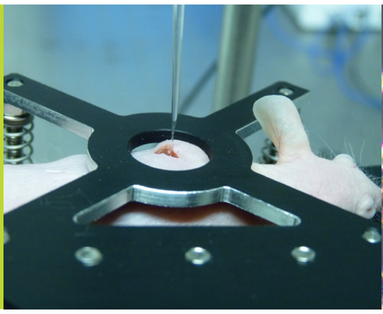
UNISENSE

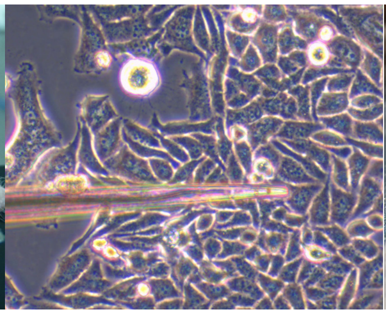
SOLUTIONS FOR MICROSCALE MEASUREMENTS

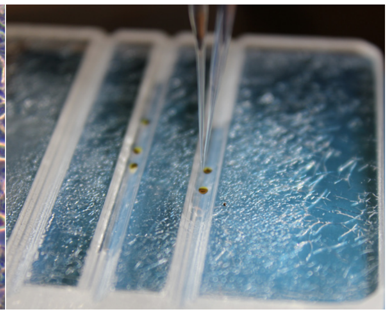
ENABLING

SCIENTIFIC

RESEARCH







Unisense microsensors in neuro-research

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

- Measure oxygen consumption rates by pO_2 depth profiles
- Monitor oxygen in brain slices preparations
- Record oxygen tissue supply
- Perform kinetic analyses and study enzymatic processes
- Determine local variation of oxygen demand
- Evaluate NO production, pH gradient, H_2S concentration etc.

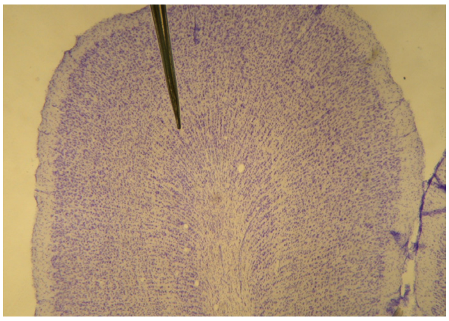
Take advantage of microsensor tips with diameters less than 10 µm and perform real time measurements directly in your sample. Regardless of you are measuring NO metabolism in tissue samples, oxygen consumption in brain slice cultures, or oxygen partial pressure the Unisense microsensors will provide you with an accurate and reliable research tool. Due to the very small sensor tips the Unisense microsensors can be applied in a non-destructive manner enabling in vivo measurements e.g. through a cranial window in mice and rats. The microsensors have a fast response time allowing you to obtain reliable pO_2 measurements over time under different treatment conditions or changing activity states.

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.

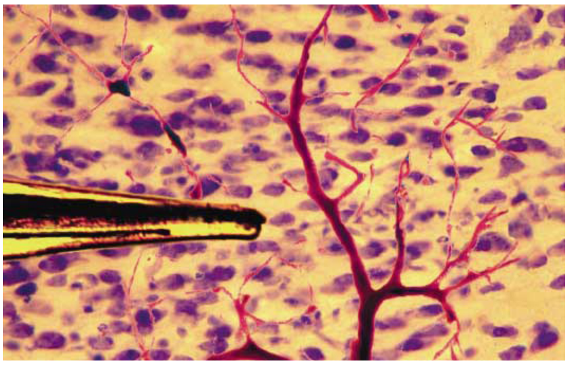
The MicroProfiling System consists of a Unisense amplifier, here the Microsensor Multimeter, a micromanipulator mounted on a laboratory stand and SensorTrace Suite software. The MicroProfiling System comes in a manual or automatic version and it enables you to perform high resolution microprofiles.

