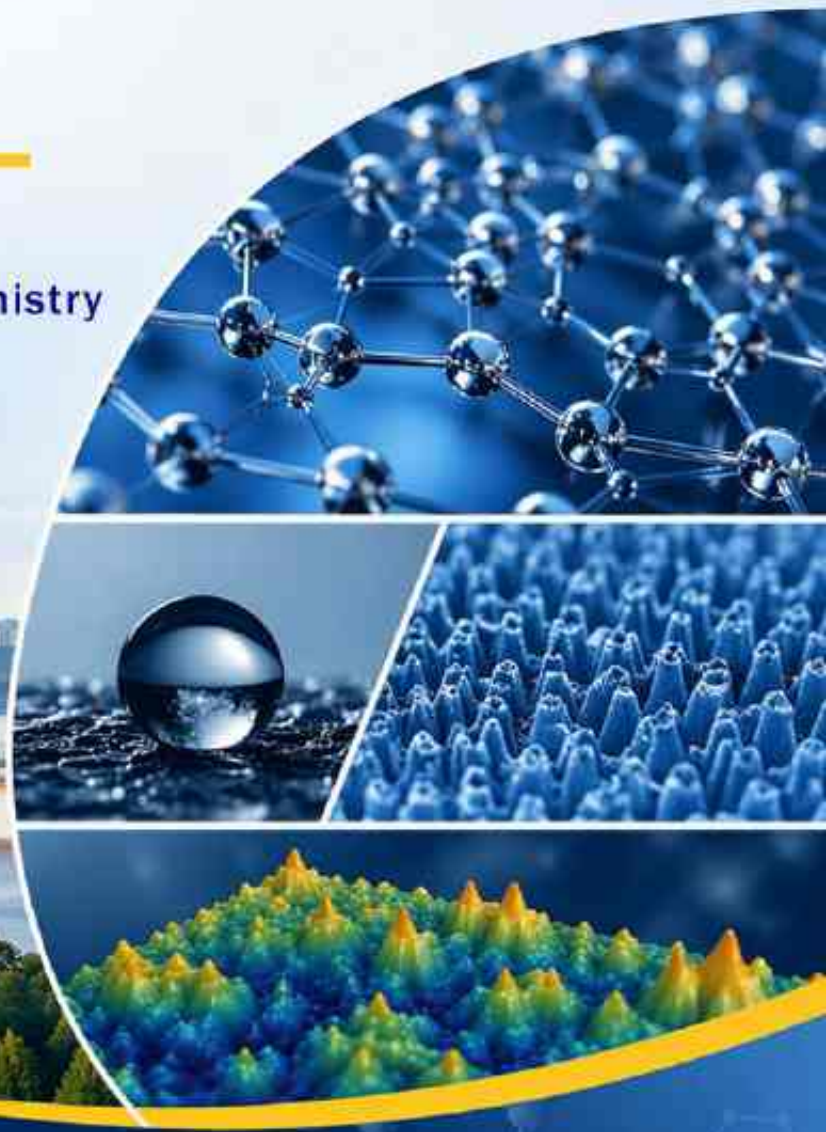
Ukrainian Conference
with International Participation

CHEMISTRY, PHYSICS AND TECHNOLOGY OF SURFACE

devoted to
40th anniversary of the
Chuiko Institute of Surface Chemistry
of NAS of Ukraine





27-28 May, 2026, Kyiv, Ukraine



Chuiko Institute of Surface Chemistry
of National Academy of Sciences of Ukraine
Scientific Council
"Chemistry and Technology of Surface Modification"
Interbranch Scientific and Technical Complex "Surface Chemistry"
of National Academy of Sciences of Ukraine

Ukrainian Conference with International Participation

"CHEMISTRY, PHYSICS AND TECHNOLOGY OF SURFACE"

devoted to the 40th anniversary of
the Chuiko Institute of Surface Chemistry of NAS of Ukraine

Book of abstracts

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Kyiv
Ukraine

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Тези доповідей Всеукраїнської конференції з міжнародною участю “Хімія, фізика і технологія поверхні”, присвяченій 40-річчю з дня заснування Інституту хімії поверхні ім. О.О. Чуйка НАН України – Київ, 2026. – 290 с.

Book of abstracts of Ukrainian Conference with International Participation “Chemistry, Physics and Technology of Surface” devoted to the 40th anniversary of the Chuiko Institute of Surface Chemistry of NAS of Ukraine – Kyiv, 2026. – 290 p.

