LABORATORY OF ELECTROCHEMISTRY IN ADVANCED MATERIALS

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Areas of expertise

Electrochemical sensors
Advanced materials for membrane sensors
Modelling and simulation

Team

Prof. Lorentz Jäntschi, Prof. Dr. Chem. Elena-Maria Pică, Assoc. Prof. Dr. Chem. Mihaela-Ligia Ungureşan, Assoc. Prof. Dr. Eng. Dana-Adriana Iluțiu-Varvara, Assoc. Prof. Dr. Liviu-Călin Bolunduț, Prof. Dr. Phys. Eugen Culea, Dr. Eng. Ec. Luminița Cristina Pirău, Dr. Mioara Zagrai, Dr. Eng. Marius Roman, Drd. Phd. students: Cornel Sava, Dragoș Teodor Lup

Representative projects

Pică E.M.: Selective electrochemical nitrite sensor for the control of nitrites in agro-food products. Nitritsenz", INDAL_90/MCT/PNCDI/AGRAL/269/2004, 2004-2006, 44 k$.
Pică E.M.: Synthetic porphyrinic macrocycles, nanostructures with involvement in the configuration of sensors, photovoltaic cells, in anti-corrosion protection and in medicine - NANOMATPORFIRINE. PC-D04-PT4-181/CEEX/MCT/1332/29.06.2005, 300 k$.
Ungureșan M.L.: Kinetics of fast Cu(II) redox reactions with thiocombinations, AT_143/CNCSIS/33532/2003, 2003-2004.
Iluțiu-Varvara D.A.: Development of an efficient recovery method of oily tunder by testing the material and evaluating combustion emissions, CI-1.1-UTCN 2016, 2016-2017, 10k$.
Jäntschi L.: From mathematical chemistry to quantum chemistry, and to medicinal chemistry, ID_1051/UEFISCSU/202/1.10.2007, "IDEAS" 2007-2010, 377 k$.

Significant results

The most representative publications of the past 5 years:

1. Jäntschi, L. 2023. Nanoporous carbon, its pharmaceutical applications and metal organic frameworks. Journal of Inclusion Phenomena and Macrocyclic Chemistry (ISSN 1573-1111, 1388-3127) 103(7-8): 245-261. DOI 10.1007/s10847-023-01194-1
2. Roman, M.-D.; Sava, C.; Iluțiu-Varvara, D.-A.; Mare, R.; Pruteanu, L.-L.; Pică, E.M.; Jäntschi, L. Biological activated sludge from wastewater treatment plant before and during the COVID-19 pandemic. Int. J. Environ. Res. Public Health 2022, 19, 11323.
3. Stoenoiu, C.E.; Putz, M.V.; 5.Jäntschi, L. 2023. Is triple crossed C28 cyclic polyyne cluster a stable conformation?. Fullerenes, Nanotubes and Carbon Nanostructures (ISSN 1536-383X, 1536-4046) - 28p. DOI 10.1080/1536383X.2023.2261573.
4. Culea, E. Nicula Al.; Erat I. An Infrared Study of xV2O5·(1-x)B2O3 Glasses. Physica status solidi A 2022, 83, 435-438.
5. Jäntschi, L. Energetics of $C_8B_8N_8$, $N_{12}B_{12}$, and C_{24} Macrocycles and Two [4]Catenanes. Foundations 2022, 2, 781-797.
6. Jäntschi, L. Introducing structural symmetry and asymmetry implications in development of recent pharmacy and medicine. Symmetry 2022, 14, 1674.
7. Jäntschi, L. Modelling of acids and bases revisited. Studia UBB Chemia 2022, 66, 73-92.