Selected microsensor applications:

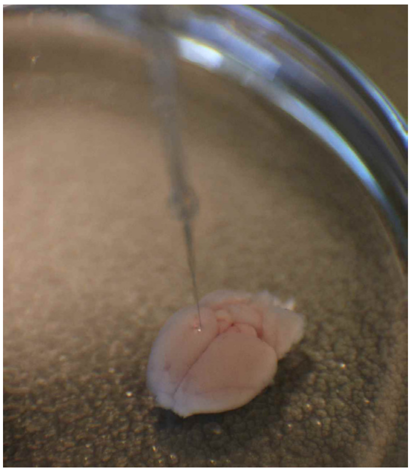
A



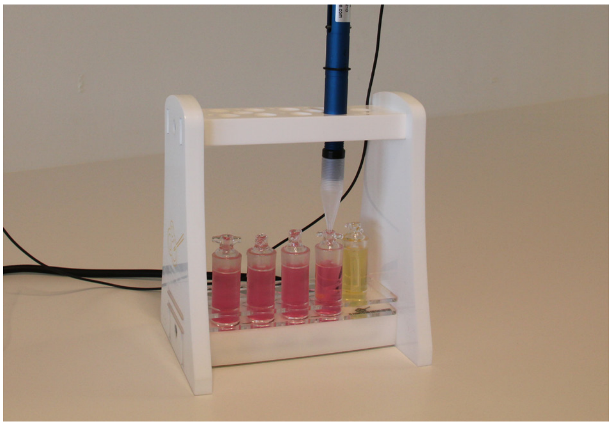
B



C



D



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. Oxygen consumption in cell suspension measured by MicroRespiration System.

Recent papers in which Unisense microsensors are used:

- C. Mathiesen, A. Brazhe, K.Thomsen, and M. Lauritzen. **Spontaneous calcium waves in Bergman glia increase with age and hypoxia and may reduce tissue oxygen.** Journal of Cerebral Blood Flow & Metabolism 33 (2):161-169, 2012.
- A. S. Thrane, T. Takano, Thrane Rangroo, V, F. Wang, W. Peng, O. P. Ottersen, M. Nedergaard, and E. A. Nagelhus. I**n vivo NADH fluorescence imaging indicates effect of aquaporin-4 deletion on oxygen microdistribution in cortical spreading depression.** J.Cereb.Blood Flow Metab, 2013.
- C. Huchzermeyer, N. Berndt, H. G. Holzhutter, and O. Kann. **Oxygen consumption rates during three different neuronal activity states in the hippocampal CA3 network**. J.Cereb.Blood Flow Metab 33 (2):263-271, 2013.
- R. Aamand, T. Dalsgaard, F. B. Jensen, U. Simonsen, A. Roepstorff, and A. Fago. G**eneration of nitric oxide from nitrite by carbonic anhydrase: a possible link between metabolic activity and vasodilation**. American Journal of Physiology- Heart and Circulatory Physiology 297 (6):H2068, 2009.
- M. Zilberter, A. Ivanov, S. Ziyatdinova, M. Mukhtarov, A. Malkov, A. Alpar, G. Tortoriello, C. H. Botting, L. Fulop, A. A. Osypov, A. Pitkanen, H. Tanila, T. Harkany, and Y. Zilberter. **Dietary energy substrates reverse early neuronal hyperactivity in a mouse model of Alzheimer's disease.** J.Neurochem. 125 (1):157-171, 2013.
- A. S. Geneslaw, M. Zhao, H. Ma, and T. H. Schwartz. **Tissue hypoxia correlates with intensity of interictal spikes.** J.Cereb.Blood Flow Metab 31 (6):1394-1402, 2011.
- C. N. Hall, M. C. Klein-Flugge, C. Howarth, and D. Attwell. **Oxidative phosphorylation, not glycolysis, powers presynaptic and postsynaptic mechanisms underlying brain information processing.** J.Neurosci. 32 (26):8940-8951, 2012.
- I. Almendros, R. Farre, A. M. Planas, M. Torres, M. R. Bonsignore, D. Navajas, and J. M. Montserrat. **Tissue oxygenation in brain, muscle, and fat in a rat model of sleep apnea: differential effect of obstructive apneas and intermittent hypoxia.** Sleep 34 (8):1127, 2011.
- J. C. Fordsmann, R. W. Ko, H. B. Choi, K. Thomsen, B. M. Witgen, C. Mathiesen, M. Lonstrup, H. Piilgaard, B. A. MacVicar, and M. Lauritzen. **Increased 20-HETE synthesis explains reduced cerebral blood flow but not impaired neurovascular coupling after cortical spreading depression in rat cerebral cortex.** J.Neurosci. 33 (6):2562-2570, 2013.