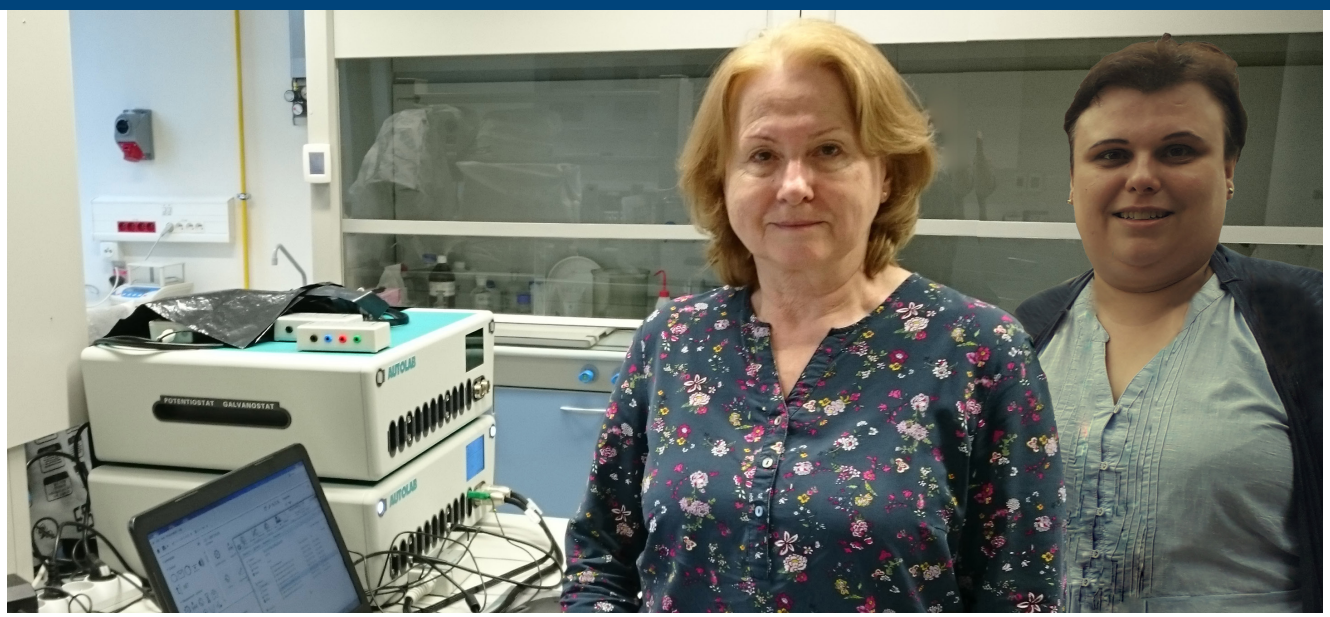
Bioanalytical Research Group



HEAD:

Prof. Magdalena Maj-Żurawska*, PhD DSc

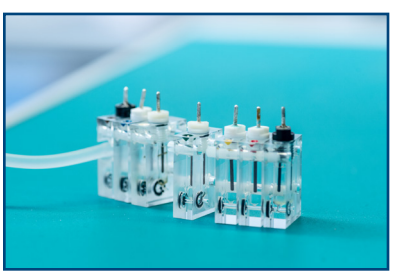
GROUP MEMBERS:

Prof. Andrzej Lewenstam, PhD DSc (Professor affiliated to the University of Warsaw, allocated at Biological and Chemical Research Center); Adriana Palińska-Saadi, PhD (allocated at Biological and Chemical Research Center)

RESEARCH PROFILE:

Voltammetric and spectrometric analysis of interactions between nucleic acids and various substances.
Construction of chemical and biochemical sensors on screen-printed electrodes.
Construction of new ion-selective electrodes and optimizing their work conditions.
Potentiometric determination of the ions concentration in various samples.
Analyzes of biological and water samples by biochemical discrete analyzer.

