

LABORATORY OF ECOLOGICAL CHEMISTRY

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SHORT HISTORY

Created on April 6, 1962 under the name of Laboratory of Mineral Resources, it goes into a wider area of concern as the Mineral Resources and Water Chemistry Laboratory, then named Ecological Chemistry Laboratory preoccupied with the quality of the environment.

Created by distinguished personalities like: Nicolai Lobanov (1897-1972)- Ph.D. in chemistry, modernized by Valeriu Ropot (1934-2002)- Ph.D. in chemistry, coordinated by academician, DSc, Professor, State Prize laureate Tudor Lupascu, who gives it a new breath.

TEAM OF THE LABORATORY

There are 13 researchers working in the laboratory, including 1 academician, 3 DSc in chemistry, 5 PhD in chemistry, 1 PhD in medicine.



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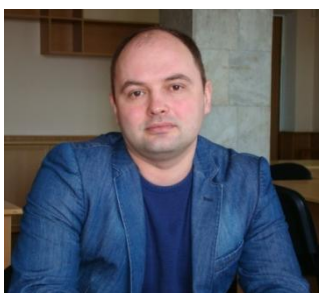
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RESEARCH DIRECTIONS

- Optimization of the obtaining and modification technologies of carbonaceous and mineral adsorbents (their sorptional-structural characteristics) for purpose of their use in practice.
- Obtaining and studying of the structure parameters of carbonaceous and mineral catalysts for their use in the catalytic processes of pollutants removal (oxidation of hydrogen sulphide) from underground and surface waters.
- Synthesis and study of the new polyfunctional materials (including biologically active substances) by chemical and physico-chemical methods, useful for economy, medicine, industry, agriculture and environment.

MAIN RESULTS OF THE RESEARCH

- Optimisation of obtaining and regeneration procedures of activated carbons from vegetable by-products.
- Obtaining of a trademark for preparations based on the biologically active substance "ENOXIL" and the medicinal preparations produced at SA "Farmaco", which were tested in 4 republican clinics from Chisinau.
- Obtaining of pillared sorbents based on bentonite from Moldova, useful as adsorbents / catalysts in drinking water technologies and / or oxidative purification of waste waters.

PRACTICAL ELABORATIONS

- The technology for the production of activated carbons from local raw material (wood, nut shells, peach, plums and apricots stones) was developed, which is implemented at SRL "Ecosorbent", Stefan Voda (Republic of Moldova). (The production capacity of the factory is 110-120 tons per year. The cost of the technology is 17859,39 lei / ton, by 50% cheaper than the imported ones (implementation act from 08.12.2014).
- It was developed and tested in the Hincesti town a new technology for removal of the hydrogen sulphide from groundwaters. (The implementation of the recommended technology provides a 100% efficiency for the removal of hydrogen sulphide from groundwaters and 30% for ammonium ions. There were carried out *in situ* testing of the semi-pilot installation for hydrogen sulphide removal from water).
- It was developed a technology of underground water treatment from iron and manganese ions based on the process of iron and manganese removal from water, through the formation of insoluble products, which are easily separated through a sand filter, tested in the Sculeni village, Ungheni district (Ecological and health expertise confirms that the proposed technology is efficient and the treated water meets the ecological and sanitary norms regarding the quality of drinking water).
- Based on the compound Enoxil (2%) (active substance with amplified antibacterial properties) an experimental batch of compositions was prepared and tested: cream, ointment, gel.

