

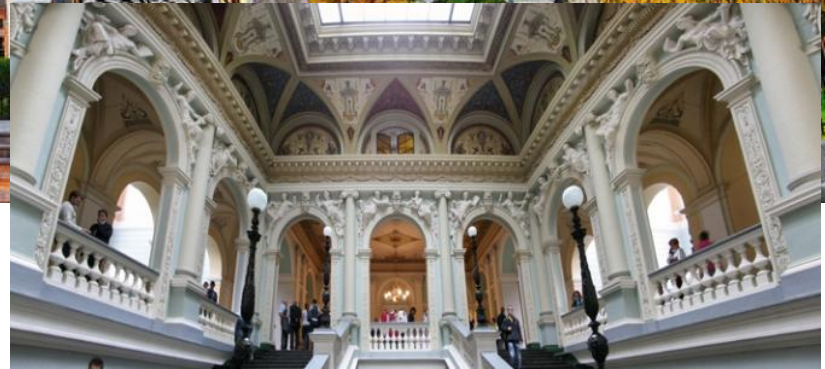


Educational traditions since 1872



**Institute of Chemistry and Chemical Technologies  
of Lviv Polytechnic National University  
(Lviv, Ukraine)**

Lviv Polytechnic National University  
is the oldest technical higher educational institution  
of Ukraine and Eastern Europe



It was founded in 1816

[lpnu.ua](http://lpnu.ua)



**Institute of Chemistry and Chemical Technologies**  
is a part of Lviv Polytechnic. Chemical and technological  
education was established at the University in **1872**



[lpnu.ua/en/icct](http://lpnu.ua/en/icct), [icct.org.ua](http://icct.org.ua)

## Departments of Institute of Chemistry and Chemical Technologies

- Department of Chemical Engineering
- Department of Chemical Technology of Oil and Gas Processing
- Department of Chemical Technology of Plastics Processing
- Department of Chemical Technology of Silicate Materials
- Department of Chemistry and Technology of Inorganic Substances
- Department of Organic Chemistry
- Department of Organic Products Technology
- Department of Physical, Analytical and General Chemistry
- Department of Technology of Biologically Active Substances, Pharmacy and Biotechnology

[icct.org.ua/departments](http://icct.org.ua/departments)

**Bachelors, Masters and Postgraduate students** are being trained  
in 7 main specialties:

- Biotechnology and bioengineering
- Biomedical engineering
- Chemical technologies and engineering
- Chemistry
- Food technologies
- Oil and gas engineering and technologies
- Pharmacy and industrial pharmacy

[icct.org.ua/enrollee](http://icct.org.ua/enrollee)

Institute of Chemistry and Chemical Technologies has everything for students' **qualified training...**





...and interesting leisure time –  
exhibitions, cultural events, conferences, excursions, open lectures



For scientists and staff Institute is publishing **journals...**



**Chemistry & Chemical Technology**  
(Indexation: Scopus, WoS)

[science2016.lp.edu.ua/chcht](http://science2016.lp.edu.ua/chcht)



**Chemistry, Technology and Application of Substances**  
(Indexation: Index Copernicus)

[science.lpnu.ua/ctas](http://science.lpnu.ua/ctas)



...and organizing scientific conferences:



## Chemical Technology and Engineering



[cte.org.ua](http://cte.org.ua)

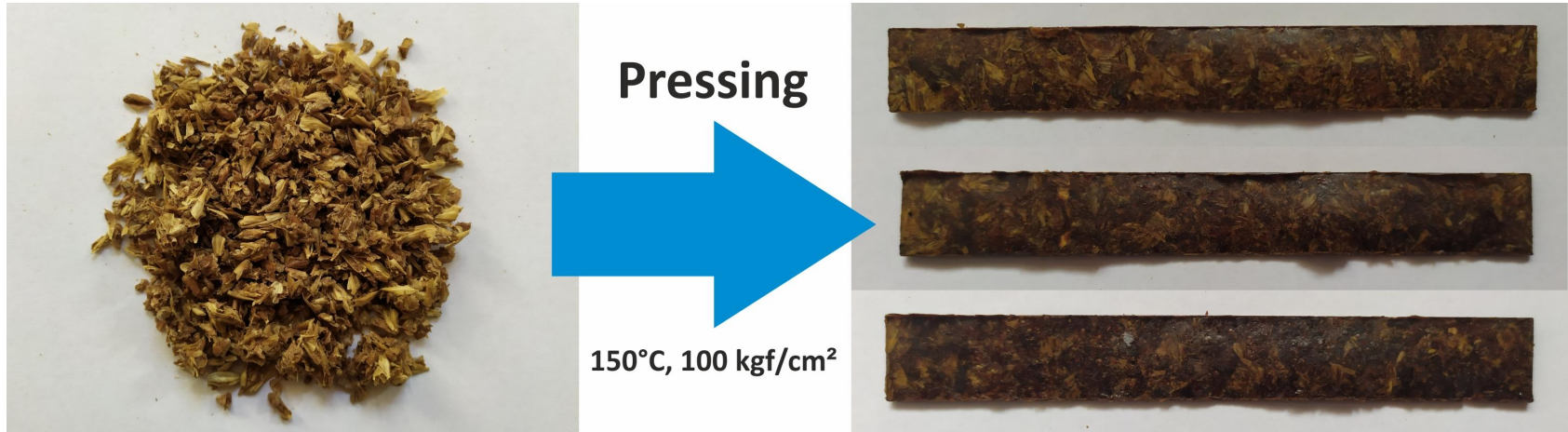
## Advance in Petroleum and Gas Industry and Petrochemistry

[apgip.lviv.ua](http://apgip.lviv.ua)

## Youth Science Forum “LITTERIS ET ARTIBUS”

[openreviewhub.org/lea](http://openreviewhub.org/lea)

