

CORROSION AND ANTICORROSION PROTECTION CENTER

Contact details

Name	Corrosion and Anticorrosion Protection Centre
Acronym	CAPC
Logo	
Site	https://coroziune.utcluj.ro/
Address	103-105 Muncii Av., room G09C 400641, Cluj-Napoca, Romania
Faculty Department	Faculty of Materials and Environmental Engineering Environmental Engineering Department
Telephone	+40 264 401696
Fax	+40 264 415 054
Director	Prof. Dr. Hab. Eng. Horatiu Vermesan
e-mail	Horatiu.Vermesan@imadd.utcluj.ro



Areas of expertise

Surface engineering technologies for corrosion protection, including the development of surface layers that modify structural and/or chemical properties, and the deposition of anticorrosion coatings.
 Analysis and characterization of surface layers, including assessment of coating thickness, adhesion, gloss level, mechanical properties, and tribological behavior.
 Evaluation of corrosion resistance in artificial atmospheres in accordance with ISO 9227, ISO 10289, and ASTM B117 standards.
 Electrochemical methods for corrosion characterization using accelerated corrosion testing, including cyclic voltammetry, polarization resistance measurements, and electrochemical impedance spectroscopy (EIS).

Team

Prof. Dr. Eng. Horațiu VERMEȘAN, Assoc Prof. Ancuta TIUC, Assoc Prof. Timea GABOR, Assoc Prof. Ioana SUR, PhD Denisa CUIBUS, PhD Carmen Teodora (Florea) POPA
 PhD student Maria ȘERBAN, PhD student Delia-Niculina PISCOIU, PhD student: Claudia CRIȘAN.

Representative projects

TheTRADE-IT: Innovative Technologies For Advanced Materials Recovery from IT and Telecommunication Waste PN-III-P1-1.2-PCCDI-2017-0652, project NR. 84PCCDI - 01/03/2018 TRADE-IT.
Establishing the correlation between bath conductivity and the amount of phosphates accumulated at lubrication, project code C.I.1.1.T.2, 2016, financed by TUCN
ZINITECH: "Innovative technology for production of zinc-nickel alloy layers with anticorrosive properties by co-deposition of composite nano-particles", INNOVATION Project 261/20.10.2008
"Thermal shock behaviour of functional gradient layers deposit on austenitic stainless steels", Grant 944/2005;
"Obtaining, characterization and modelling of thin layers with specific properties" Contract 33385 tema A67, code CNCIS 404
"Theoretical and experimental research concerning the tribo-corrosion of diffusion layers obtained by surface engineering technologies", 66-1353-2001.
"The amelioration of wear and corrosion resistance by plastic deformation and plasma nitriding surface hardening" Project 7067-B4.
"Research concerning the influence of oxygen on the structure and properties of nitrided and nitrocarburized layers" Project AT, 3/225 2001
"Nano-crystalline electro-deposits - their processing, character and properties"

Significant results

The most representative publications of the past 5 years:

1. "Crisan, CA; Vermesan, H; Stefan-Sicoe, A; Zdrob, N, Using Organic Substances as Green Corrosion Inhibitors for Carbon Steel in HCl Solution, APPLIED SCIENCES-BASEL, eISSN:2076-3417, Volume:15, Issue:18, Art nr:9983, 2025, DOI:10.3390/app15189983, WOS:001579550200001"
2. Chira, M; Lazarescu, AV; Hegyi, A; Vermesan, H; Csapai, A; Ionescu, BA; Toader, TP; Florean, C, Influence of Alkaline Activator Properties on Corrosion Mechanisms and Durability of Steel Reinforcement in Geopolymer Binders COATINGS, ISSN:2079-6412, Volume:15, Issue:6, Art nr:734, 2025 DOI:10.3390/coatings15060734, WOS:001514746400001
3. Piscoiu, DN; Rada, S; Vermesan, H, Enhancing Electrochemical Properties of Vitreous Materials Based on CaO-Fe₂O₃-Fe-Pb and Recycled from Anodic Plate of a Spent Car Battery, MATERIALS, eISSN:1996-1944, Volume:18, Issue:9, Art nr:2017, 2025, DOI:10.3390/ma18092017, WOS:001486385100001"
4. Piscoiu, DN; Rada, S; Macavei, S; Popa, A; Crisan, CA; Vermesan, H; Culea, E, The Effect of Calcium and Iron (III) Oxides on Lead Spent Plates: Spectroscopic, Voltametric, and EIS Investigations, Materials, 2024, DOI10.3390/ma17174229.
5. Florean, CT; Chira, M; Vermesan, H; Gabor, T; Hegyi, A; Crisan, CA; Campian, C., The Influence of Using Recycled Waste Aggregates and Adding TiO₂ Nanoparticles on the Corrosion Resistance of Steel Reinforcement Embedded in Cementitious Composite, Materials, 2024, DOI10.3390/ma17163895.
6. Florean, CT; Csapai, A; Vermesan, H; Gabor, T; Hegyi, A; Stoian, V; Uriciuc, WA; Petcu, C; Cîmpan, M., Influence of the Addition of TiO₂ Nanoparticles on the Self-Cleaning Capacity of Cementitious Composites., Materials 2024, DOI10.3390/ma17133098.
7. Florean, CT; Vermesan, H; Gabor, T; Neamtu, BV; Thalmaier, G; Hegyi, A; Csapai, A; Lazarescu, AV., Influence of TiO₂ Nanoparticles on the Physical, Mechanical, and Structural Characteristics of Cementitious Composites with Recycled Aggregates, Materials, DOI10.3390/ma17092014.
8. Florean, CT; Vermesan, H; Thalmaier, G; Neamtu, BV; Gabor, T; Campian, C; Hegyi, A; Csapai, A., Coatings, 2024, DOI10.3390/coatings14020218.
9. Florean, C; Vermesan, H; Gabor, T; Neamtu, BV; Thalmayer, G; Corbu, O; Lazarescu, AV; Hegyi, A; Csapai, A., Possibilities for Conserving Natural Resources and the Environment through the Use of Recycled Waste Aggregates as a Substitute for Natural Aggregates in Cementitious Composites, International Journal of Conservation Science, 2024, DOI10.36868/IJCS.2024.01.10.
10. Rada, R; Vermesan, H; Rada, S; Leostean, C; Manea, DL; Culea, E (Culea, Eugen)., Development of Iron-Silicate Composites by Waste Glass and Iron or Steel Powders, Molecules, 2024, DOI10.3390/molecules28176296.
11. Rada, R; Vermesan, H; Rada, S; Leostean, C; Manea, DL; Culea, E., Development of Iron-Silicate Composites by Waste Glass and Iron or Steel Powders, Molecules, 2023, 28, 17. DOI 10.3390/molecules28176296
12. Crisan, CA; Timis, EC; Vermesan, H. PickT: A Decision-Making Tool for the Optimal Pickling Process Operation, Materials, 2023, 16,16. DOI 10.3390/ma16165567
13. Hegyi, A; Lazarescu, AV; Ciobanu, AA; Ionescu, BA; Grebenisan, E; Chira, M; Florean, C; Vermesan, H; Stoian, V. Study on the Possibilities of Developing Cementitious or Geopolymer Composite Materials with Specific Performances by Exploiting the Photocatalytic Properties of TiO₂ Nanoparticles, Materials, 2023, 16, 10, DOI 10.3390/ma16103741
14. Cuibus, D; Rada, S; Macavei, S; Vermesan, H. Natrium Diacid Phosphate-Manganese-Lead Vitroceramics Obtained from Spent Electrodes, Materials, 2023, 16, 5, DOI 10.3390/ma16052018.
15. Ionescu, B.A.; Chira, M.; Vermeşan, H.; Hegyi, A.; Lăzărescu, A.-V.; Thalmaier, G.; Neamtu, B.V.; Gabor, T.; Sur, I.M. Influence of Fe₂O₃, MgO and Molarity of NaOH Solution on the Mechanical Properties of Fly Ash-Based Geopolymers. Materials 2022, 15, 6965. <https://doi.org/10.3390/ma15196965>
16. Tiuc, A.-E.; Borlea (Mureşan), S.I.; Nemeşan, O.; Vermeşan, H.; Vasile, O.; Popa, F.; Pinţoi, R. New Composite Materials Made from Rigid/Flexible Polyurethane Foams with Fir Sawdust: Acoustic and Thermal Behavior. Polymers 2022, 14, 3643. <https://doi.org/10.3390/polym14173643>
17. Uriciuc, W.A.; Boşca, A.B.; Băbţan, A.-M.; Vermeşan, H.; Cristea, C.; Tertiş, M.; Păşcuţă, P.; Borodi, G.; Suciu, M.; Barbu-Tudoran, L.; Popa, C.O.; Ilea, A. Study on the Surface of Cobalt-Chromium Dental Alloys and Their Behavior in Oral Cavity as Cast Materials. Materials 2022, 15, 3052. <https://doi.org/10.3390/ma15093052>
18. Hegyi, A.; Vermeşan, H.; Lăzărescu, A.-V.; Petcu, C.; Bulacu, C. Thermal Insulation Mattresses Based on Textile Waste and Recycled Plastic Waste Fibres, Integrating Natural Fibres of Vegetable or Animal Origin. Materials 2022, 15, 1348. <https://doi.org/10.3390/ma15041348>.
19. Mangău, A.; Vermeşan, H.; Pădureţu, S.; Hegyi, A. An Incursion into Actuality: Addressing the Precautionary Principle in the Context of the Circular Economy. Sustainability 2022, 14, 10090. <https://doi.org/10.3390/su141610090>
20. Uriciuc, W.A.; Vermesan, H.; Tiuc, A.E.; Ilea, A.; Bosca, A.B.; Popa, C.O., Casting over Metal Method Used in Manufacturing Hybrid Cobalt-Chromium Dental Prosthetic Frameworks Assemblies, MATERIALS, Volume: 14, Issue: 3, 539, DOI:10.3390/ma14030539, Published: 2021, WOS: 000615381900001;
21. Neamtu, BV; Pszola, M ; Vermesan, H ; Stoian, G; Grigoras, M; Oprisa, A ; Cotojman, L ; Marinca, TF; Lupu, N ; Chincinas, I, Preparation and characterisation of Fe/Fe₃O₄ fibres based soft magnetic composites, CERAMICS INTERNATIONAL Volume: 47 Issue: 1 Pages: 581-589 DOI: 10.1016/j.ceramint.2020.08.165 Published: 2021, WOS:000589639400002
22. Vermeşan H., Mangau, A., Tiuc A.-E. Perspectives of Circular Economy in Romanian Space, SUSTAINABILITY, Volume: 12, Issue: 1, Article Number: 74, DOI: 10.3390/su12176819, Published: 2020, WOS:000569589800001

