

**МІНІСТЕРСТВО ОХОРОНИ ЗДОРОВ'Я УКРАЇНИ
ВИЩИЙ ДЕРЖАВНИЙ НАВЧАЛЬНИЙ ЗАКЛАД УКРАЇНИ
«БУКОВИНСЬКИЙ ДЕРЖАВНИЙ МЕДИЧНИЙ УНІВЕРСИТЕТ»**



МАТЕРІАЛИ

101 – ї

підсумкової наукової конференції

професорсько-викладацького персоналу

Вищого державного навчального закладу України

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Матеріали 101 – ї підсумкової наукової конференції професорсько-викладацького персоналу вищого державного навчального закладу України «Буковинський державний медичний університет» (м. Чернівці, 10, 12, 17 лютого 2020 р.) – Чернівці: Медуніверситет, 2020. – 488 с. іл.

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У збірнику представлені матеріали 101 – ї підсумкової наукової конференції професорсько-викладацького персоналу вищого державного навчального закладу України «Буковинський державний медичний університет» (м.Чернівці, 10, 12, 17 лютого 2020 р.) із стилістикою та орфографією у авторській редакції. Публікації присвячені актуальним проблемам фундаментальної, теоретичної та клінічної медицини.

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four independent experiments. Significant differences between groups were evaluated by using Wilcoxon test with $p < 0.05$.

Ceruloplasmin concentration in blood plasma of rats with alloxane diabetes was found to be lower than in the control group of animals for 7 and 14 days by 38 % and 29% respectively. Therefore, the level detected in the experiment may be due to the depletion of the antioxidant protective system. As a result, evoked oxidative stress breaks the pro- and antioxidant balance.

The introduction of melatonin during 7 days contributed to the increase of ceruloplasmin concentration on 20 % compared with alloxan diabetic rats. In addition, the administration of melatonin during 14 days contributed to the normalization ceruloplasmin concentration (higher on 20% compared with untreated animals).

The obtained results evidence the effectiveness of the use of melatonin for the correction of the antioxidant defense system in experimental diabetes mellitus. The antidiabetic melatonin function is implemented at the cellular and systemic levels. An important aspect of the cellular effect of melatonin is its effect on the process of lipid peroxidation and the level of free radicals that increase in diabetes mellitus. Antioxidant effect of melatonin is likely related to the ability to intercept free radicals due to the presence of indole ring in its composition. There are certain data available that melatonin may directly effect on genes expression responsible for the synthesis of antioxidant enzymes.

Alloxane diabetes was found to reduce concentration of ceruloplasmin in the blood. In conditions of alloxane diabetes and the introduction of exogenous melatonin in rats with alloxane diabetes in the dose of 10 mg / kg daily for 7 and especially 14 days, it caused a pronounced antioxidant effect, normalizing ceruloplasmin concentration, an enzyme of antioxidant protection in the blood of alloxane diabetic rats.

Mishchenchuk V. V.

IMPROVEMENT OF THE RDE STATIONARY VOLTAMMETRY METHOD

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The processes occurring within the diffusion part of electrical double layer (EDL) can make a significant influence on the electrode reactions in the low ionic strength systems. The classical model of the concentration polarization processes simulation is based on the Levich's equation of convective diffusion, which considers only the convection and diffusion parts of the electroactive components transfer within the diffusion layer while the migration flux remains neglected. This approach can derive a systematic error in the surface-inactive electrolyte systems with low ionic strength because the background electrolyte concentration is insufficient to ensure smallness of the electroactive components migration flux. Let's study this question.

The experimental results have been used to find the kinetic parameters of persulfate ion reduction on the tin RDE under the stationary voltammetry. The linear regression equations were found by the Gui-Chapman-Stern-Grem (GCSG) EDL theory, Frumkin's slow discharge/ionization theory while the mass-transfer equations with respect to the boundary conditions and electroneutrality condition were used to calculate the electroactive ions concentrations in the near-electrode layer. A solution for the mass transfer equation without consideration of the migration flux can be found analytically. Concentration profile for the electroactive ions with consideration of the migration flux was calculated by numerical methods.

From Fig. it is seen that the differences in the obtained results increase with decreasing ionic strength of the solution.