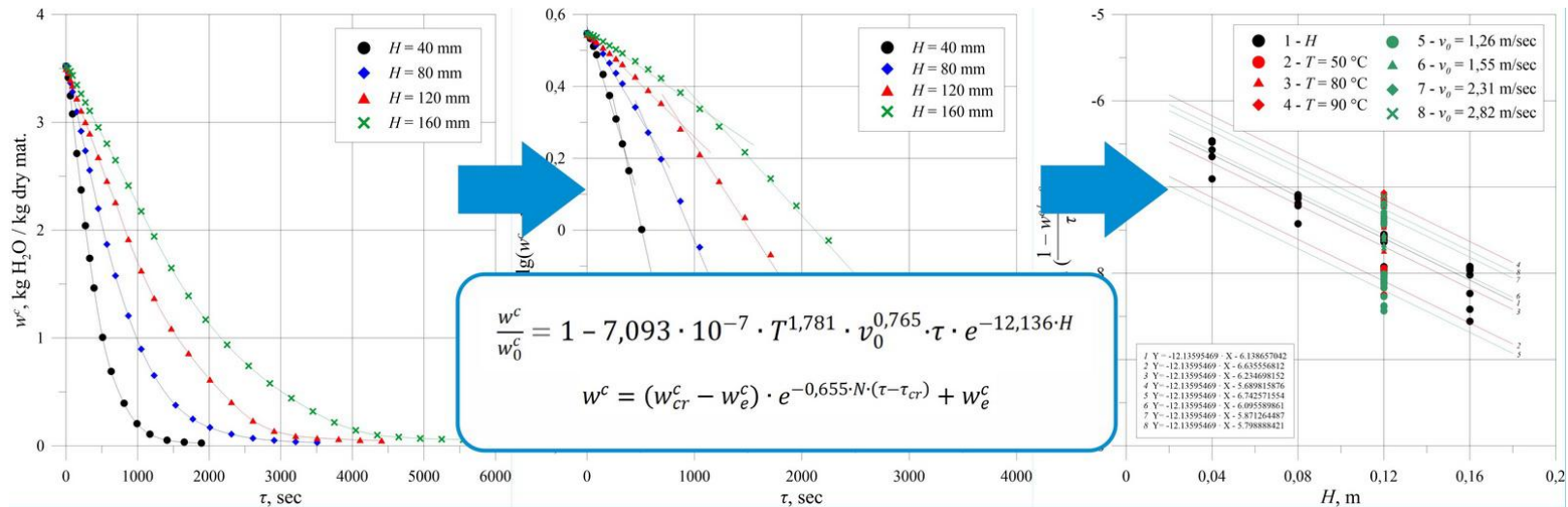
There are a lot of different scientific research activities:



**Obtaining of the alternate solid fuels from organic waste of organic origin** (alcohol distillery stillage, brewer's spent grain, coffee production waste etc). The alternate solid fuels have high calorific values, do not contain harmful impurities, do not require additional cleaning. It also provides additional disposal of industrial wastes, increases environmental friendliness by replacing traditional fuel resources and the absence of large amounts of harmful emissions.

- O.S. Ivashchuk, V.M. Atamanyuk, R.A. Chyzhovych, S.S. Kiiiaieva, R.R. Zhrebetskyi, I.B. Sobechko. Preparation of an alternate solid fuel from alcohol distillery stillage // *Voprosy khimii i khimicheskoi tekhnologii*. – Number 1. – 2022. – pp. 54-59. <http://dx.doi.org/10.32434/0321-4095-2022-140-1-54-59>
- Oleksandr S. Ivashchuk, Volodymyr M. Atamanyuk, Roman A. Chyzhovych, Sofiiia S. Kiiiaieva, Vasyl P. Duleba, Iryna B. Sobechko. Research of solid fuel briquettes obtaining from brewer's spent grain // *Journal of Chemistry and Technologies*. – Vol. 30, No. 2 – 2022. – pp. 216-221. <https://doi.org/10.15421/jchemtech.v30i2.256749>

## There are a lot of different scientific research activities:

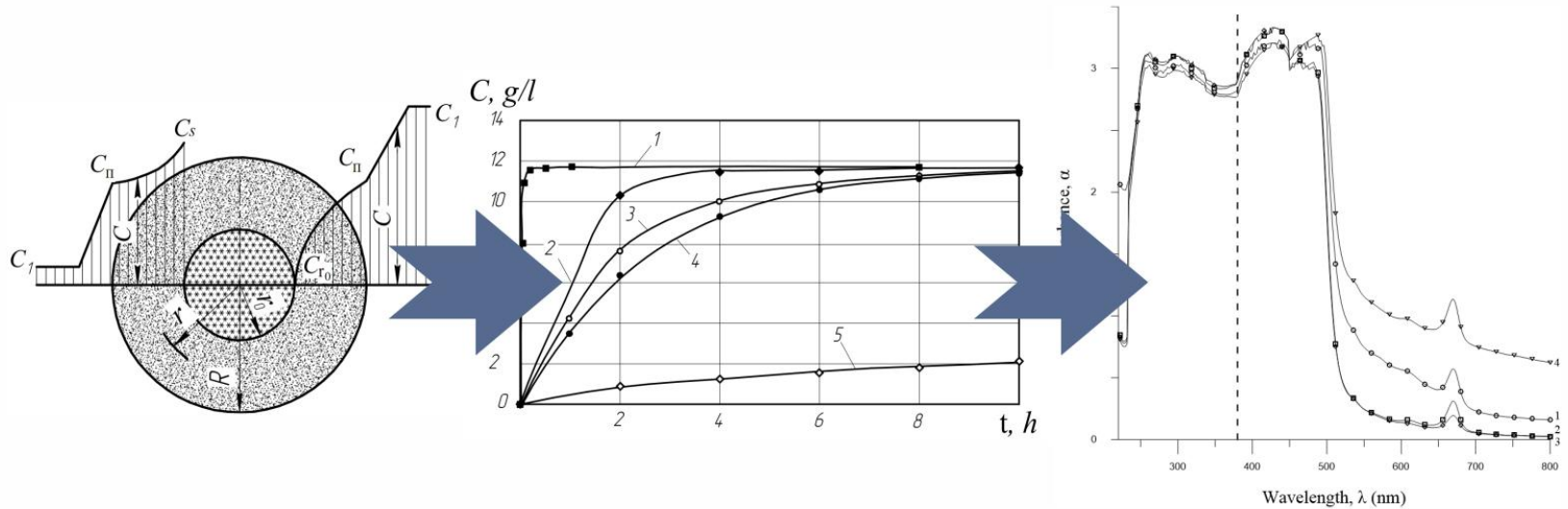


**Research of the filtration drying regularities** (study of hydrodynamics, kinetics and diffusion mass transfer). The obtained data make it possible to predict energy costs and economic feasibility of drying processes, calculate optimal heat and mass transfer coefficients, and select rational parameters of the heat agent to ensure high drying intensity and process costs.