SCIENTIFIC COLLABORATION

National

- State University of Moldova
- State University of Medicine and Pharmacy "N. Testemitanu"
- University of Tiraspol
- State University Dimitrie Cantemir
- National Center of Public Health
- Institute of Genetics, Physiology and Plant Protection
- SRL "Ecosorbent"

International

- *Institute of Surface Chemistry of NAS of Ukraine*
- *Institute of Colloidal Chemistry and Water Chemistry of NAS of Ukraine*
- *Institute of Macromolecular Chemistry P. Poni of the Romanian Academy*
- *ECOIND Institute - Bucharest*
- *University A.I. Cuza from Iasi*
- *Technical University from Iasi*
- *Polytechnic University from Bucharest*
- *Lower Danube University from Galati*
- *Institute of General and Inorganic Chemistry of AS Belarus*
- *Institute of Timisoara Chemistry of the Romanian Academy*
- *Brighton University from UK*
- *University of Alicante from Spain*
- *University of Budapest from Hungary*

RELEVANT PUBLICATIONS

Monographies:

1. DUCA, G.; LUPAȘCU, T.; NICOLAU, E.; CULIGHIN, E. *Chimie ecologică și a mediului*. US „D. Cantemir”. Ch.: Tipografia Biotehdesign, 2018. 250 p. ISBN 978-9975-108-51-5 (in rom.)
2. T. LUPAȘCU. Cărbuni activi din materii prime vegetale”. ÎEP “Știința”, Chișinău, 2004, 224 p. (in rom.)
3. T. LUPAȘCU, GH. DUCA, G. LUPAȘCU, Enoxil – preparat ecologic pentru protecția plantelor. Chișinău, tip. AȘM, 2010, 136 p. (in rom.)
4. T. LUPAȘCU, GH. DUCA, V. GONCIAR, Enoxil – preparat ecologic pentru sănătatea omului. Chișinău, tip. AȘM, 2012, 256 p. (in rom.)
5. V. RUSU, T. LUPAȘCU, Chimia sedimentelor acvatice, Chișinău, 2004, 272 p. (in rom.)

Chapters in monographies:

1. KOZAKEVYCH, R.; BOLBUKH, Y; LUPASCU, L; LUPASCU, T; TERTYKH, V. Polymeric Composite Films with Controlled Release of Natural Antioxidant Enoxil. In: *FESEENKO, O.; YATSENKO, L., eds. Nanochemistry, Biotechnology, Nanomaterials, and Their Applications*. Springer International Publishing AG, part of Springer Nature, 2018, Springer Proceedings in Physics 214, pp. 149-164. https://doi.org/10.1007/978-3-319-92567-7_9.
2. LUPAȘCU, T.; MITINA, T.; GRIGORAȘ, D. Metodele de determinare a microelementelor in obiectele biologice. În: *Microelementele în obiectele biosferei Republicii Moldova și aplicarea în agricultură și medicină*, 2016, Chișinău, pp.240-253. ISBN 978-9975-51-724-9. (in rom.)
3. LUPASCU, T.; NASTAS, R.; RUSU, V. Treatment of Sulfurous Waters Using Activated Carbons. In: DUCA, GH. Ed. *Management of Water Quality in Moldova*. Switzerland: Springer International Publishing, 2014, pp. 209-224. DOI 10.1007/978-3-319-02708-1_11.
4. Т. ЛУПАШКУ, Р.НАСТАС, Глава в монографии. Адсорбция, адсорбен-ты и адсорбционные процессы в нанопорист-ых материалах Москва, 2011, Глава 17, p. 425-446. (in russ.)
5. ПОВАР И., ЛУПАШКУ Т., ЛЯХ Т., АНДРИЕШ С., ФИЛИПЧИУК В. Природные и антропогенные факторы воздействия на качество почв и водных ресурсов Республики Молдова. Chisinau: Tipografia ASM, 2014, 265p. (in russ.)
6. LUPAȘCU, T; DUCA Gh, Obținerea preparatelor medicamentoase și agricole in baza substanței biologice active Enoxil sintetizat din enotaninuri. Capitol in monografia ”Produce vinicole secundare” 2011. ÎEP Știința, p.171-234 (in rom.)
7. CADOCINICOV, O.; PETUHOV, O. Possible Use of Certain Mineral Raw Materials of Moldova for DDTs and HCHs Adsorption from Aqueous Solutions. *Environmental Security Assessment and Management of Obsolete Pesticides in Southeast Europe*, Springer 2013. p.311-321. ISBN 978-94-007-6461-3 (e-book), DOI 10.1007/978-94-007-6461-3