A comparison between dispersions of the two approaches by Fisher's method proves that a difference between them is statistically insignificant. Therefore, both approaches show same reproducibility. However, a difference derived from the modified Student's test of the kinetic parameters found by both approaches is statistically significant. This means that the systematic error



arises in calculations of the kinetic parameters performed for the low ionic strength solutions without consideration of the migration of electroactive components.

The results of this work can be extended to any ions electroreduction processes governed by the first single-electron transfer stage.

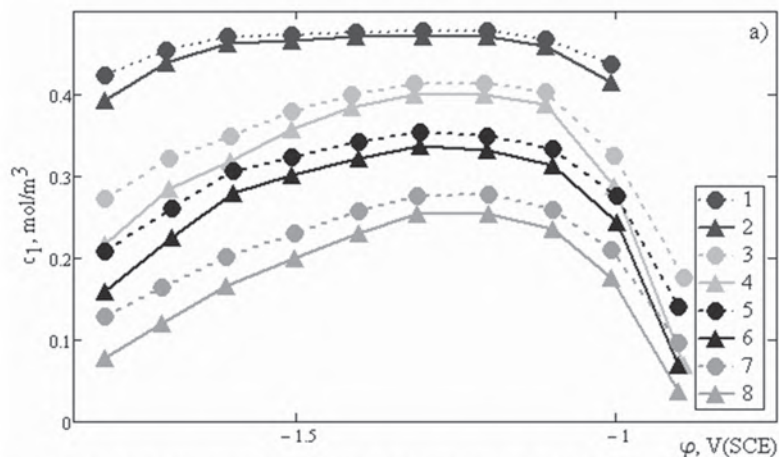


Figure. Dependencies of the concentration profiles for persulfate ions near the electrode surface ($c_{i,s}(5\lambda)$) according to the Levich's approach (solid line) and for all three contributions into transportation of ions taken into account (dotted line) on the electrode potential. Lines correspond to the following NaF concentration, mol/m³: (1,2) – 19; (3,4) – 14; (5,6) – 9; (7,8) – 4.

Okrepka G.M.

MATHEMATICAL PLANNING OF THE QUANTUM DOTS SYNTHESIS

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AgInS₂, as one of ternary I-III-VI₂ quantum dots (QDs), are promising due to their size and composition dependent optical properties. The aim of this work is to reveal and describe the interrelation between the studied in wide range precursor initial content ratio and AgInS₂ QDs optical properties. For this purpose, we have applied simplex design experiment planning approach according to the Scheffe plan. Such mathematical tool is usually used to determine the optimum combination of multicomponent system chemical constituents that provides a desire property using a minimum number of experimental runs. This approach also enables the number of experiments to be decreased to substantially reduce the time for the investigations.

Ag-In-S/ZnS quantum dots were synthesized in water solution. Spectral properties of QDs have been investigated by the photoluminescence and absorption spectroscopies. Depends on the ratio of the concentration of initial components AgInS₂ QDs with different optical properties were synthesized. Coordinates of concentrate triangle ABC for the synthesis of AgInS₂ nanoparticles were: A- Ag-rich (25AgNO₃ + 50InCl₃ + 25Na₂S), B-S-rich (10AgNO₃ + 50InCl₃ + 40Na₂S), C- In rich (10AgNO₃ + 80InCl₃ + 10Na₂S). The composition of 15 experimental points pertinent to the triangle ABC according to the Scheffe plan and corresponding λ_{exp} values of the PL peak position of the colloidal AgInS₂ solution are shown as Table.

2D representation of PL-maximum dependence of AgInS₂ QDs on the composition of reaction mixture are constructed as triangle with isolines with the same value of the wavelength of PL peak position. Total theoretical equation for the experimental data can be expressed as:

$$y = 617x_1 + 671x_2 + 603x_3 + 68x_1x_2 + 0x_1x_3 - 72x_2x_3 + 144x_1x_2(x_1 - x_2) + 69x_1x_3(x_1 - x_3) - 58,6x_2x_3(x_2 - x_3) + 112(x_1 - x_2)^2x_1x_2 + 85(x_1 - x_3)^2x_1x_3 + 64(x_2 - x_3)^2x_2x_3 - 1056x_1^2x_2x_3 - 10,7x_1x_2^2x_3 + 688x_1x_2x_3^2$$