- Diana Kindzera, Roman Hosovskyi, Volodymyr Atamanyuk, Dmytro Symak. Heat Transfer Process During Filtration Drying of Grinded Sunflower Biomass // *Chemistry and Chemical Technology*, - 2021. - Vol. 15, Issue 1. - P. 118 - 124/2021 <https://doi.org/10.23939/chcht15.01.118>
- Kobeyeva, Z., Khussanov, A., Atamanyuk, V., Hnativ, Z., Kaldybayeva, B., Janabayev, D., & Gnylrianska, L. Analyzing the kinetics in the filtration drying of crushed cotton stalks // *Eastern-European Journal of Enterprise Technologies*. - 2022. - 1(8(115)), 55–66. <https://doi.org/10.15587/1729-4061.2022.252352>



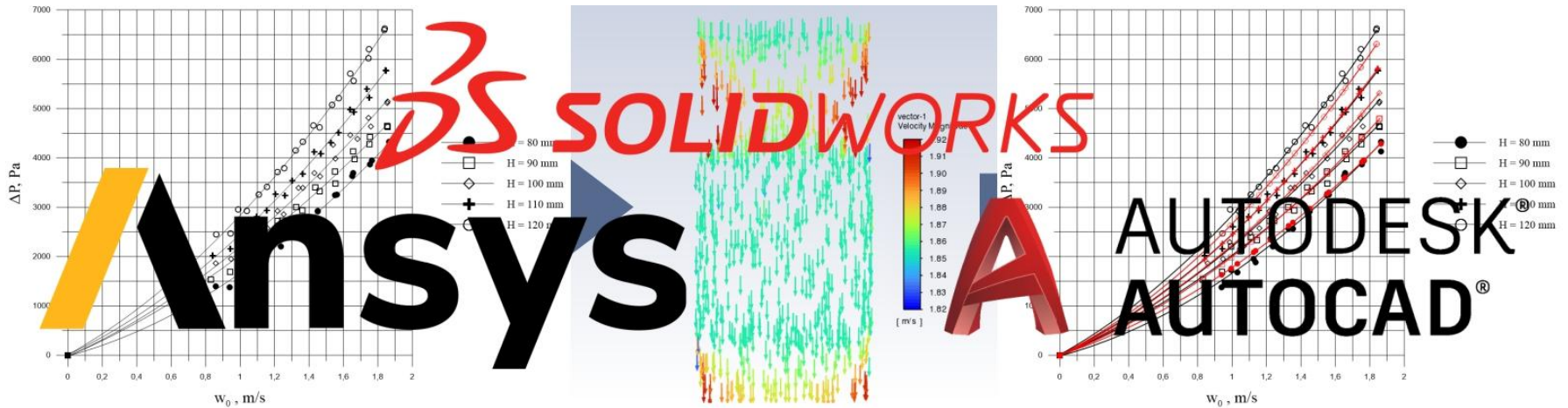
There are a lot of different scientific research activities:



**Extraction in the “solid - liquid” system** (study of the extraction mechanism and process conditions). Research of the mechanism and kinetics of the target components extraction from mineral raw materials, vegetable oils, etc. by different solvents. Obtaining of the kinetic and diffusion coefficients of the extraction process.

- Yevgen Semenyshyn, Volodymyr Atamanyuk, Tetiana Rymar, Oleksandr Ivashchuk, Anna Hlukhaniuk. Mass transfer in the solid-liquid system: mechanism and kinetics of the extraction process // *Chemistry & Chemical Technology*. – Vol.14. – Number 1. – Lviv. – 2020. – P.121-128. <https://doi.org/10.23939/chcht14.01.121>
- Ivashchuk O., Hlukhaniuk A., Semenyshyn Ye., Chyzhovych R., Kuzminchuk T., Khomyak S. Influence of extraction conditions on qualitative composition of vegetable oils // *Chemistry & Chemical Technology*. – Vol.15. – Number 2. – Lviv. – 2021. – P.233-238. <https://doi.org/10.23939/chcht15.02.233>

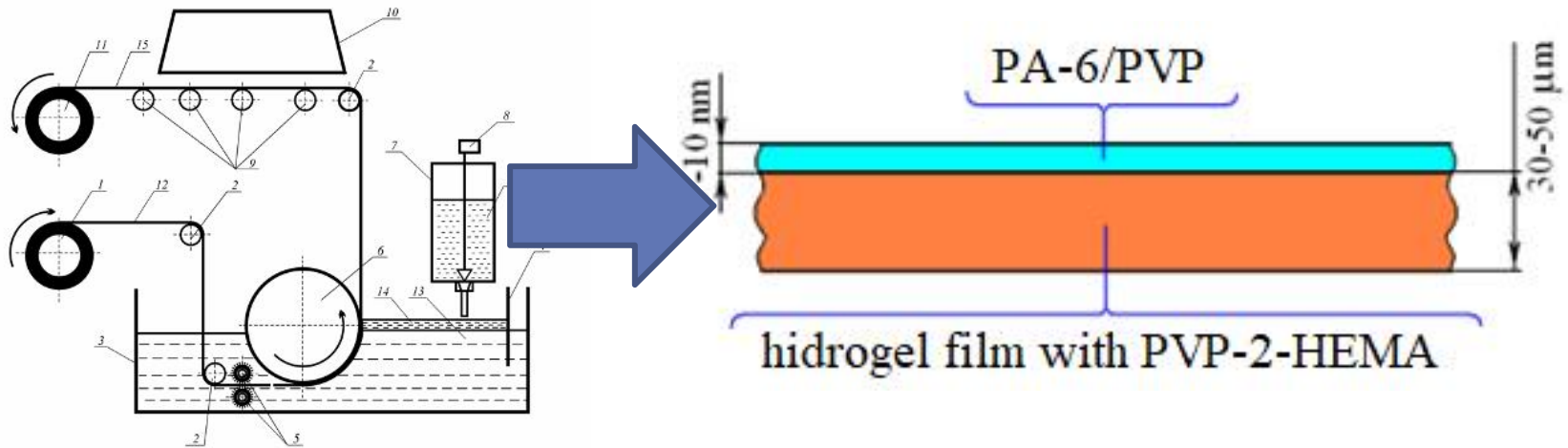
There are a lot of different scientific research activities:



**Computer modeling of processes and apparatuses.** Projecting, numerical and computer modeling, CFD simulation using software: Ansys, SolidWorks, ChemCAD, AutoCAD, etc.

- Oleksandr Ivashchuk, Roman Chyzhovych, Volodymyr Atamanyuk, Zoriana Hnativ. *The Computer Modeling of the Thermal Agent Hydrodynamics Through the Alcohol Distillery Stillage Stationary Layer* // *Proceedings of 2023 17th International Conference on the Experience of Designing and Application of CAD Systems (CADSM)*. – Jaroslaw, Poland, 22–25 February, 2023. – pp. 1-4. <http://dx.doi.org/10.1109/CADSM58174.2023.10076496>
- Roman Chyzhovych, Oleksandr Ivashchuk, Volodymyr Atamanyuk. *CFD-Modeling of Thermal Agent Flow Through a Layer of Barley Brewer's Spent Grain* // *4th International Scientific Conference «Chemical Technology and Engineering»: Proceedings*. – June 26–29th, 2023, Lviv, Ukraine. – Lviv: Lviv Polytechnic National University, 2023. – P. 31-37. <https://doi.org/10.23939/cte2023.031>

There are a lot of different scientific research activities:

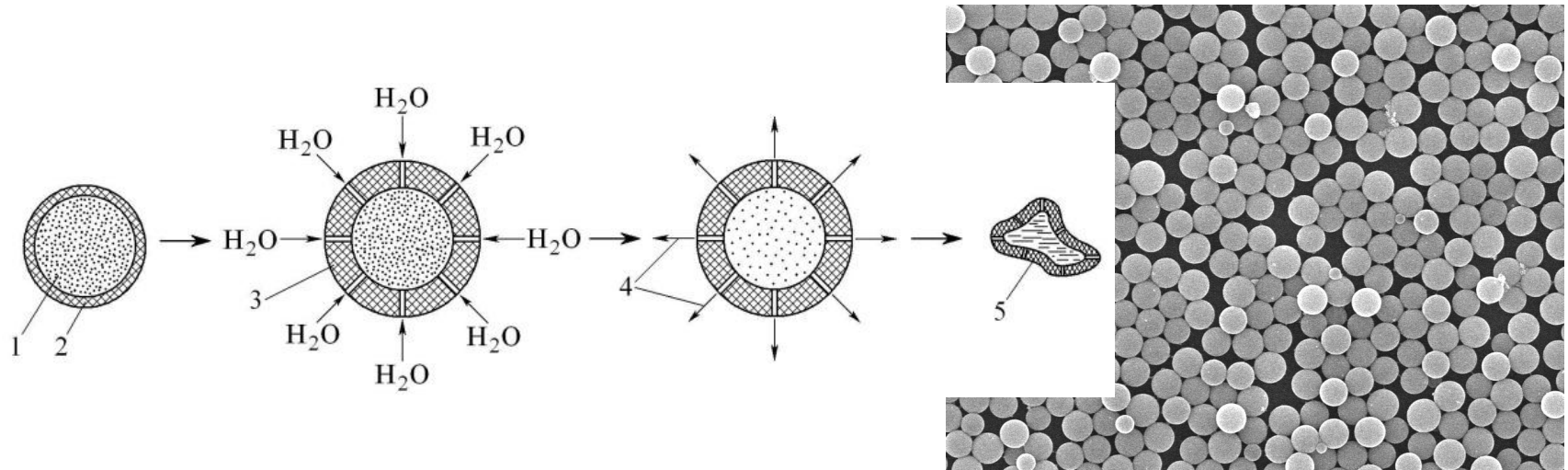


**New technology for obtaining composite hydrogel membranes** with bactericidal and fungicidal properties which can be applied in medicine, pharmacy and biotechnology in the production processes of injection solutions as filter elements at the stage of light and fine filtration of drug solutions.

- *Suberlyak O., Baran N., Melnyk Y., Grytsenko O., Yatsulchak G. Regularities of strengthening of film hydrogel membranes based on 2-hydroxyethyl-metacrylate copolymers and polyvinylpyrrolidone // Functional Materials. – 2020. – Vol. 27, No. 2. – P. 329–333. <https://doi.org/10.15407/fm27.02.329>*



There are a lot of different scientific research activities:



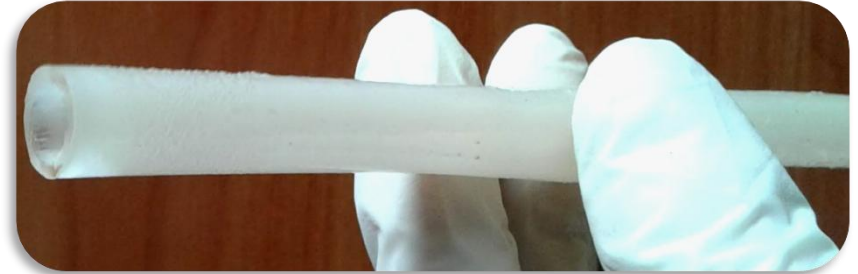
**Polymer therapeutic capsulated and granular systems of prolonged and directed action** – developed technologies for the production of capsulated and granular of prolonged drugs release systems with a controlled rate based on liquid-structured copolymers of 2-hydroxyethyl methacrylate with polyvinylpyrrolidone making it possible to reduce the therapeutic dose of the medicine form in the body by 5-10 times as well as ensure its release at a constant rate depending on the pH of the environment.