Articles:

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2. COTELEA, T.; NIȚULESCU, G.; PETUHOV, O.; MORUȘCIAG, L. Physicochemical investigations on some 2-phenethylbenzoyl thiourea derivatives. *Farmacia*, 2015, **63**(5), 652-655. (IF= 1.005)
3. CRETESCU, I.; LUPASCU, T.; BUCISCANU, T.; BALAU-MINDRU, T; SOREANU, G. Low-cost sorbents for the removal of acid dyes from aqueous solutions. *Process Safety and Environmental Protection*. ISSN 0957-5820. DOI: 10.1016/j.psep.2016.05.016. (IF= 2.078).
4. GUNKO, V.M.; LUPASCU, T.; KRUPSKA, T.V.; GOLOVAN, A.P.; PAKHLOV, E.M.; TUROV, V.V. Influence of tannin on aqueous Layers at a surface of hidrophilic and hidrophobic nanosilicas. *Colloid and Surfaces A*, 531(2017), 9-17. ISSN:0927-7757 (IF=2.7).

5. LUPASCU, T.; CIOBANU, M.; BOTAN, V.; SANDU, I.G.; DRAGALIN, I.; MITINA, T.; SANDU, I. Removal of ammonium ions and ammonia from groundwater by oxidation processes. *Revista de Chimie*. 2018, 11. (IF: 1,412)
6. MOLDOVAN, Z.; MARINCAS, O.; POVAR, I.; LUPASCU, T.; LONGREE, PH.; SIMOVIC ROTA, J.; SINGER, H.; ALDER, A. Environmental Exposure of Anthropogenic Micropollutants in the Prut River at the Romanian-Moldavian Border: A Snapshot in the Lower Danube River Basin. *Environmental Science and Pollution Research*. 2018, **25**, 31040-31050. ISSN: 0944-1344. <https://doi.org/10.1007/s11356-018-3025-8> (IF: 2.741)
7. SPATARU, P.; POVAR, I.; LUPASCU, T.; ALDER, A.; MOSANU, E. Study of nitrogen forms in seasonal dynamics and kinetics of nitrification and denitrification in prut and nistru river waters. *Environmental Engineering and Management Journal*. 2018, **17**(7), 1711-1719. ISSN: 1582-9596. <http://eemj.eu/index.php/EEMJ/article/view/3634> (IF: 1.021)
8. TUROV, V.; LUPASCU, T.; KRUPSKA, T.; POVAR, I. Nanosilica A-300 influence on water structures formed on the bioactive agent Enoxil. *Canadian Journal of Chemistry*, 2015, **93**, DOI: 10.1139/cjc-2015-0360, published on the web 19 October 2015(IF-1,061)
9. TUROV, V.; LUPASCU, T.; KRUPSKA, T.; POVAR, I. Nanosilica A-300 influence on water structures formed on the bioactive agent Enoxil. *Canadian Journal of Chemistry*. 2016, 94(1), 88-94, ISSN: 1939-019X, DOI: 10.1139/cjc-2015-0360, (IF=1.066).
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11. IVANETS, A.I.; NASTAS, R.I.; KUZNETSOVA, T.F.; AZAROVA, T.A.; POSTOLACHI, L.V.; GINSARI, I.N.; VORONETS, E.A.; RUSU, V.I.; LUPASCU, T.G. Regularities of Modification of Active Carbons by Oxygen-Containing Manganese Compounds. *Protection of Metals and Physical Chemistry of Surfaces*. 2018, **54** (4), 587–593. ISSN 2070-2051, DOI: 10.1134/S2070205118040056 (IF: 0,71).
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14. MAFTULEAC, A. Space-Time Relationships and Thermal Effects in Centrifugal Field. *International Journal of Modern Physics and Applications (American Institute of Science)*, 2015, **1**(2), 17-21. ISSN: 2381-6945 (Print), 2381-6953 (On line).
15. MAFTULEAC, A. The hydrated and hydrolyzed states of exchangeable cations in the montmorillonite and their quantitative assessment. *International Journal of Materials Science and Applications*, 2015, **4**(2), 124-129. ISSN : 2327-2635 (Print), 2327-2643 (Online). doi: 10.11648/j.ijmsa.20150402.19.
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INTERNATIONAL AND NATIONAL RESEARCH PROJECTS