Збірник містить тези доповідей, які було представлено на конференції. Тематика конференції: теорія хімічної будови та реакційна здатність поверхні твердих тіл; фізико-хімія поверхневих та міжфазних явищ; хімія, фізика та технологія наноматеріалів; медико-біологічні та біохімічні аспекти вивчення наноматеріалів. Тези доповідей подано в авторській редакції.

The Book contains abstracts of the Conference presentations. The Conference topics: theory of chemical structure and reactivity of solid surfaces; physical chemistry of surface and interfacial phenomena; chemistry, physics and technology of nanomaterials; medical, biological and biochemical aspects of investigation of nanomaterials. The abstracts are published in the author's edition.

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Національної академії наук України, 2026

Chuiko Institute of Surface Chemistry of
National Academy of Sciences of Ukraine, 2026

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Conference Program

May 27, Wednesday

9:00 – 9:45 Registration of participants

10:00 – 10:25 Opening of the Conference at the Chuiko Institute of Surface Chemistry of National Academy of Sciences of Ukraine
Corresponding Member of NAS of Ukraine, Professor V. Turov

Oral Session 1
Chair: Professor V. Turov

10:25 – 10:50 **P.P. Horbyk**, S.M. Makhno, O.M. Lisova, A.P. Kusyak, R.V. Mazurenko, S.L. Prokopenko, D.Yu. Lyashenko, N.V. Roik, I.M. Trofymchuk, S.P. Turanska, A.L. Petranovska, H.M. Hunia, O.M. Shcheglov, P.O. Mechyk. **New multifunctional nanostructured materials for special technical, medical, biological and environmental applications: synthesis, physicochemical and operational properties** (*Chuiko Institute of Surface Chemistry, NAS of Ukraine, Kyiv*).

10:50 – 11:15 V.M. Gun'ko. **Behavior of nanooxides, polymers, proteins, and motile bacteria in aqueous media** (*Chuiko Institute of Surface Chemistry, NAS of Ukraine, Kyiv*).

11:15 – 11:25 Group Photo

11:25 – 11:45 Coffee break

Oral Session 2
Chair: Dr. (Chem.) O. Linnik

11:45 – 12:00 **A.I. Ievtushenko**[1], S.P. Starik[2], L.A. Myroniuk[1], A.S. Nikolenko[3], I.M. Danylenko[3], L.I. Fiyalka[1], O.Yu. Karpenko[4]. **Effect of thermal annealing on the structural and photocatalytic properties of magnetron-sputtered Cu-Al-O Films** ([1]*Frantsevich Institute for Problems of Materials Science, NAS of Ukraine, Kyiv,* [2]*V. Bakul Institute for Superhard Materials, NAS of Ukraine, Kyiv,* [2]*V.Ye. Lashkaryov Institute of Semiconductor Physics, NAS of Ukraine, Kyiv,* [4]*Institute of Applied Physics, NAS of Ukraine, Sumy*).

12:00 – 12:15 **L. Sartinska**[1], S. Fomanyuk[2], H. Kolbasov[2], D. Borovyk[1], G. Frolov[1], A. Ievtushenko[1]. **Surface-suppressed electrochemical behavior of BN–Me (Ti, Cr, Al, Zr) nanocomposites synthesized under concentrated light** ([1]*Frantsevich Institute for Problems of Materials Science, NAS of Ukraine, Kyiv,* [2]*V.I. Vernadsky Institute of General and Inorganic Chemistry, NAS of Ukraine, Kyiv*).

12:15 – 12:30 **D. Vistorskaja**, A. Katelnikovas, A. Kareiva. **Insights into YAG-based high-entropy garnets** (*Vilnius University, Faculty of Chemistry and Geosciences, Institute of Chemistry, Vilnius, Lithuania*).

12:30 – 12:45 **A.R. Timonina**[1], O.M. Lytvynova[1], M.O. Puzhaichereda[1], K.N. Belikov[1,2]. **Floating perlite/TiO_2/Ag composites as effective photocatalysts for the removal of polycyclic aromatic hydrocarbons from water** (*[1]State Scientific Institution "Institute for Single Crystals", NAS of Ukraine, Institute of Functional Materials Chemistry, Kharkiv, [2]V.N. Karazin Kharkiv National University, Ukraine*).