- Melnyk Y., Stetsyshyn Y., Skorokhoda V., Nastishin Y. Polyvinylpyrrolidone-graft-poly(2-hydroxyethylmethacrylate) hydrogel membranes for encapsulated forms of drugs // *Journal of Polymer Research*. – 2020. – Vol. 27, No. 11. – P. 1–11. <https://doi.org/10.1007/s10965-020-023335-7>
- Skorokhoda V., Semenyuk N., Dudok G., Melnyk Y. Hydrogel copolymers of methacrylic esters for controlled drug release systems // In “Advanced polymer materials and technologies: recent trends and current priorities: collective monograph” / Eds. by V. Levytskyi, V. Plavan, V. Skorokhoda, V. Khomenko. – Lviv: Lviv Polytechnic Publishing House, 2022. – P. 76-80. <https://doi.org/10.30857/978.617.7506.62.0>

There are a lot of different **scientific research activities**:



Based on PHEMA-*graft*-PVP

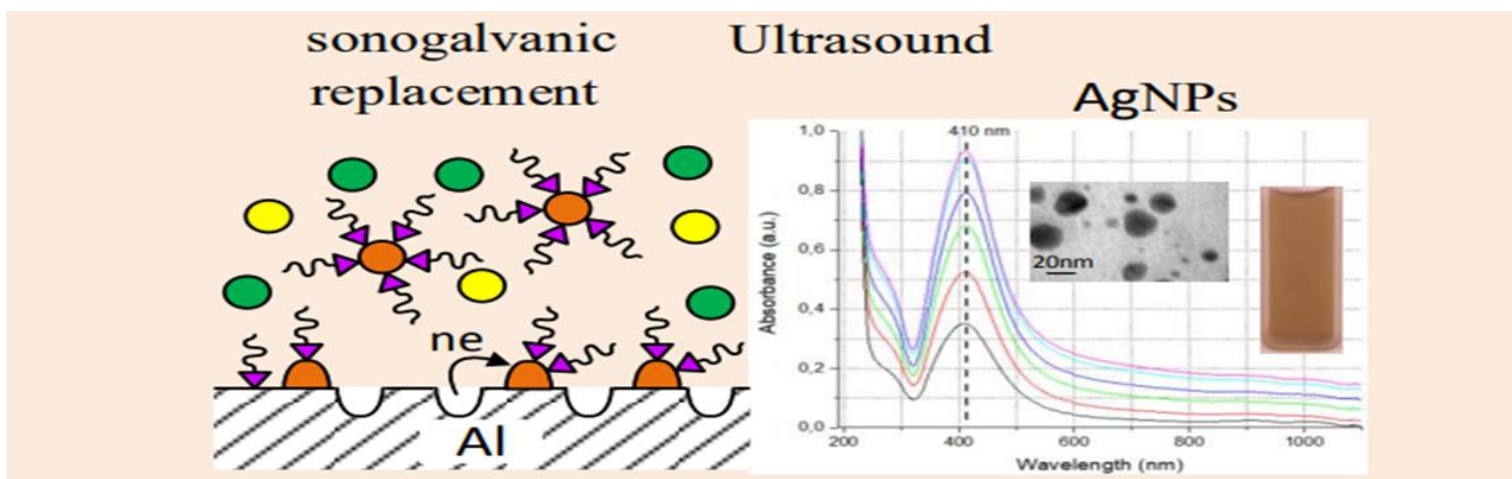


Based on (PA/PVP)/PHEMA-*graft*-PVP

**Hydrogel tubular products of increased strength.** The technology of forming hydrogel tubular products based on modified cross-linked structured copolymers of 2-hydroxyethyl methacrylate (HEMA) with polyvinylpyrrolidone (PVP) for use as blood vessel prostheses was developed.

- *Suberlyak O., Grytsenko O., Baran N., Yatsulchak G., Berezhnyy B. Formation features of tubular products on the basis of composite hydrogels // Chemistry and Chemical Technology. – 2020. – Vol. 14, No. 3. – P. 312–317. <https://doi.org/10.23939/chcht14.03.312>*

There are a lot of different scientific research activities:

