

# Konstantin Mikhelson & Elena Solovyeva scientific group



Konstantin N. Mikhelson

Ionophore-based ion-selective electrodes (ISEs) - *in-depth* experimental and theoretical studies of ISEs: potentiometry, chronopotentiometry, electrochemical impedance spectroscopy, computer simulations.



Galina A. Khripoun

For a first time, the origin of the deviations of the real-world ISEs response slope from the theoretical Nernstian value was explained quantitatively in terms of transmembrane fluxes of electrolytes.



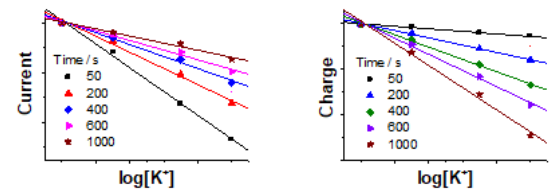
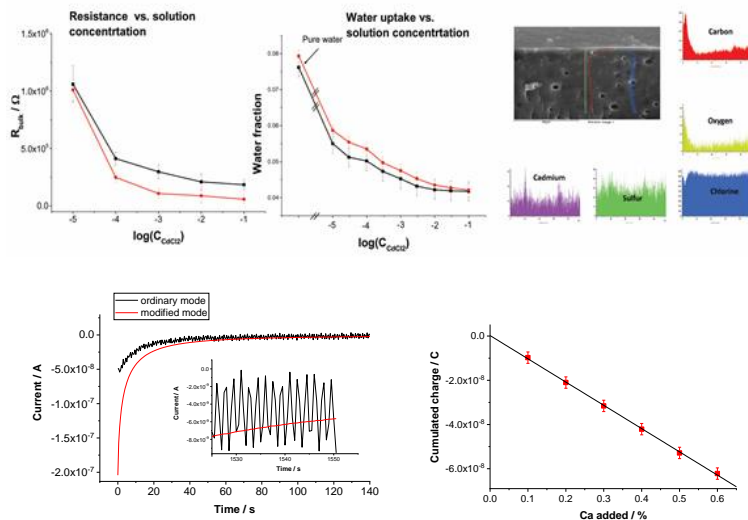
Valentina M. Keresten

Current fundamental research is focused on the paradox of the non-constancy of the bulk resistance of ISEs within the Nernstian response range. To this end, it is proposed, for the first time, consider ISE membranes as heterogeneous materials.



Anna V. Bondar

Practically oriented studies are focused on large improvement of the sensitivity of the measurements by use of ISEs in chronoamperometric and coulometric modes.



$$i_t = \frac{RT}{z_1 F} \ln \frac{a_t^{ini}}{a_t^{fin}} \left[ \frac{1}{R_{mem}} e^{-\frac{t}{R_{mem} C_{pol}}} + \left( \frac{N}{2} \right) t^{-1/2} \right]$$



Elena V. Solovyeva

Obtaining new organo-inorganic nanocomposites with a controlled size and structure, distinguished by the presence of "hot spots".



Alexei N. Smirnov

Novel bioanalytical applications of SERS spectroscopy. In particular, a method has been developed for the determination of folic acid in pharmaceuticals. Sensitivity of the SERS spectra to conformational transitions associated with the rotation of methyl groups was shown, for the first time, with neocuproine as example.



Alisa I. Shevchuk

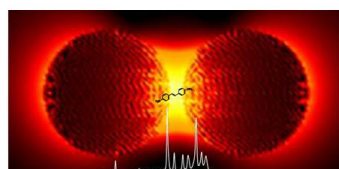
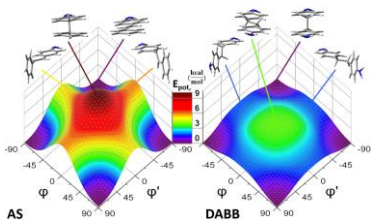
Current works includes the development of optical labels for fluorescence imaging and agents for therapeutic hyperthermia based on silver and gold nanoparticles, as well as synthesis of osteo-inductive materials based on doped hydroxyapatite for endoprosthetics.



