



The Objects of the Study

Ion selective electrodes with ionophore-based membranes: experimental and theoretical study by the means of

potentiometry

chronoamperometry/coulometry

voltammetry

• electrochemical impedance and chronopotentiometry

• computer simulation

V.M. Keresten, A.G. Bykov, I.V. Gofman, E.V. Solovveva, A.Yu. Vlasov, K.N. Mikhelson, Non-constancy of the bulk resistance of ionophore-based ion-selective membranes within the Nernstian response range: A semi-guantitative explanation, J. Membr. Sci. 683 (2023) 121830. IF 9.5

V. Keresten, E. Solovyeva, K. Mikhelson, The Origin of the Non-Constancy of the Bulk Resistance of Ion-Selective Electrode Membranes within the Nernstian Response Range, Membranes 11 (2021) 344. IF 4.2

E.V. Solovyeva, H. Lu, G.A. Khripoun, K.N. Mikhelson, S.G. Kazarian, In situ ATR-FTIR spectroscopic imaging of PVC, plasticizer and water in solvent-polymeric ionselective membrane containing Cd^{2+} -selective neutral ionophore, J. Membr. Sci. (2020) 118798 IF 9.5

V. Keresten, K. Mikhelson, Voltammetric Ion Sensing with Ionophore-Based Ion-Selective Electrodes Containing Internal Aqueous Solution, Improving Lifetime of Sensors, Membranes 12 (2023) 1048. IF 4.2



A. Bondar, K. Mikhelson, Constant Potential Coulometric Measurements with Ca²⁺⁻ Selective Electrode: Analysis Using Calibration Plot vs. Analysis Using the Charge Curve Fitting, Sensors, 22 (2022) 1145. IF 3.8

Ye.O. Kondratyeva, E.G. Tolstopjatova, D.O. Kirsanov, K.N. Mikhelson, Chronoamperometric and coulometric analysis with ionophore-based ionselective electrodes: A modified theory and the potassium ion assay in serum samples, Sens. Actuat. B. Chemical 310 (2020) 127894. IF 8.4

Conferences

Conference on Electrochemistry (23 - 27.10 2023, Russia) Euroanalysis Geneva 2023 (27 - 31.08 2023, Switzerland) AnalytiX-2023 (17 - 19.05 2023, Japan) Matrafüred 2022 International Conference on Chemical Sensors (12 - 17.06 2022, Hungary)

Mendeleev 2021 (6 - 10.09 2021, Russia)

72nd Annual Meeting of the International Society of Electrochemistry (29.08 – 3.09 2021, Korea)

Ionometry Group Room 2091

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Current Research Areas

Mechanistic Studies of ISE Response



The paradox of non-constancy of ISE bulk resistance within the Nernstian response range: theoretical explanation and possible practical application of the effect



Voltammetric Measurements with Ion Selective Electrodes



1.6x10

Study of ISEs containing several ionophores which can be used for multianalyte voltammetric analysis



Chronoamperometric/Coulometric Measurements with Ion Selective Electrodes



Increasing the sensitivity of analysis with ISE to less than a percent of the relative change in analyte concentration (compared to several percent in classical potentiometry)



Increasing the reliability of analysis with ISE by using new type of a signal

At the conference Matrafüred 2022







Electrode preparation: on the left – membrane is fixed with glue, on the right – formed by drop-casting





1 × 10^{-5.0} N

1 × 10^{-4.5} N

- 1 x 10^{-4.0} M

1 × 10^{-3.5} M

× 10^{-3.0} N - 1 × 10^{-2.5} M

1 × 10^{-2.0} M

0.4 0.5

E / V



1000