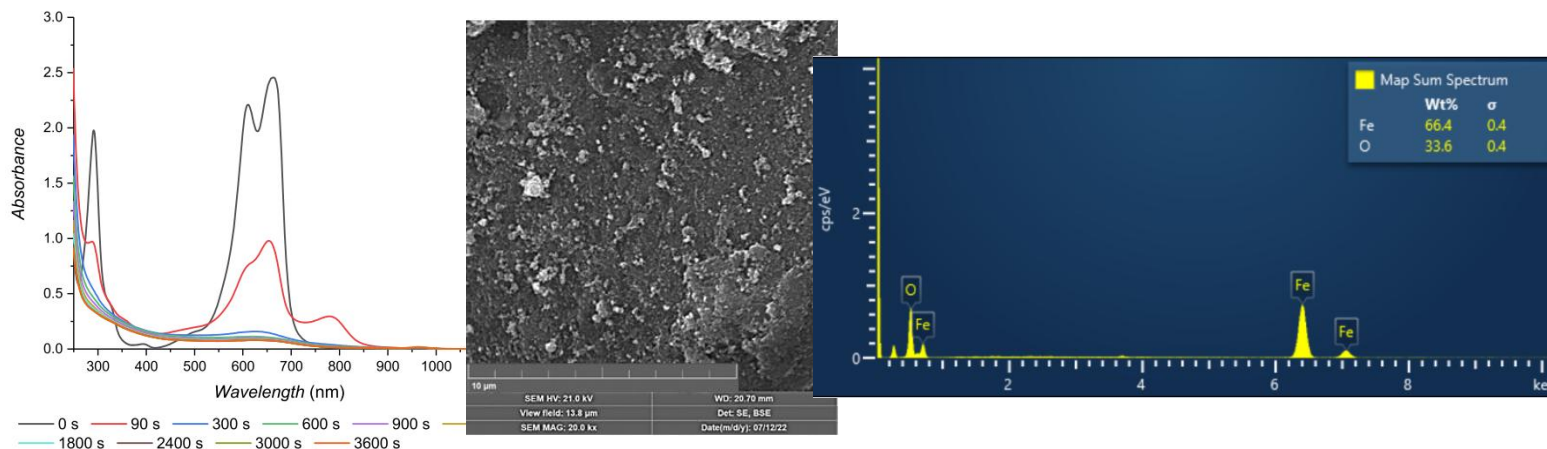


**Synthesis of nanostructured mono- and bimetals with electrocatalytic and antimicrobial properties by electrochemical methods.** Electrolysis and galvanic substitution are among the current areas of nanochemistry for obtaining nanostructures with specified properties, which ensures their controlled synthesis. In the aspect of obtaining new electrocatalytic materials, modification of metal and semiconductor surfaces with metal nanostructures, as well as sonoelectrochemical and sonogalvanic synthesis of solutions of silver nanoparticles, which exhibit antibacterial and antifungal properties, are studied.

- O. Kuntiyi, G. Zozulya, M. Shepida, "CO<sub>2</sub> Electroreduction in Organic Aprotic Solvents: A Mini Review", *Journal of Chemistry*, vol. 2022, Article ID 1306688, 2022. <https://doi.org/10.1155/2022/1306688>
- G. Zozulya, O. Kuntiyi, R. Mnykh, A. Kytsya and L. Bazylyak, "Synthesis of silver nanoparticles by sonogalvanic replacement on aluminium powder in sodium polyacrylate solutions," *Ultrasonics Sonochemistry*, vol. 84, Article ID 105951, 2022. <https://doi.org/10.1016/j.ultsonch.2022.105951>



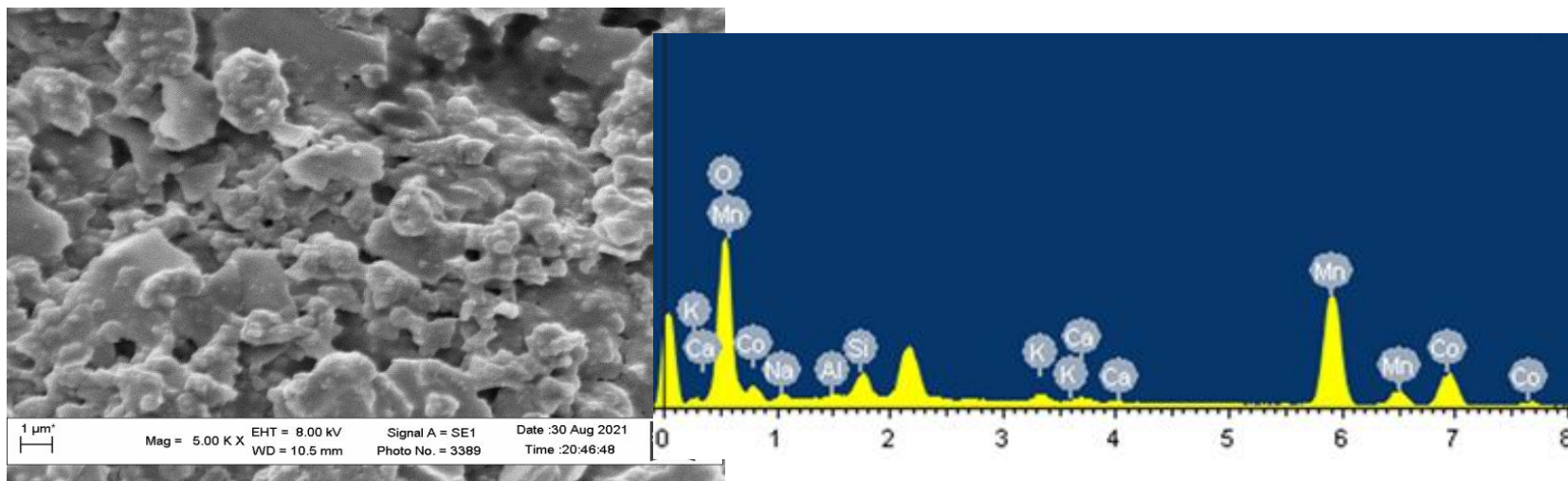
## There are a lot of different scientific research activities:



**Research on the degradation of aromatic compounds, N-containing dyes and antibiotics using combined treatment methods (cavitation + advanced oxidation processes).** The purpose is to generate a complex of powerful oxidants (both radicals and non-radical species) for the degradation of bio-resistant organic pollutants in aquatic environments (in particular, wastewater from chemical industries, dyes industries, pharmaceutical enterprises, etc.). The main advantages are flexibility, high efficiency and intensity, the possibility of adjusting the treatment duration using nanocatalysts synthesized by the sonochemical method to activate oxidants.

