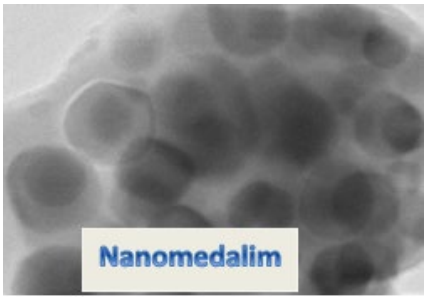
NANOMATERIALS AND APPLICATIONS IN ENVIRONMENTAL AND FOOD ANALYSIS

Contact details

Name	**Nanomaterials and application in environmental and food analysis**
Acronym	**Nanomedalim**
Logo	
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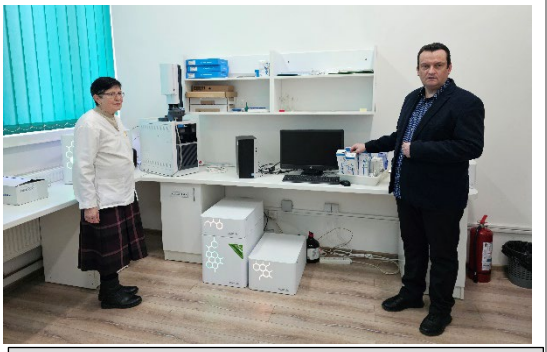
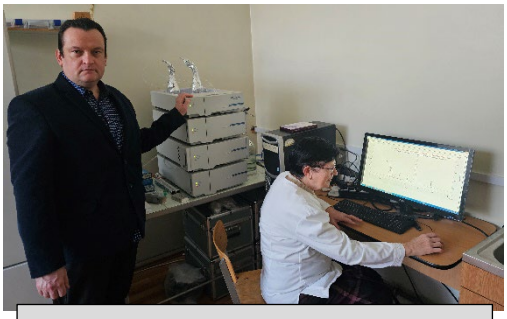


Gas chromatograph G3950A INTUVO. Agilent 2019



Liquid chromatograph HPLC YL 9100, 2016

Areas of expertise

Synthesis and characterisation of nanoparticles embedded in silica, polyvinilalcool and PVA-SiO_2 matrix
- Synthesis of MFe_2O_4, $M^1_xM^2_{1-x}Fe_2O_4$ and $M^1_xM^2_{1-x-y}M^3_yFe_2O_4$ (M, M^1, M^2, M^3 = Ag^+, Na^+, Co^{2+}, Mn^{2+}, Zn^{2+}, Cu^{2+}, Ni^{2+}, Cd^{2+}, Ca^{2+}, La^{3+}, Bi^{3+}, Cr^{3+}) oxidic system nanoparticles nonembedded and embedded in silica, PVA and PVA-SiO_2
- Structural (TG-DTG-DTA-MS, XRD, FT-IR, Mossbauer, BET, porosity), morphological (TEM; SEM, AFM) and magnetic (VSM, M_s, M_r, H_c, K) characterization of ferrite-based nanocomposites.
- Photocatalytic and coloristic applications of ferritic nanomaterials embedded in silica matrices.

Environmental chemistry. Mathematical modelling of environmental data;
- Analysis of physico-chemical parameters of water; assessment of the water quality in water reservoirs, lakes, groundwater, glacial lakes and drinking water supply network, assessment of the impact of anthropogenic activities on water quality parameters, chemical modelling of groundwater quality in the aquifer; heavy metal pollution index, human health risk assessment; water quality index; mathematical modelling of environmental data; drawing the pollution map.
- Transfer of pollution from water to fish, and evaluation of metal content in fish tissues

Physico-chemical and sensory characterization of food
- Assesment of hydrolysis and oxidation processes in animal fats; monitoring of chemical parameters during storage
- Increasing the oxidative stability of alimentary fat by the addition of antioxidants;
- Analysis of Volatile Compounds, Fatty Acid Composition, Metals and Thermal Behaviour of solids foods (spices, milk powder, tea, coffee, cocoa powder);
- Chromatographic analysis of food components and environmental pollutants by HPLC and gas chromatography.

