolution microprofiles.

Selected microsensor applications:



A. Composite picture showing an oxygen microsensor inside brain tissue. Courtesy of Dr. Jeff Thompson. B. Composite picture showing an APOX microsensor inside brain tissue. The APOX sensor is a specialized microsensor that measures both oxygen partial pressure and action potential. Courtesy of Dr. Jeff Thompson. C. pH measurements in a mouse brain. D. H_2S production in cell suspension measured by MicroRespiration System.

Recent papers in which Unisense H_2S microsensors are used:

- X. Zhu, Z. Tang, B. Cong, and J. Du. **Estrogens increase cystathionine-F-lyase expression and decrease inflammation and oxidative stress in the myocardium of ovariectomized rats.** *Menopause* 20 (10):1, 2013.
- J. Wu, J. Wei, X. You, X. Chen, H. Zhu, X. Zhu, Y. Liu, and M. Xu. **Inhibition of hydrogen sulfide generation contributes to lung injury after experimental orthotopic lung transplantation.** *Journal of Surgical Research*, 2012.
- T. Itoh, N. Hamada, R. Terazawa, M. Ito, K. Ohno, M. Ichihara, Y. Nozawa, and M. Ito. **Molecular hydrogen inhibits lipopolysaccharide/interferon gamma-induced nitric oxide production through modulation of signal transduction in macrophages.** *Biochemical and Biophysical Research Communications* 411 (1):143-149, 2011.
- X. J. You, C. Xu, J. Q. Lu, X. Y. Zhu, L. Gao, X. R. Cui, Y. Li, H. Gu, and X. Ni. **Expression of Cystathionine beta-synthase and Cystathionine gamma-lyase in Human Pregnant Myometrium and Their Roles in the Control of Uterine Contractility.** *PLoS One* 6 (8):e23788, 2011.
- W. Chen, M. Kajjya, G. Giro, K. Ouhara, H. E. Mackler, H. Mawardi, H. Boisvert, M. J. Duncan, K. Sato, and T. Kawai. **Bacteria-derived hydrogen sulfide promotes IL-8 production from epithelial cells.** *Biochemical and Biophysical Research Communications* 391 (1):645-650, 2010.
- X. Y. Zhu, S. J. Liu, Y. J. Liu, S. Wang, and X. Ni. **Glucocorticoids suppress cystathionine gamma-lyase expression and H_2S production in lipopolysaccharide-treated macrophages.** *Cellular and molecular life sciences* 67 (7):1119-1132, 2010.
- T. Itoh, Y. Fujita, M. Ito, A. Masuda, K. Ohno, M. Ichihara, T. Kojima, Y. Nozawa, and M. Ito. **Molecular hydrogen suppresses Fc-epsilon-RI-mediated signal transduction and prevents degranulation of mast cells.** *Biochem. Biophys. Res. Commun.* 389 (4):651-656, 2009.