LABORATORY OF ELECTROCHEMISTRY IN ADVANCED MATERIALS

Contact details

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Areas of expertise

Chemical data analysis
Electrochemistry
Materials for sensors
Modelling and simulation

Team

Prof. Dr. Eugen Culea, Assoc. Prof. Dr. Mihaela-Ligia Ungureşan, Assoc. Prof. Dr. Dana-Adriana Iluțiu-Varvara, Assoc. Prof. Dr. Liviu-Călin Bolunduț, Dr. Eng. Ec. Luminița Cristina Pirău, Dr. Mioara Zagrai, Dr. Eng. Marius Roman, Dr. Dan-Marian Joița, Drd. Dragoș Teodor Lup, Drd. Caterina Banu, Drd. Oana Moldovan

Representative projects

Ilutiu-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$.
Jäntschi L.: From mathematical chemistry to quantum chemistry, and to medicinal chemistry, ID_1051/UEFISCSU/202/1.10.2007, "IDEAS" 2007-2010, 377 k$.
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.

Significant results

The most representative publications of the past 5 years:

1. Prabhu S, Arulperumjothi M, Jäntschi L, Manimozhi V, Madhusudhan RM. Molecular Characterization of Three Classes of Bow-Tie-Shaped Graphene Nanoflakes by Polynomials as Alternative for Their Computed Energies and Spectral Patterns. *ACS Omega* **2025**, 10 (35): 40291.
2. Jäntschi L, Pruteanu LL. Geometry of C32 cyclic polyyne and some of its clusters. *Carpathian. J. Math.* **2025**, 41(2): 371.
3. Donfack Fendzi E, Fotoula Tatsitsa GR, Jäntschi L, Fendzi MW, Tebue Tala E, Nguenang JP, Pradeep J, Ghanshyam TG, Jiotsa Kenfack A, Smerat A, Khishe M. Nuclei discovered new practical insights via optimized soliton-like pulse analysis in a space fractional-time beta-derivatives equation. *Sci. Rep.* **2025**, 15: 8440.
4. Bosca M, Bolundut LC, Pop L. et al. Synergistic bactericidal and anticancer potential of rubidium and silver-containing phosphate-based bioglasses. *Sci Rep* **2025**, 15: 37135.
5. Jäntschi L. Topological Characterization of a Complete Set of Small-Sized Graphene Sheets Using Molecular Descriptors with Energy Storage Applications. *Energy Storage* **2025**, 7(6), e70253.
6. Ungureanu EM, Ștefaniu A, Isopescu R, Mușina CE, Bujduveanu MR, Jäntschi L. Extended characteristic polynomial

estimating the electrochemical behaviour of some 4-(azulen-1-yl)-2,6-divinylpyridine derivatives. *J Electrochem Sci Eng* **2025**, 15(1): 2374.
7. Sava C, Varvara Iluțiu DA, Mare R, Roman MD, Rada S, Pică EM, Jäntschi L. Physico-chemical characterization and possible uses of sludge processed from an urban sewage treatment plant. *Heliyon* **2024**, 10(8): e29576.
8. Jäntschi L. Triple crossed $3C_{26}$ cyclic cumulene catenane. *Fuller Nanotub Carbon Nanostruct* **2024**, 32(10): 962.
9. Stoenoiu CE, Putz MV, Jäntschi L. Is triple crossed C_{28} cyclic polyyne cluster a stable conformation? *Fuller Nanotub Carbon Nanostruct* **2024**, 32(1): 55.
10. Rada S, Gorea AB, Culea E. Graphite–Phosphate Composites: Structure and Voltammetric Investigations. *Materials* **2024**, 17: 5000.
11. Bolundut L, Pop L, Bosca M, Pascuta P, Stefan R, Culea E, Popa A. Influence of Sm_2O_3/AgNPs Addition on the Properties of Lithium-Borate Glass-Ceramic System. *Anal Lett* **2024**, 58(3): 364–373.
12. Stoenoiu CE, Jäntschi L. Least squares for generalized Gauss-Laplace distribution of the error in certain nonlinear regressions with perpendicular offsets. *Springer Proc Math Stat* **2024:** 446.
13. Jäntschi L. Nanoporous carbon, its pharmaceutical applications and metal organic frameworks. *J Incl Phenom Macrocycl Chem* **2023**, 103(7-8): 245-261.
14. 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
15. 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.
16. 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.
17. 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.
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.

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
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, 2010, http://patents.google.com/patent/RO122790B1
Fagadar-Cosma, E.; Vlascici, D.; Pică, E.M. Costişor, O.; Cosma, V.; Olenic, L. Bizerea, O. Senzor potenţiometric pe bază de ionofor porfirinic cu selectivitate înaltă pentru argint, 2012, http://patents.google.com/patent/RO123447B1
Bălan, M.C.; Jäntschi, L. Heating and cooling system for passive buildings based on heat and cold storage, 2014, http://patents.google.com/patent/GB2524551A

The offer addressed to the economic environment

Research & development	The development of methods for achievement of electrochemical sensors and some new sensors for 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
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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