Team

Prof. dr. habil. Thomas Dippong, Assoc. prof. dr. Cristina Mihali, Lecturer dr. Claudia Butean, Lecturer dr. Flavia Pop, Lecturer dr. Zorica Vosgan, PhD. student Raul Reiz, PhD student Andrada Pop (Szmical), PhD student Ovidiu Nasca, PhD student Buda Anamaria

Representative projects

CLAMROUA, "Clean Air Management in the Romania - Ukraine Transboundary Area", European Union, Hungary-Slovakia-Romania-Ukraine, ENPI- Cross-border Cooperation Program project, http://www.territorialcooperation.eu/frontpage/show/20419 (2013-2015)
POIM project 118881- Participatory management of the Natura 2000 sites Pricop-Huta-Certeze, Tisa Superior and of the protected natural area Ronișoara Forest. 2020-2022, https://www.heidenroslein.ro/arhive/1446

Infrastructure
Gas chromatograph INTUVO, Agilent 2019
HPLC YL INSTRUMENT 9100, produced in 2016
Spectrophotometer Perkin Elmer, produced 2014
WTW pH-meter, produced 2014

Last updated: January 2026

Significant results

The most representative publications of the past 5 years:

1. **T. Dippong**, M.A.Resz, C. Tănăselia, O. Cadar. Assessing microbiological and heavy metal pollution in surface waters associated with potential human health risk assessment at fish ingestion exposure. *Journal of Hazardous Materials*. 476 (2024) 135187, ***FI – 12.2 (Q1).***
2. **T. Dippong, C. Mihali**, M. Marian, O.M. Rosca, M.A. Resz, Correlations between chemical, hydrological and biotic factors in rivers from the protected area of Tisa Superioara, Romania. *Process Safety and Environmental Protection* 176 (2023) 40-55. ***FI – 7.8 (Q1).***
3. **T. Dippong**, M. Senila, O. Cadar, M.A. Resz, Assessment of the heavy metal pollution degree and potential health risk implications in lakes and fish from northern Romania. *Journal of Environmental Chemical Engineering*, 12:2, 112217 (2024) 112217. ***FI – 7.7 (Q1).***
4. **T. Dippong**, M.A. Resz, Water and sediments pollution from Iza river (Romania): Influence on water quality and metals content. *Process Safety and Environmental Protection* 200 (2025) 107335. **FI – 7.8 (Q1).**
5. **T Dippong**, I. Török, C Tănășelia, M.A. Resz, Impact of water and sediment pollution in Valea Viseului river, Romania. *Process Safety and Environmental Protection* (2025) 106796. **FI – 7.8 (Q1)**.
6. **T. Dippong**, I. Török, C. Tănășelia, M.A. Resz, Impact of water and sediment pollution in Valea Viseului river, Romania. *Process Safety and Environmental Protection* 195 (2025) 106796. **FI – 7.8 (Q1).**
7. **T. Dippong**, M.A. Hoaghia, M. Senila Appraisal of heavy metal pollution in alluvial aquifers. Study case on the protected area of Ronișoara Forest, Romania. *Ecological Indicators*, 143 (2022) 109347, ***FI – 7.4 (Q1).***
8. **T. Dippong**, I.G. Deac, M.D,Lazar, I. Petean, E.A. Levei, G. Borodi, O. Cadar, Effect of heat-treatment temperature and zinc addition on magnetostructural and surface properties of manganese nanoferrite prepared by an ecofriendly sol–gel synthesis, *Journal of Materials Research and Technology*. 15 (2021) 6528-6540, ***FI – 6.5 (Q1).***
9. **T. Dippong**, I.Petean, I.G.Deac, A.E. Levei, O. Cadar. Influence of heat treatment and formulation on the structure, morphology, thermal and magnetic properties of $CoBi_{\phi}Fe_{2-\phi}O_4/SiO_2$ nanocomposites. *Journal of Alloys and Compounds* 1028 (2025) 180703. FI – 6.3, ***FI – 6.3 (Q1).***
10. **T. Dippong**, D. Toloman, M. Dan, E.A. Levei, O Cadar, Structural, morphological and photocatalytic properties of Ni-Mn ferrites: Influence of the Ni:Mn ratio, *Journal of Alloys and Compounds* 913 (2022), 165129, ***FI – 6.3 (Q1).***
11. **T. Dippong**, O. Cadar, I.G. Deac, I. Petean, E.A. Levei, D. Simedru, Influence of La^{3+} substitution on the structure, morphology and magnetic properties of $CoLa_xFe_{2-x}O_4@SiO_2$ nanocomposites. *J Alloys and Compounds.* 976 (2024) 172998. ***FI = 6.3 (Q1)***
12. **T Dippong**, E.A. Levei, O. Cadar, Correlation between structure, morphology and magnetic properties in $Zn_xCo_{0.8-x}Ni_{0.2}Fe_2O_4@SiO_2$ (0.1÷0.7) nanocomposites. *Journal of Alloys and Compounds*. 24 (2023) 330. ***FI=6.3 (Q1)***
13. **T. Dippong**, I. Petean, I.G. Deac, E.A. Levei, O. Cadar, Effect of Ca^{2+} doping and annealing temperature on the structure, morphology and magnetic behavior of $Ca_xCo_{1-x}Fe_2O_4/SiO_2$ nanocomposites. *Results in Physics* 56 (2024) 107306. ***FI=5.3 (Q1)***
14. **T. Dippong**, R.A. Mereu, Effect of La^{3+} on thermal, structural and morphological properties of Zn–Co ferrite spinel-based pigments. *Ceramics International* 50:7 (2024) 10314-10324, ***FI – 5.2 (Q1).***
15. **T. Dippong,** L.E. Muresan, L. Senila, Comparison of the Thermal Behavior and Chemical Composition of Milk Powders of Animal and Plant Origin. Foods. 14:3 (2025) 389. ***FI – 5.1 (Q1).***
16. **F. Pop, T. Dippong**, The Antioxidant Effect of Burdock Extract on the Oxidative Stability of Lard and Goose Fat during Heat Treatment., *Foods* 13 (2) (2024) 304. ***FI – 5.1 (Q1).***
17. **T. Dippong,** M.A. Resz, Chemical Assessment of Drinking Water Quality and Associated Human Health Risk of Heavy Metals in Gutai Mountains, Romania. *Toxics.* 12:3 (2024) 168 ***FI - 4.6 (Q1)***
18. **T. Dippong**, I.G. Deac, I. Petean, E.A. Levei, O. Cadar, Evolution of morphology, structure and magnetic behavior of $Cd_xZn_{1-x}Fe_2O_4@SiO_2$ nanocomposites with Cd^{2+} content and heat treatment. *Optical Materials* 162 (2025) 116936, **FI – 4.2** ***(Q1).***
19. **F. Pop**, C.A.Semeniuc, M. Dan, **T. Dippong**, Impact of different processing methods and thermal behaviour on quality characteristics of soybean and sesame oils. *J Therm Anal Calorim* 149 (2024) 1403–1417, ***FI – 4.4 (Q1).***
20. **T. Dippong**, A.M. Savolszki-Madaras, **R.M. Reiz**, I. Petean, O. Cadar. Thermal, Structural, and Morphological Analysis of $ZnFe_2O_4$ Embedded and Non-Embedded in a SiO_2 Matrix for Magnetic and Photocatalytic Applications. Nanomaterials, 15 (2025) 1644. ***FI – 4.3 (Q1).***
21. **O. Nasca Ovidiu, T. Dippong,** M.A. Resz, M. Marian, Interdisciplinary Evaluation of the Săpânta River and Groundwater Quality: Linking Hydrological Data and Vegetative Bioindicators. Water, 17:13 (2025) 1975, **FI– 3.0** ***(Q2).***

