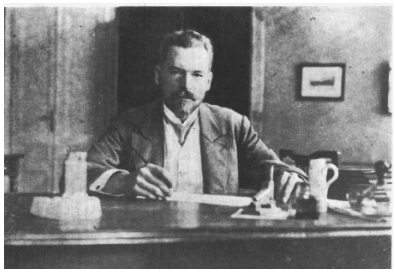

Contribution ID: **23** Type: **Poster**

The investigation of BK ion channels activity using the method of Empirical Mode Decomposition

Sunday, 18 September 2022 16:51 (3 minutes)

The ion channels are characterized by a high degree of complexity, largely sensitive to the measurement conditions. The complex dynamics of the processes taking place in biological membranes is nontrivial and difficult to describe by the standard techniques dedicated to signal analysis. It is still unclear what specific mechanism leads to pink noise, which is an averaged effect of ion channel dynamics [2].
In this work the ionic conductivity signals of BK channels are decomposed into a finite number of empirical components, using a procedure called Empirical Mode Decomposition (EMD) pioneered by N. E. Huang et al. [1]. To fully understand the principles underlying these complex microbiological systems, the received frequency components were carefully analyzed through the methods dedicated to nonlinear and non-stationary signals: multifractal techniques and information entropy. These nonlinear features of the ion channels system activity strongly depend on the sampling rate at patch-clamp recording.
The modes extraction technique in conjunction with the implementation of the complexity measures allows for a better understanding of the structure of the time series and the process hidden behind the data including impact of individual components with different frequency characteristics on the entire signal.

REFERENCES
[1] N. E. Huang et.al,The empirical mode decomposition and hilbert spectrum for nonlinear and nonstationary time series analysis. Proc. Roy. Soc. London A, 454, 903–995, 1998.
[2] Machura, L., Wawrzkiewicz-Jałowiecka, A., Bednarczyk, P., & Trybek, P. (2022). Linking the sampling frequency with multiscale entropy to classify mitoBK patch-clamp data. Biomedical Signal Processing and Control, 76, 103680.

Primary authors: Dr TRYBEK, Paulina (University of Silesia in Katowice, Faculty of Science and Technology, Chorzów, 41-500, Poland); MACHURA, Lukasz (University of Silesia in Katowice, Faculty of Science and Technology, Chorzów, 41-500, Poland); WAWRZKIEWICZ-JALOWIECKA, Agata (Silesian University of Technology, Faculty of Chemistry); Dr BEDNARCZYK, Piotr (Department of Physics and Biophysics, Institute of Biology, Warsaw University of Life Sciences—SGGW)

Presenter: Dr TRYBEK, Paulina (University of Silesia in Katowice, Faculty of Science and Technology, Chorzów, 41-500, Poland)

Session Classification: Poster session party