12:45 – 13:00 **A. Kramar**[1], V. Vorobets[2], G. Kolbasov[2], O. Linnik[1]. **Structural features, photoelectrochemical and photocatalytic properties of zinc modified iron titanate (Fe_2TiO_5) films** (*[1]Chuiko Institute of Surface Chemistry, NAS of Ukraine, Kyiv, [2]V.I. Vernadsky Institute of General and Inorganic Chemistry, NAS of Ukraine, Kyiv*).

13:00 – 14:00 Break

Oral Session 3
Chair: ***Dr. (Chem.) P. Kuzema***

14:05 – 14:20 **V. Vivcharenko**, K. Zaręba, A. Przekora, K. Kowalczyk. **Polysaccharide-based plasma-treated biomaterial as a potential carrier of reactive oxygen and nitrogen species** (*Department of Tissue Engineering and Regenerative Medicine, Medical University of Lublin, Poland*).

14:20 – 14:35 **V.V. Poltavets**, O.V. Netronina, O.Y. Abraimowa, H.S. Maslak. **A high-precision electrochemical microfluidic platform based on nanostructures MnO_2 for sensitive quantification of hydrogen peroxide in biological fluids** (*Department of Biochemistry and Medical Chemistry, Dnipro State Medical University, Ukraine*).

14:35 – 14:50 **P. Kazimierczak**[1], A. Wójcik[1], J. Matusiak[2], V. Vivcharenko[1], K. Pałka[3], R. Panek[2], W. Franus[2], A. Przekora[1]. **A bifunctional zeolite-chitosan-bisphosphonate complex-based implant for osteoporotic fracture treatment** (*[1]Department of Tissue Engineering and Regenerative Medicine, Medical University of Lublin, Poland, [2]Department of Construction Materials Engineering and Geoengineering, Lublin University of Technology, Poland, [3]Department of Materials Engineering, Lublin University of Technology, Poland*).

14:50 – 15:05 **E.V. Dikhtiaruk**[1], L.Y. Shtanova[2], O.O. Kalmukova[3], A.D. Yefimenko[3], P.V. Mateychenko[4], V.M. Gun'ko[1]. **Biomedical aspects of nanocomposites based on macroporous chitosan/PVA cryogels** (*[1]Chuiko Institute of Surface Chemistry, NAS of Ukraine, Kyiv, [2]Institute of Macromolecular Chemistry, NAS of Ukraine, Kyiv, [3]Department of Biochemistry, Educational and Scientific Centre "Institute of Biology and Medicine", Taras Shevchenko National University of Kyiv, Ukraine, [4]State Scientific Institution "Institute for Single Crystals", NAS of Ukraine, Kharkiv*).

A high-precision electrochemical microfluidic platform based on nanostructures MnO_2 for sensitive quantification of hydrogen peroxide in biological fluids

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Microfluidic systems represent one of the most promising frontiers in analytical chemistry, offering significant advantages in cost-effectiveness and portability for point-of-care applications.

We report the development and application of a microfluidic platform for the electrochemical sensing of ultra-low concentrations of hydrogen peroxide utilizing a MnO_2-modified electrode. The catalytic thin film was synthesized via the electrochemical oxidation of Mn^{2+} ions. Material characterization, including phase composition and surface morphology, was conducted using X-ray diffraction (XRD), electrochemical impedance spectroscopy (EIS), and scanning electron microscopy (SEM). Based on the elucidated electrocatalytic mechanisms, a precise analytical method was established for the quantification of H_2O_2 in biological matrices using a stop-flow protocol.

The developed methodology was applied to evaluate the clinical status of patients with polytrauma. Comparative analysis was conducted using isolated blood plasma samples collected 5–7 days post-injury, with healthy individuals serving as a control group. The study focused on assessing plasma resistance to elevated concentrations of peroxide. In the microfluidic device, plasma samples were diluted 100-fold and reacted with a phosphate buffer solution containing 170 μmol/L H_2O_2. A strictly controlled stop-flow protocol was employed, with precisely recorded flow and stop times. Under these conditions, H_2O_2 was not detected in control samples, indicating effective neutralization by the endogenous antioxidant system. Conversely, plasma from polytrauma patients exhibited significant residual H_2O_2 levels, which is attributed to a depleted antioxidant reserve, specifically a marked reduction in catalase activity. These microfluidic findings were further validated by spectrophotometric assays of catalase activity in the same clinical samples.

The microfluidic approach enables rapid screening of the patient's physiological response to therapy, providing a robust means for the early diagnosis of hidden pathological shifts.