Products and technologies:

1. Obtaining of $M^1_xM^2_{1-x}M^3_{2-y}Fe_2O_4$ (M^1,M^2= Ag^+,Na^+,Co^{2+},Mn^{2+},Zn^{2+},Cu^{2+},Ni^{2+},Cd^{2+},Ca^{2+}; M^3 =La^{3+},Bi^{3+},Cr^{3+}) oxide system nanoparticles embedded in SiO_2 matrix with structural, morphological, magnetic, coloristic and photocatalytic activities.
2. Studies on the impact of anthropogenic activities on water quality parameters, chemical modelling of groundwater quality in the aquifer. Method of determination of the metal transfer from water to fish and sediment.
3. The use of CG-MS, CG-FID and HPLC techniques in the analysis of chemical compounds in food
4. Analysis of caffeine and methylxanthine derivatives in food, beverages and pharmaceutical products.
5. Thermal behaviour and metal composition of solid foods.
6. Chemical composition of volatile compounds and fatty acids in spices
7. The effect of antioxidant character on food quality

The offer addressed to the economic environment	Depollution solution using nanotechnology Determination of soil characteristics related to the transfer process of the pollutant elements from water to fish, sediments, plants; Quantifying the impact of microelements in soil on the plants grown in areas with historical anthropogenic pollution and comparison with unpolluted reference areas;
Consulting	Modelling the traceability of microelements on the food chain soil-plant-food-human. Human health risk assessment in areas polluted with microelements.
Training	Training on the nanoparticles synthesis and their application in environment and food analysis, Training on the negative effects of microelements on human health. Training on CG and HPLC.

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