Vasilisa O. Svinko



Alexei S. Strelnikov



- A.V. Bondar, V.M. Keresten, K.N. Mikhelson, Registration of small (below 1%) changes of calcium ion concentration in aqueous solutions and in serum by the constant potential coulometric method, *Sens. Actuators B. Chemical* 354 (2022) 131231. DOI: 10.1016/j.snb.2021.131231 **IF 7.460**
- 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. DOI: 10.3390/membranes11050344 **IF 3.094**
- Z. Jamshidi, S. Ashtari-Jafari, A. Smirnov, E. Solovyeva, Role of Herzberg–Teller Vibronic Coupling in Surface-Enhanced Resonance Raman Spectra of 4,4'-Diaminotolane with Nearly Close Molecular and Charge-Transfer Transitions, *J. Physical Chemistry C*, 125, 31 (2021) 17202 DOI: 10.1021/acs.jpcc.1c04524 **IF=4.126**
- 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*, 310 (2020) 127894 DOI: 10.1016/j.snb.2020.127894 **IF 7.100**
- 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 ion-selective membrane containing Cd<sup>2+</sup>-selective neutral ionophore, *J. Membr. Sci.* (2020) 118798 DOI: 10.1016/j.memsci.2020.118798 **IF 7.183**
- E.V. Solovyeva, E. Borisov, Demonstration of Physical and Analytical Features of Surface-Enhanced Raman Scattering by Analysis of Folic Acid in Commercial Tablets, *J. Chem. Education* 97 (2020) 8 2249 DOI: 10.1021/acs.jchemed.0c00103 **IF 1.385**
- Ye.O. Kondratyeva, E.V. Solovyeva, G.A. Khripoun, K.N. Mikhelson, Paradox of the variation of the bulk resistance of potassium ion-selective electrode membranes within nernstian potentiometric response range, *Russ. J. Electrochem.* 55 (2019) 1118 DOI: 10.1134/S1023193519110090 **IF 1.043**
- A.V. Kalinichev, E.V. Solovyeva, A.R. Ivanova, G.A. Khripoun, K.N. Mikhelson, Non-constancy of the bulk resistance of ionophore-based Cd<sup>2+</sup>-selective electrode: A correlation with the water uptake by the electrode membrane, *Electrochim. Acta* (2019) 135541 DOI: 10.1016/j.electacta.2019.135541 **IF 5.383**
- A.N. Smirnov, O.V. Odintsova, G.L. Starova, E.V. Solovyeva, X-ray and vibrational analysis of amino and chloro bibenzyl 4,4'-derivatives supported by quantum chemical calculations, *J. Molec. Struct.* 1202 (2020) 127287 (2019) DOI: 10.1016/j.molstruc.2018.07.088 **IF 2.463**
- O.V. Odintsova, A.N. Smirnov, E.V. Solovyeva, Plasmonic nanoparticles modified by dimercaptostilbene for metamaterials. *Proc. SPIE* 11025 (2019) 1102512 DOI: 10.1117/12.2520783 **IF 0.56**
- E.V. Solovyeva, Surface enhanced Raman scattering of 4,4'-diaminostilbene: dependence of spectral features and resonant enhancement on surface coverage, *J. Raman Spectr.* 50 (2019) 647. DOI: 10.1002/jrs.5562 **IF 2.00**
- E.V. Solovyeva, A.N. Smirnov, O.V. Odintsova, G.L. Starova, A.S. Denisova, Vibrational spectroscopy and X-ray study of three stilbene dyes combined with DFT calculations, *J. Mol. Struct.* 1175 (2019) 287 DOI: 10.1016/j.molstruc.2018.07.088 **IF 2.463**
- Ye.O. Kondratyeva, E.V. Solovyeva, G.A. Khripoun, K.N. Mikhelson, Paradox of the variation of the bulk resistance of potassium ion-selective electrode membranes within nernstian potentiometric response range, *Russ. J. Electrochemistry* 55 (2019) 1118 DOI: 10.1134/S1023193519110090 **IF 1.043**
- A.V. Kalinichev, E.V. Solovyeva, A.R. Ivanova, G.A. Khripoun, K.N. Mikhelson, Non-constancy of the bulk resistance of ionophore-based Cd<sup>2+</sup>-selective electrode: A correlation with the water uptake by the electrode membrane, *Electrochimica Acta* (2019) 135541 DOI: 10.1016/j.electacta.2019.135541 **IF 5.383**
- E.V. Solovyeva, E.V. Ubyivovk, A.S. Denisova, Effect of diaminostilbene as a molecular linker on Ag nanoparticles: SERS study of aggregation and interparticle hot spots in various environments, *Coll. Surf. A* 528 (2018) 542 DOI: 10.1016/j.colsurfa.2017.11.040 **IF 3.990**
- E.V. Solovyeva, A. Rakhimbekova, Y.V. Lanchuk, L.A. Myund, A.S. Denisova, SERS investigation of neocuproine adsorption on silver: influence of electrode potential on methyl groups, *J. Raman Spectr.* 49 (2018) 207 DOI: 10.1002/jrs.5265 **IF 2.00**
- M.B. Levin, G.A. Khripoun, S.M. Korneev, K.N. Mikhelson, Water Hardness Electrodes with Ionophores Containing Oxy- and Ester-Groups, *Russ. J. Electrochemistry* 54 (2018) 391–399 DOI: 10.1134/S1023193518040055 **IF 0.828**
- V.V. Timofeev, M.B. Levin, A.A. Starikova, M.A. Trofimov, S.M. Korneev, K.N. Mikhelson, Solid-Contact Ion-Selective Electrodes with Copper Hexacyanoferrate in the Transducer Layer, *Russ. J. Electrochemistry* 54 (2018) 400 DOI: 10.1134/S1023193518040080 **IF 0.828**
- A. Ivanova, K. Mikhelson, Electrochemical Properties of Nitrate-Selective Electrodes: The Dependence of Resistance on the Solution Concentration. *MDPI Sensors* 18 (2018) 2062 DOI: 10.3390/s18072062 **IF 2.475**