

**Development of Iridium Oxide pH sensor coupled with FSCV detection of neurotransmitters for measurements in brain in vivo.**

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Measurement of change in dopamine concentration in brain using fast scan cyclic voltammetry at carbon fiber ultramicroelectrodes in behaving animals has proven to be a unique method to provide insight in chemical basis of behavior. However, the selectivity of the method is limited since accurate correlation between the current measured and dopamine concentration is compromised by change in concentration of other electrochemically active species of which pH plays important role. Changes in pH that occur during dopamine release are caused by metabolic activity of the brain and change in cerebral blood flow. In order to precisely distinguish this pH related contribution to the current, an independent potentiometric iridium oxide sensor was developed.

A pH sensitive microelectrode with iridium oxide layer electrochemically deposited on carbon fiber was constructed and tested in situ. The sensitivity of the electrode was shown to be  $-80 \pm 6$  mV per pH unit. Microelectrode response time was optimized by decreasing iridium oxide thickness. Characteristic response time in sub-second time frame was achieved. Hardware and software were developed for simultaneous measurements of pH and FSCV detection of dopamine. Ability to measure pH changes of physiological importance ( $\pm 0.07$  pH units) in such setup was demonstrated.

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