- **FP-7 Program: Title of the project:** „Nanostructured Biocompatible/Bioactive Materials // Number: PIRSES-GA-2013-612484”. Term of execution 2014-2017.
- **Horizon 2020 programme: Title of the project:** “Nanoporous and Nanostructured Materials for Medical Applications” *Proposal ID 734641*. Term of execution 2017-2020.
- **Horizon 2020 programme: Title of the project:** “Preparatory phase for the pan-european research infrastructure DANUBIUS-RI “THE INTERNATIONAL CENTRE FOR ADVANCED STUDIES ON RIVER-SEA SYSTEMS” grant agreement number — **739562**. Term of execution 2017-2020.
- **Joint Research Program ASM-NAS Belarus: Title of the project:** “Metal Oxide Catalysts for Water Treatment: Synthesis, Properties, Usage” Term of execution 2015-2016
- **Program STCU: Title of the project:** “Chitosan-dicarboxylic acid derivatives” Term of execution: 2018-2019.
- **Joint Research Program ASM-CNC Italy: Title of the project:** „The thermodynamic optimization of the innovative processes developed for the valorization of industrial waste containing precious metals”. Term of execution 2018-2019.
- **Joint Research Program ASM-ASSII Ukraine: Title of the project:** “Multi-component nanocomposites to stimulate the growth of agricultural plants” Term of execution 2017-2018

- **Program RESINFRA: Title of the project:** "Enhanced monitoring of heavy metal content in environmental compartments". Term of execution 2017-2018
- **Research program for young researchers: Title of the project:** "Utilization of the pyrolysis residue of the tires by obtaining pigments and supplements". Term of execution 2019.
- **INTAS – 93-2725:** Development of New Types of Active Carbons, Inorganic Oxides and Phosphates as Selective Adsorbents and Carriers for Catalysts, and their Application in Industry.
- **INTAS – 94-3608:** Decontamination of Exhausted Gases and Sewage Water by Chemically Modified Inorganic Ion Exchangers and Active Carbons.
- **INTAS – 00174:** Water Purification for Food Production.
- **NATO Sfp:** Prut River 974064.
- **CRDF-MRDA ME 2 – 3038:** Ion Exchangers and Catalysts from Carbon Adsorbents for Water Treating.
- **INTAS- Moldova 05-104-7505:** Optimization of Tartaric acid and enantiomers extraction from winery wastes and their utilization for the synthesis of new compounds with biological activity and antioxidant properties.
- **CRDF-MRDA:** Implementation and Optimization of the Activated Carbon (AC) Mass-production using Non-traditional Raw Materials.
- **SCOPES – Switzerland:** Xenobiotic Input to the Prut River (XENOPRUT)
- **BLACK SEA BASIN** Nr.2.2.2.72569.201 MIS-ETC 2641, ECO-AGRI, Sharing collectively the competences of the researchers to the farmers for a sustainable and ecological exploitation of the agricultural and environment protection.
- **FP-7 Program,** Nanostructured Biocompatible/Bioactive Materials (NanoBioMat) Nr. PIRSES-GA-2013- 612484.
- **ASM – FRCF:** New carbon and mineral adsorbents with different rigidity of the casing: their structure and properties.
- **SCSTD:** New grape seed preparations for human and veterinary medicine and agriculture.
- **SCSTD:** Evaluation of the activity of medicinal and agricultural preparations obtained on the basis of the biologically active substance ENOXIL under clinical and field conditions.
- **SCSTD:** Improvement of underground and surface water drinking technologies.