Abstract

Title: A Gamma-Aminobutyric Acid (GABA) biosensor for Continuous *Ex Vivo* Monitoring of in Real-Time

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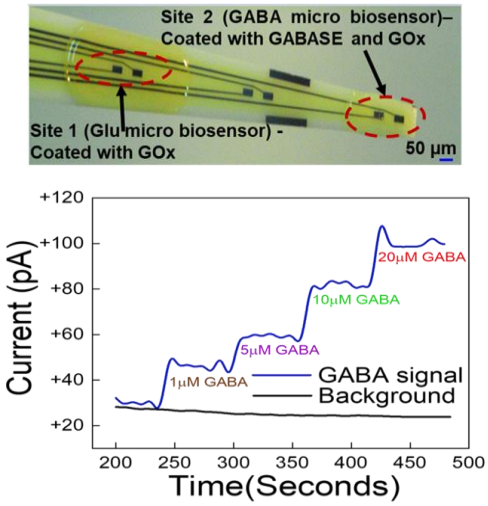
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I. Abstract

The Gamma-aminobutyric acid (GABA) is an essential inhibitory neurotransmitter in brain-related to multiple neuronal processes. Abnormal GABA levels related to brain disorders such as epilepsy, psychiatric disease, spasticity, and stiff-person syndrome, and therefore, controlling GABA has been the target for a wide range of drug therapeutics. As a non-electroactive GABA, detection in real-time is challenging. Presently, microdialysis with a high-performance liquid chromatography (HPLC) system that employs electrochemical (EC) and spectroscopic methodology used in GABA detection, which is bulky and nonviable for continuous real-time monitoring. Here, we report a GABA sensor that operates on an enzyme-based principle can simultaneously detect GABA and Glutamate (a major excitatory neurotransmitter) continuously in real-time in vitro and ex vivo and without any externally applied reagents. The GABA sensitivity of 36±2.5 pA. $\mu M^{-1}.cm^{-2}$ Achieved in-vitro, which is 26-fold higher than currently reported sensors with a limit of detection (LOD) of 2±0.12 µM. The GABA sensor successfully tested in brain slice extracted from an adult rat indicates the developed GABA probe can be integrated into the future preclinical trials for assessing the combined role of GABA and Glu signaling in various brain disorders.

II. Image:



a. Reference:

1 Hossain, I., Tan, C., Dutta, G., Siddiqui, S., Iasemidis, L.D. and Arumugam, P.U., 2018. "A Novel Electrochemical Microbiosensor Microarray for Real-Time Continuous In Vitro Monitoring of Gamma-Aminobutyric Acid." *Frontiers in Neuroscience*, *12*, pp.500.

2 Niwa, O., Kurita, R., Horiuchi, T., and Torimitsu, K., 1998. Small-volume on-line sensor for continuous measurement of γ-aminobutyric acid. *Analytical Chemistry*, *70*(1), pp.89-93.

3 Grabauskas, G., 2004. Time course of GABA in the synaptic clefts of inhibitory synapses in the rostral nucleus of the solitary tract. *Neuroscience Letters*, *373*(1), pp.10-15.

III. Biography:

Gaurab Dutta has completed his Ph.D. from Louisiana Tech University and currently pursuing postdoctoral studies in the Center of Integrated Biomedical and Bioengineering Research (CIBBR), University of New Hampshire USA. He is the lead scientist BioMEMS and Nanoelectronics Lab, dedicated to neurochemical sensing via novel electrochemical sensors. He has authored in 12 papers in reputed international journals and has been serving as a peer reviewer in the editorial board of reputed journals such as MDPI, Elsevier, Hindawi.

IV. Presenting author details



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