Significant solutions:

Assessment of the corrosive impact of various natural atmospheric environments. Development of anticorrosive protection strategies for materials exposed to aggressive climatic conditions, including urban, industrial, marine, and mining environments. Evaluation of galvanic (contact) corrosion between dissimilar metals. Accelerated corrosion testing of protective paint coatings. Investigation of the microstructural and performance properties of protective coatings, including thickness measurement, impact resistance, adhesion (cross-cut and pull-off methods), formability, elasticity, relative hardness, and abrasion resistance. Enhancement of the corrosion resistance of hot-dip galvanized coatings. Selection of appropriate paint systems for the effective protection of galvanized steel structures.

Products and technologies:

1. Technology for obtaining anti-corrosion layers by composite nano-particles codeposition
2. Technology for obtaining of zinc-nickel alloy layers with anticorrosive properties by co-deposition of composite nano-particles
3. Surface engineering technologies for improving wear resistance of austenitic stainless steels.
4. Nano-crystalline electro-deposits with high anticorrosion properties.
5. Diffusion layers obtained by surface engineering technologies for tribocorrosion applications.

The offer addressed to the economic environment

Research & development	Development of original solutions for protection against corrosion in various environments Security of social infrastructure and security of long service life coated steel sheet Study the fundamental characteristics of corrosion behavior and utilize this knowledge to develop new technologies and processes to help solve challenging problems and issues. Partner with industry and continue to foster relationships to tackle pressing corrosion and surface related demands affecting our society.
Consulting	Choosing Surface Engineering technologies for corrosion protection purposes. Research on corrosion behavior of metallic deposits. Study of new layers with anticorrosive properties.
Training	Training courses for engineers in the field of corrosion and corrosion protection. The best available techniques in corrosion protection technologies. Training courses in electrochemical deposition of metals and alloys.

Last update in January 2026