CORROSION AND ANTICORROSION PROTECTION CENTER

Contact details

Name	**Corrosion and Anticorrosion Protection Centre**
Acronym	**CAPC**
Logo	
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Areas of expertise

Surface Engineering technologies for corrosion protection. Layers that alter the structure and / or chemical composition and deposition of anticorrosion coatings.
Analysis and characterization of surface layers. Characterization of deposit thickness, adhesion, degree of gloss, mechanical properties, tribological properties.
Evaluation of corrosion resistance in artificial atmosphere according to ISO 9227, ISO 10289 and ASTM B117. Electrochemical methods for the characterization of corrosion through accelerated corrosion tests. Cyclic voltammetry, polarization resistance, impedance spectroscopy

Team

Prof. Dr. Eng. Horațiu VERMEȘAN, Assoc Prof. Ancuta TIUC, PhD Denisa CUIBUS
PhD student Delia-Niculina Piscoiu, PhD student: Claudia CRIȘAN, PhD student Carmen Teodora (Florean) Popa,

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 CNCSIS 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"
EC Research Project, NEPCAP, Contract No G1ST-CT-2002-50211;

Significant results

The most representative publications of the past 5 years:

1. 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
2. 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
3. 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
4. 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.
5. Ionescu, B.A.; Chira, M.; Vermeșan, H.; Hegyi, A.; Lăzărescu, A.-V.; Thalmaier, G.; Neamțu, 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
6. Tiuc, A.-E.; Borlea (Mureșan), S.I.; Nemeș, O.; Vermeșan, H.; Vasile, O.; Popa, F.; Pințoi, 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
7. Uriciuc, W.A.; Bosca, A.B.; Băbțan, A.-M.; Vermeșan, H.; Cristea, C.; Tertiș, M.; Păscuță, 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
8. Hegyi, A.; Vermeșan, 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.
9. Mangău, A.; Vermeșan, H.; Pădurețu, 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
10. 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 Assembles, MATERIALS, Volume: 14, Issue: 3, 539, DOI:10.3390/ma14030539, Published: 2021, WOS: 000615381900001;
11. Neamtu, BV; Pszola, M ; Vermesan, H ; Stoian, G; Grigoras, M; Oprisa, A ; Cotojman, L ; Marinca, TF; Lupu, N ; Chicinas, 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
12. Vermeșan 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:

Estimation of corrosive action of different natural atmospheric environments. Anticorrosive protection of materials in different aggressive climatic conditions: urban, industry, marine, mining etc. Testing of galvanic (contact) corrosion of different metals. Accelerated corrosion testing of protective paint coatings. Investigation of the micro-structural properties of protective coatings: thickness, impact tests, adherence (cross-cut and pull off methods), drawability, elasticity, relative hardness and abrasion. Improving corrosion resistance of hot-dip galvanized coatings. Choice of paints for 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 behaviour and utilise 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 the Surface Engineering technologies for corrosion protection purposes. Research on corrosion behaviour 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.

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