



PARTNER PRESENTATION AND INTEREST IN HORIZON EUROPE PARTICIPATION

Name of the organisation	NATIONAL INSTITUTE FOR RESEARCH AND DEVELOPMENT OF ISOTOPIC AND MOLECULAR TECHNOLOGIES - ITIM
Country	Romania
Type of organisation	NATIONAL INSTITUTE FOR RESEARCH AND DEVELOPMENT
Short description	With more than 70 years of tradition in research, ITIM is nowadays involved in a wide area of micro- and nanotechnology. The main focus of our developments is on carbon structures, nano/micro-porous materials, magnetic micro/nanogels, thin films, micro/nano-patterned surfaces, magnetic / semiconducting nanoparticles and clusters, novel polymers / copolymers and micro/nanocomposites based on them, or hybrid nanosystems built on such platforms. The envisaged major practical applicability domains are: environment protection / depollution, health – including nanomedicine, energy and combating climate changes, nanoelectronics, safety and security, information and communication technology, agriculture.
Laboratory/ Faculty Department	Research team: “Multifunctional materials and biologically active compounds”
Contact person	Dr. Rodica Turcu
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Short description of Laboratory/ Faculty Department involved

The research team “**Multifunctional materials and biologically active compounds**” has expertise in advanced materials and develops research related to the synthesis, characterization and applications of functionalized hybrid nanostructures, polymers and bioactive compounds with controlled properties <http://ro.itim-cj.ro/materiale-multifunctionale-si-compusi-biologic-activi/>

Research topics:

- Functionalized hybrid nanostructures based on magnetic nanoparticles and organic compounds;
- Smart magnetic micro / nanogels for applications in biotechnology and nanomedicine;
- Magnetic nanoparticles and magnetic clusters with controlled properties for applications in magnetic separation, depollution, nanomedicine and security;
- New polymers/copolymers with special properties for applications in the electronic industry, food industry, agriculture, pharmaceutical industry and medicine;
- New highly stretchable, lightweight, multifunctional polymer composite for application in electronics packaging and automotive industry;
- Complex characterization of multifunctional materials: nanostructure-properties correlation, properties changes in response to external stimuli, specific interactions with biomolecules and

certain drugs, recyclability (X-ray photoelectron spectroscopy (XPS), FTIR spectroscopy, EELS spectroscopy); determination of the position on an absolute scale (with respect to the vacuum) of the valence and conduction bands using XPS, UPS and UV-vis methods on semiconductor nanoparticles;

- Synthesis of nanomaterials with controlled properties, using environmentally friendly reagents;
- Magnetic nanoparticles and carbon structures modified with metal oxides - synthesis and characterization. Applications in depollution and medicine;
- Extraction and characterization of bioactive compounds from plants;
- Improving the quality of cosmetic products using natural plant extracts with antioxidant and photoprotective properties;
- Applications of nanomaterials and bioactive compounds for environment's decontamination and in agriculture;
- Applications of chromatographic (HPLC, TLC) and spectrophotometric (UV-Vis) methods in analyzing pollutants in the environment and determining the quality of medicines, the quality of food, the purity of synthesized organic and organometallic compounds;
- Determining the influence of stress factors on plant development and bioactive compounds in plants.

Involved persons. Short CV

Dr. Rodica Turcu graduated the Faculty of Physics, University of Bucharest, Romania and received the PhD in Physics in 1997. Since 1983 she is working at the National Institute for Research and Development of Isotopic and Molecular Technology, Cluj-Napoca, where she founded a research group working in the field of conducting polymers and hybrid nanostructures based on polymers and magnetic nanoparticles. She is senior scientist degree I and she is the leader of the research team "Multifunctional materials and biologically active compounds".

