### Contact details

<table>
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<tr>
<th>Name</th>
<th>Nanomaterials and application in environmental and food analysis</th>
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### Areas of expertise

**Environmental chemistry**
- Assessment of the degree of soil pollution due to microelements content, determination of microelements in plants; assessment of the health risk associated with the consumption of plants (vegetables and fruit) cultivated on polluted areas;
- Mathematical modelling of environmental data;
  - transfer of microelements from soil to plant, study of the influence of ionic exchange processes on microelements transfer in the soil-plant system;
  - analysis of soil characteristics (pH, conductivity, ionic exchange capacity);
  - analysis of water quality characteristics;
  - QSAR/QSAR studies;

**Air quality analysis and monitoring**
- Analysis of air pollutant and their spatial and temporal distribution;
- Analysis of wet air deposition.

**Synthesis and characterisation of nanoparticles embedded in silica matrix**
- Synthesis of the nanocomposite system CoₓFeₓOᵧ/SiO₂;
- analysis and interpretation of the thermogravimetric curves (TG), of the derivative thermogravimetric curves (DTG), differential thermogravimetric analysis;
- the analysis and interpretation of diffractograms;
- plotting and interpretation of FT-IR and Mossbauer spectra;
- interpretation of electron microscopy SEM and TEM + EDX;
- the study of the distribution of CoFe₂O₄ nanoparticles;
- interpretation of the BET absorption isotherms;
- tracing and interpretation of magnetic hysteresis curves.

**Monitoring of drinking water quality**
- Monitoring of water quality in the municipal distribution network;
  - analysis of physico-chemical parameters of water and the interpretation of their trend;
  - assessment and monitoring of the water quality in water reservoirs and lakes;
  - spectrometric analysis by molecular absorption spectrometry and by atomic absorption spectrometry;
  - cluster analysis of data;
  - mathematical modelling of environmental data;
-Drawing the map of the heavy metal distribution in the water reservoirs.

**Analysis of physic-chemical and sensory parameters of food**
- Assessment of physico-chemical parameters of wines;
- Comparative sensory assessment of wines assortments;
- Chromatographic analysis of food components by HPLC and thin layer chromatography.

**Physico-chemical and sensory characterization of food**
- Assessment 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

**Team**
Assoc. prof. dr. Cristina Mihali; Assoc. prof. dr. Zoita Marioara Berinde; Lecturer dr. eng. Claudia Butean; Assoc. prof. dr. eng. Thomas Dippong; Lecturer dr. eng. Flavia Pop

**Representative projects**


**Significant results**

**The most representative publications of the past 5 years:**

1. C. Mihali, G. Oprea, A. Michnea, S.G. Jelea, M. Jelea, C. Man, M. Šenilă, L. Grigor, „Assessment of heavy metals content and pollution level in soil and plants in Baia Mare area, NW Romania”, in Carpathian Journal of Earth and Environmental Sciences, vol. 8, no. 2, 2013, pp. 143-152


18. T. Dippong, C. Mihali, F. Goga, G. Ardelean, Mathematical modeling of the variation in water quality along the network of water supply of Satu Mare municipality, Studia Universitatis Babes-Bolyai Chimia, 61:3 (2016) 251-262

19. T. Dippong, C. Mihali, G. Ardelean, Seasonal variation of fizico-chemical parameters in the drinking water supply network of Satu Mare city, NW Romania, Environmental Engineering and Management Journal, accepted.


30. Pop Flavia, Giurgiulescu Liviu, Dumuța Anca, Voșgan Zorica, Assessment of lipolytic and oxidative changes in fish oil stored under refrigeration and freezing, Revista de Chimie, 2013, 64(11), 1372-1376.


Products and technologies:

1. Obtaining of CoFe$_2$O$_4$ magnetic nanoparticles embedded in silica matrix
2. Method of determination of the microelements transfer factors from soil to plant
3. Method of assessment the risk on the health consumers due to the consumption of vegetables grown on contaminated areas with microelements
4. Data base on soil and plant microelement content on some anthropic polluted areas in Baia Mare zone and in a reference area without pollution sources.

The offer addressed to the economic environment

Research & development

Determination of soil characteristics related to the transfer process of the pollutant elements from soil to plants: pH, hydrolytic acidity, cationic exchange capacity, organic matter content (humus), total nitrogen content, mobile phosphorus and potassium, granulometric analysis of soil and clay content.

Studies on the historical and actual pollution sources with different microelements

Quantifying the impact of microelements in soil on the plants grown in areas with historical anthropogenic pollution and comparison with unpolluted reference areas

Studies on air pollution sources.

Develop the “Action Plan for Good Air Quality Maintenance in Maramures County”

Consulting

Modeling the transfer factors soil-plant and the traceability of microelements on the food chain soil-plant-food-human.

Human health risk assessment due to the consumption of vegetables and fruit grown in areas polluted with microelements.

Training

Training the students and high school students from Baia Mare and surroundings rural on the negative effects of microelements on soil, living organisms and human health, measures of minimizing the risk to the health.

Training on the nanoparticles synthesis and their application in environment and food analysis.