- *Decolorization of an aqueous solution of methylene blue using a combination of ultrasound and peroxate process / Yu. Sukhatskiy, M. Sozanskyi, M. Shepida, Z. Znak, P.R. Gogate // Separation and Purification Technology. – 2022, Vol. 288, Art.ID 120651. <https://doi.org/10.1016/j.seppur.2022.120651>*
- *Degradation of benzene present in wastewater using hydrodynamic cavitation in combination with air / P. Thanekar, P.R. Gogate, Z. Znak, Yu. Sukhatskiy, R. Mnykh // Ultrasonics Sonochemistry. – 2021, Vol. 70, Article ID 105296. <https://doi.org/10.1016/j.ultsonch.2020.105296>*

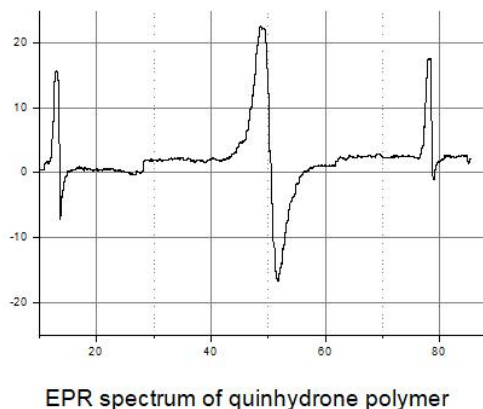
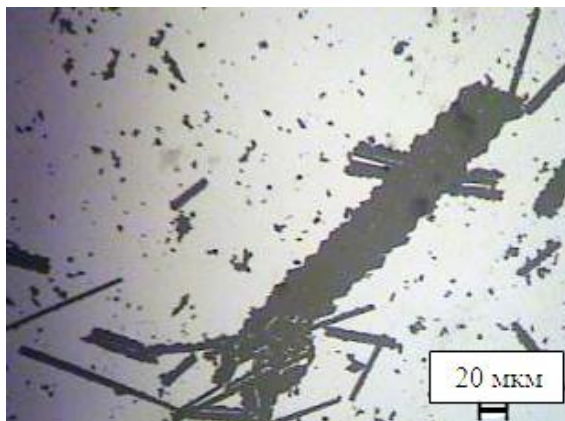
There are a lot of different scientific research activities:



**Obtaining filter materials with antibacterial and catalytic properties for water purification.** Filter materials obtained on the basis of natural clinoptilolite, modified with ions and/or nano-sized particles of silver and manganese(IV) oxide provide effective cleaning of natural surface waters from dispersed and colloidal particles, as well as ions of iron, manganese, hydrogen sulfide, etc. Filter materials are implemented in real technological processes of water purification.

- Z. Znak, O. Zin, A. Mashtaler, S. Korniy, Yu. Sukhatskiy, Parag R. Gogate, R. Mnykh, Pooja Thanekar. Improved modification of clinoptilolite with silver using ultrasonic radiation. // *Ultrasonics Sonochemistry*. Volume 73, May 2021, <https://doi.org/10.1016/j.ultsonch.2021.105496>
- Znak Z.O., Kornii S.A., Mashtaler A.S., Zin O.I. Production of Nanoporous Zeolites Modified by Silver Ions with Antibacterial Properties // *Materials Science*, 2021, January, V 56, № 4, P. 536 – 543. <http://dx.doi.org/10.1007/s11003-021-00461-1>

There are a lot of different scientific research activities:

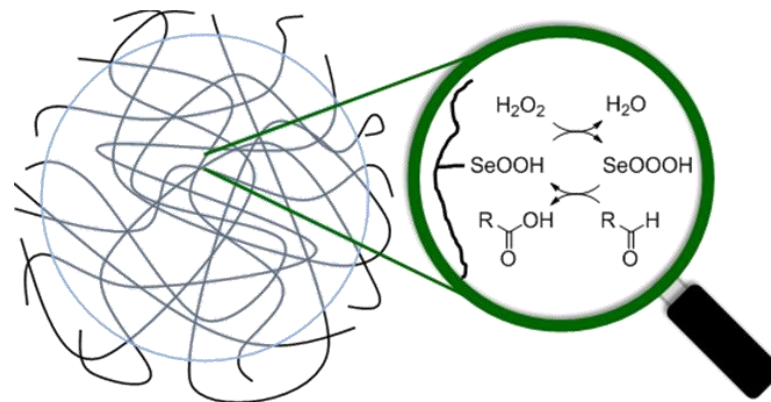
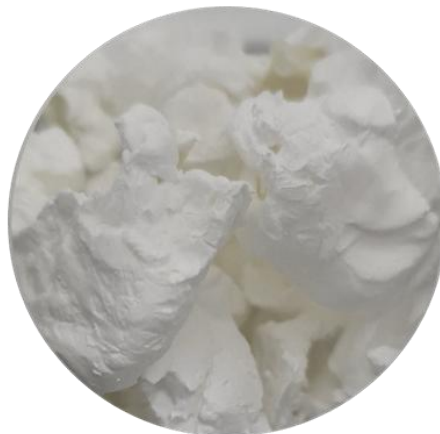


**Technologies of plasma-chemical processing of hydrogen sulfide into hydrogen and sulfur and purification of fuel and ventilation gases from hydrogen sulfide with the production of sulfur.** Controlled cooling of the products of plasma chemical decomposition of hydrogen sulfide makes it possible to obtain ecologically clean fuel - hydrogen, and special types of sulfur, in particular, polymer. Alkaline-oxidation systems based on quinhydrone have been developed for the purification of gases with a low concentration of hydrogen sulfide, which provide a high degree of purification of gases from H<sub>2</sub>S with the production of highly dispersed sulfur.

- Slyuzar A., Znak Z., Kalymon Y., Helesh A. Study of oxygen chemisorption during regeneration of quinhydrone absorbing solution in the apparatus with a continuous bubbling layer // *Chemistry & Chemical Technology*. – 2020. – Vol. 14, № 2. – P. 257–263 <https://doi.org/10.23939/chcht14.02.257>
- Ya.A. Kalymon, A.B. Helesh, A.V. Slyuzar, Z.O. Znak. Theoretical studies of H<sub>2</sub>S, SO<sub>2</sub>, and O<sub>2</sub> absorption in mass exchange apparatus with a continuous bubbling layer and mechanical dispersion of an absorbent. // *Voprosy khimii i khimicheskoi tekhnologii* – 2022 - No.3 - P. 33-43 . <http://dx.doi.org/10.32434/0321-4095-2022-142-3-33-43>



There are a lot of different **scientific research activities**:



**Catalysis.** A unique “smart” microgel catalysts for green and sustainable oxidation processes for chemical and pharmacological industries. Inspired by selenocysteine enzymes, a toolbox was designed for tailor-made synthetic enzyme-mimicking Se-modified microgel catalysts that can be used for various oxidation processes of synthesis of functional chemicals in a greener and sustainable way: water-based synthesis, high yield and selectivity, efficient catalyst recovery and turnover and mild reaction conditions.