8. Pascuta, P.; Stefan, R.; Olar, L.E.; Bolundut, L.C.; Culea, E. Effects of copper metallic nanoparticles on structural and optical properties of antimony phosphate glasses co-doped with samarium ions. Materials 2020, 13, 5040.
9. Pirău, L.C.; Pică, E.M. Maintenance of the equipment used in the medical optics office (in Romanian), Cluj-Napoca, Cluj, Romania: AcademicDirect, 2022. [Online]. Available: http://ph.academicdirect.org
10. Piscoiu, D.N.; Rada, S.; Macavei, S.; Vermeșan, H.; Culea, E. Characterization of calcium oxide treated lead–lead dioxide vitroceramics from recycled automobile batteries by x-ray diffraction, infrared and ultraviolet–visible spectroscopy, and voltammetry. Anal. Lett. 2022, 55, 2347-2358.
11. Pruteanu, L.-L.; Braicu, C.; Módos, D.; Jurj, M.-A.; Raduly, L.-Z.; Zănoagă, O.; Magdo, L.; Cojocneanu, R.; Paşca, S.; Moldovan, C.; Moldovan, A.I.; Ţigu, A.B.; Gurzău, E.; Jäntschi, L.; Bender, A.; Berindan-Neagoe, I. Targeting cell death mechanism specifically in triple negative breast cancer cell lines. Int. J. Mol. Sci. 2022, 23, 4784.
12. Rada, S.; Unguresan, M.; Zagrai, M.; Popa, A. Structural, optical, and magnetic studies of the metallic lead effect on MnO_2-Pb-PbO_2 Vitroceramics. Materials 2022, 15, 8061.
13. Rada, S.; Unguresan, M.; Zhang, J. Structure, XAS analysis, and voltammetric study of copper–manganese-doped electrode materials obtained by recycling of a lead–acid battery. J. Solid State Electrochem. 2022, 26, 2673–2683.
14. Sas-Boca, I.-M.; Iluțiu-Varvara, D.-A.; Tintelecan, M.; Aciu, C.; Frunză, D.I.; Popa, F. Studies on hot-rolling bonding of the Al-Cu bimetallic composite. Materials 2022, 15, 8807.
15. Sava C.; Pică E. M. Drying and Energy Recovery of Sludge, Studia UBB Chemia 2021, 55, 267-276.
16. Sava, C.; Pică, E.M.; Roman, M.D. Considerations regarding the use of sludge in agriculture. Res. J. Agric. Sci. 2019, 51, 57-63.
17. Taulescu C. A.; Taulescu M.; Suciu M.; Bolunduț L. C.; Păscuța P.; Toma C.; Urda-Cîmpean A.; Dreanca A.; Șenilă M.; Cadar O.; Ștefan R. A novel therapeutic phosphate-based glass improves full-thickness wound healing in a rat model. Biotechnol. J. 2021, 16, e2100031.
18. Tintelecan, M.; Iluțiu-Varvara, D.-A.; Sas-Boca, I.M.; Aciu, C. The Behavior of a Zn-Al Anticorrosive Coating in the Wiredrawing Process. Materials 2022, 15, 6190.
19. Zagrai, M.; Unguresan, M.L.; Rada, S.; Zhang, J.; Pică, E.M.; Culea E. Local structure in gadolinium-lead-borate glasses and glass-ceramics. J. Non-Cryst. Solids 2020,546, 1-8.

Significant solutions:
Determination of various ions in different environmental samples
Analytical control of chemical and biochemical products/processes
Research-development studies performed, for environmental pollution
Validated models of some chemical processes
Novel parametric families of methods for roots of nonlinear equations
Formulas and algorithms for binomial distributed data confidence interval calculation

Products and technologies:
The development of ecologic products from biodegradable materials for some packs and protection equipment
Electrocatalysis of some transformation reaction for a major different pollutants in inorganic and organic mater
Nanomaterials with applications in mediated electrocatalysis using modified electrodes
Online interfaces for applied research and education: http://l.academicdirect.org

Patents:
Vlascici, D.; Pică, E.M.; Cosma - Făgădar E.; Bizerea O.; Costişor O., Cosma V. Senzor potenţiometric nitrit-selectiv, Patent 2010 No.122.790, in *B.O.P.I* Section:Patents, No.1, pp.72; http://www.osim.ro/publicatii/brevete/bopi_2010/bopi110.pdf
Fagadar-Cosma, E.; Vlascici, D.; Pică, E.M. Costişor, O.; Cosma, V.; Olenic, L. Bizerea, O. Procedure for Obtaining of A Highly Selective Potentiometric Sensor for Silver Ion Detection Based on Porphyrin Ionophore, Patent 2012, No.123.447, in *B.O.P.I* Section:Patents, No.5, pp.104; http://www.osim.ro/publicatii/brevete/bopi_2012/bopi_inv_05_2012.pdf
Bălan, M.C.; Jäntschi, L. Heating and cooling system for passive buildings based on heat and cold storage Patent 2015, No. GB2524551; https://www.ipo.gov.uk/p-ipsum/Case/ApplicationNumber/GB1405465.4

The offer addressed to the economic environment

Research & development	The development of some methods for achievement of electrochemical sensors and achievement of some new sensors used in different measurements (water and soil of environmental measurements) The development of advanced modeling procedures, identification, monitoring and control of processes occurring in electrochemical interface
Consulting	Consulting, design, research and prototyping of different sensors based on reduction of ions element
Training	Advanced materials electrochemistry Design of electrochemical sensors Modelling and simulation Physical and chemical reference data Molecular topology Processing of data: experimental design and statistical analysis

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