CURRENT RESEARCH ACTIVITIES:



Our group conducts interdisciplinary research on the border of chemistry and biology. One of the areas of our research interest is the study of the interactions of nucleic acids with various chemical substances,

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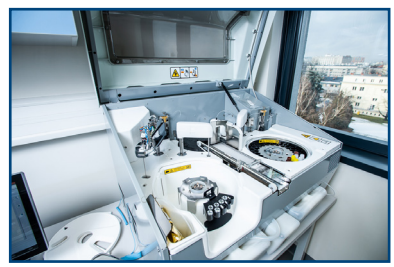
e.g. therapeutic, toxic, antioxidant, using voltammetric and spectrometric methods. The aim of our study is to determine the affinity of different substances to nucleic acid chains and the nature of occurring interactions. We are especially interested in the interactions of deoxyribonucleic acid with chemical compounds with anticancer properties, including both drugs currently used in chemotherapy and new derivatives of these drugs. Our investigations allow to characterize the dependence of the interactions on the nucleotide sequence, the concentration of the chemical compound, as well as its structure.
The second area of our research interest includes ion-selective electrodes and determination of ion content in biological and environmental samples. We develop work on new ion-selective electrodes based on new ionophores and new materials, and on their application to various sample analyses.



The newest research field in our group is a determination of various substances, especially metals and ions, in water samples using a discrete analyzer. Actually, we are going to develop these activities, to optimize procedures of new substances determination and to enlarge the number of performed tests.
Our Laboratory is accredited by the Polish Centre for Accreditation (PCA) in accordance with the requirements specified in PN-EN ISO/IEC 17025:2018-02 General requirements for the competence of testing and calibration laboratories.

SELECTED PUBLICATIONS:

1. M. Zając, A. Lewenstam, P. Bednarczyk, K. Dołowy, Measurement of multi ion transport through human bronchial epithelial cell line provides an insight into the mechanism of defective water transport in cystic fibrosis, Membranes. 43(10) (2020) 1-13.
2. P. Piotrowska, M. Łazicka, A. Palińska-Saadi, B. Paterczyk, Ł. Kowalewska, J. Grzyb, M. Maj-Żurawska, M. Garstka, Electrochemical characterization of LHCII on graphite electrodes - Potential-dependent photoactivation and arrangement of complexes, Bioelectrochemistry. 127 (2019) 37–48.
3. M. Ordak, M. Maj-Żurawska, H. Matsumoto, M. Bujalska-Zadrożny, I. Kieres-Salomoński, T. Nasierowski, E. Muszyńska, M. Wojnar, Ionized magnesium in plasma and erythrocytes for the assessment of low magnesium status in alcohol dependent patients, Drug Alcohol Depend. 178 (2017) 271–276.
4. A. Palińska-Saadi, M. Łukasiewicz, J. Oszczapowicz, M. Łukawska, I. Oszczapowicz, E. Zwierkowska, S. Achmatowicz, M. Maj-Żurawska, Voltammetric and spectrophotometric studies on DNA interacting with daunorubicin and its amidino derivatives, Electroanalysis. 29(1) (2017) 172–181.
5. D. Janiszek, M.M. Karpińska, A. Niewiadomy, A. Girstun, H. Elżanowska, M. Maj-Żurawska, P.J. Kulesza, Phase transition detection in accumulation of a potential anticancer drug Cl-IPBD with DNA: supercoiled and linear pUC19 plasmids, Electrochim. Acta. 210 (2016) 422–434.
6. M. Ordak, H. Matsumoto, T. Nasierowski, E. Bulska, M. Maj-Żurawska, M. Wojnar, Role of selenium in pathology of alcohol dependence – indications for supplementation, J. Elementol. 18(4) (2013) 757–767.
7. A. Gniazdowska, A. Palińska-Saadi, E. Krawczyk, H. Elżanowska, M. Maj-Żurawska, Supercoiled and linear plasmid DNAs interactions with methylene blue, Bioelectrochemistry. 92 (2013) 32–41.
8. M. Maj-Żurawska, A. Lewenstam, Selectivity coefficients of ion-selective magnesium electrodes used for simultaneous determination of magnesium and calcium ions, Talanta. 87 (2011) 295–301.
9. Z. Mousavi, A. Teter, A. Lewenstam, M. Maj-Żurawska, A. Ivaska, J. Bobacka, Comparison of multi-walled carbon nanotubes and poly(3-octylthiophene) as ion-to-electron transducers in all-solid-state potassium ion-selective electrodes, Electroanalysis. 23(6) (2011) 1352–1358.
10. A. Palińska, A. Grodzka, H. Elżanowska, B. Kępska, E. Zwierkowska, S. Achmatowicz, M. Maj-Żurawska, Methylene blue interactions with chromosomal and plasmid DNA on screen-printed carbon electrodes, Electroanalysis. 22(12) (2010) 1306–1313.