- Kharandiuk T., Tan K.H., Kubitska I., Al Enezy-Ulbrich M., Ivasiv V., Nebesnyi R., Potemkin I., Pich A. Synthesis of acrylic acid and acrylic esters via oxidation and oxidative alkoxylation of acrolein under mild conditions with selenium-modified microgel catalysts // *Reaction Chemistry and Engineering*, 2022, 7 (10), pp. 2192 – 2201. <https://doi.org/10.1039/d2re00252c>
- Tan K.H., Xu W., Stefka S., Demco D.E., Kharandiuk T., Ivasiv V., Nebesnyi R., Petrovskii V.S., Potemkin I.I., Pich A. Selenium-Modified Microgels as Bio-Inspired Oxidation Catalysts // *Angewandte Chemie - International Edition*, 2019, 58 (29), pp. 9791 – 9796. <https://doi.org/10.1002/anie.201901161>

There are a lot of different scientific research activities:



Compound symbol	Synthesis number	Temperature range, K	$\Sigma \Delta m \cdot 10^3$ , g	A	-B	$\Delta_{\text{vap}}H$ , kJ/mol
I	1	512.8–564.8	2.94	18.32	11091	96.2
	1	529.2–578.7	8.41	18.15	10832	94.0
	2	489.7–553.3	15.7	20.01	11014	95.6
	2*	498.4–533.0	1.59	18.78	10846	94.2
Average value $\Delta_{\text{vap}}H = 95.0 \pm 1.7$						
II	1*	549.8–579.9	1.78	22.31	13347	115.1
	2*	528.8–556.9	1.01	23.22	13017	112.3
Average value $\Delta_{\text{vap}}H = 113.7 \pm 4.4$						
III	1	505.5–549.6	0.81	23.59	14381	123.6
	2	525.5–534.6	0.30	23.38	14238	123.4
	2*	543.3–576.1	1.35	23.74	14600	125.4
Average value $\Delta_{\text{vap}}H = 123.8 \pm 2.8$						
IV	1	543.5–569.0	6.52	27.38	16473	141.4
	1*	550.6–586.7	2.03	28.72	16403	140.8
	2	549.4–566.5	10.3	26.76	16225	139.3
	2*	547.7–582.2	3.27	29.47	16581	142.3
Average value $\Delta_{\text{vap}}H = 141.0 \pm 2.0$						

**Thermochemical research.** Experimental determination of calorific value (calorific value) of solid and liquid fuel materials. Determination of the heat of formation of individual substances in condensed and gaseous states, as well as the enthalpies of phase transitions (sublimation, evaporation, melting). Research of thermodynamic parameters of interaction between solute and solvents. Determination of intra- and intermolecular interactions in individual substances and in solutions. These thermodynamic parameters are necessary to optimize the processes of synthesis, storage, processing and utilization of organic substances.

- Klachko, O., Matiychuk, V., Sobechko, I., Serheyev, V., & Tishchenko, N. (2020). Thermodynamic properties of 6-methyl-2-oxo-4-aryl-1,2,3,4-tetrahydropyrimidine-5-carboxylic acid esters. *Chemistry & Chemical Technology*, 14(3), 277–283. <https://doi.org/10.23939/chcht14.03.277>

There are a lot of different **scientific research activities**:



**Researching new methods for improving bitumens and asphalts** is an effective way to improve the quality of road surfaces, extend their lifespan, and reduce maintenance costs. Additionally, it helps to minimize negative environmental impact and enhance safety on roads. The research has prospects for further development in the areas of ecology, infrastructure, and quality of life improvement for people.

- *Pstrowska K., Gunka V., Prysiaznyy Y., Demchuk Y., Hrynychuk Y., Sidun I., Kułazyński M., Bratychak M. Obtaining of formaldehyde modified tars and road materials on their basis // Materials. – 2022. – Vol. 15, iss. 16. – P. 5693-1–5693-19. <https://doi.org/10.3390/ma15165693>*
- *Starchevskyy, V., Hrynychuk, Y., Matcipura, P., Reutskyy, V., Influence of initiators on the adhesion properties of bitumen modified by natural origin epoxide. // Chemistry and Chemical Technology, 2021, 15(1), pp. 142–147 <https://doi.org/10.23939/chcht15.01.142>*



There are a lot of different **scientific research activities**:



**Development of antimicrobial drugs and innovative disinfectants.** Modern antimicrobial drugs with a lot of advantages: the long-acting form, the active substance exceeds the antimicrobial effect of known drugs, convenient way of injection, does not contain antibiotics and has effect for the treatment of inflammatory diseases of various etiologies. Innovative disinfectants consisting of plant extracts and silver nanoparticles.

- V. Lubenets, N. Stadnytska, D. Baranovych et al. Thiosulfonates: The Prospective Substances against Fungal Infections. In: *Fungal Infection* / Eds. Érico Silva de Loreto and Juliana Simoni Moraes Tondolo, IntechOpen, London. – 2019. - P. 1-24. <http://dx.doi.org/10.5772/intechopen.84436>
- Hamada V., Bazavluk Y., Polish N., Konechna R., Mykytiuk S., Novikov V. Total phenolic and flavonoid content, antioxidant activity and antimicrobial potential of *Phlomis pungens* Willd// *Periodyk Naukowy Akademii Polonijnej (PNAP)*. – 2019. – T. 37, No. 6. – S. 133–139. <https://doi.org/10.23856/3713>

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**We are opened for collaboration!**

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[ixxt.dept@lpnu.ua](mailto:ixxt.dept@lpnu.ua)