She has important scientific results in the field of multifunctional nanostructured composites, especially based on magnetic nanoparticles and polymers, magnetic nano/microgels, magnetic clusters, surface physics and chemistry of magnetic nanoparticles, nanomagnetism, conducting polymers. She has expertise in materials characterization by XPS, FTIR spectroscopy, microscopy TEM-SEM, DLS, magnetic measurements (VSM, SQUID). Dr. Rodica Turcu has experience as responsible/coordinator of many multi-annual national research projects and also as the Romanian coordinator of international projects: 2 bilateral projects with France –Institute of Materials Jean Rouxel Nantes, 1 project FP6-NMP- NoE 2004-2008 No. 500361-2 NANOFUNPOLY, 1 project FP7-NMP-Large 2009-2013 No. 229335 MAGPRO²LIFE and COST Action TD1402 "Multifunctional Nanoparticles for Magnetic Hyperthermia and Indirect Radiation Therapy" RADIOMAG (2014-2018).

Dr. Alexandrina Nan has achieved Bachelor, Master and PhD thesis in the field of organic synthesis, characterization and stereochemistry of heterocyclic compounds at the Faculty of Chemistry and Chemical Engineering, Babes-Bolyai University, Cluj-Napoca. She was developing new saturated 6-membered heterocycles with two heteroatoms (1,3-dioxanes, 1,3-oxathianes and 1,3-oxazines) were obtained. For the first time, she could demonstrate that NMR-spectroscopy and mass spectrometry can be used to determine the tautomeric compensation and even the conformation of these tautomers. After obtaining the PhD title in 2005 she moved to a totally different field of research at the National Institute for Research and Development of Isotopic and Molecular Technology, Cluj-Napoca, in the well-known group of Dr. Rodica Turcu "Multifunctional materials and biologically active compounds", a research group working in the field of magnetic nanoparticles, polymers and hybrid nanostructures based on polymers and magnetic nanoparticles.

An important research topic was the preparation of new nanostructured recyclable magnetic organocatalysts. This issue is challenging and innovative because of its promising application in the chemical and pharmaceutical industry to lower costs, reduce wastes, toxic hazards, and energy consumption. An important task was also to develop new polymers based on renewable

resources as basic starting monomers. Based on these polymers, she also got experience in preparing and characterization of new polymer composites. She has expertise also in polymers and polymer composites characterization using NMR, FTIR spectroscopy, mass spectrometry, thermal conductivity and thermogravimetry analysis. Dr. Alexandrina Nan has experience as a Principal Investigator of many multi-annual national research projects.

Dr. Habil. Maria – Loredana Soran graduated the “Babeş-Bolyai” University, Cluj-Napoca, Faculty of Chemistry and Chemical Engineering, Romania, received the PhD in Chemistry in 2005 and habilitation in Environmental Engineering in 2018. In the period 2000 – 2004 she worked at “Raluca Ripan” Institute for Research in Chemistry, Cluj-Napoca. Since 2004 she is working at the National Institute for Research and Development of Isotopic and Molecular Technology, Cluj-Napoca and she is senior scientist degree I.

She has expertise on nanoparticles’ synthesis and hybrid systems with controlled structure and properties; synthesis of nanomaterials using environmentally friendly raw materials; synthesis and testing of catalysts for biofuel obtaining and photodegradation, water decontamination using different systems of nanoparticles and carbon structures, separation and determination of various compounds by chromatographic techniques; extraction techniques; extraction of bioactive compounds from plants by classical and modern methods; influence of stress factors on plants.

Dr. Soran has important scientific results in the synthesis and characterization of the composites based on magnetic nanoparticles and carbon structures for water decontamination and in the influence of abiotic stress on plants. She has experience as responsible/coordinator of national research projects and also as partner in EEA Grants, 3499/20.05.2015, “Methodological guide for monitoring antibiotic residues and antimicrobial resistance in the environment as a supporting instrument for an enhanced quality management of surface waters and groundwater” (2015 – 2016).

Dr. Izabell Craciunescu obtained PhD degree in chemistry in 2011 at Babes-Bolyai University, Cluj-Napoca, the title of the thesis was “COMPOSITE ELECTRODE MATERIALS BASED ON CONDUCTING POLYMERS”. In parallel with the activities carried out in the PhD thesis, she built her experience in the field of magnetic polymer and polymeric composites where have a work experience of 21 years, by effective involvement in the research activity on 16 national research projects (as a participant), 3 research grants (as principal investigator), 4 international research projects. As a result of scientific research she participated as co-author of two book chapters, two patents and 35 scientific papers, Hirsch index 9. Based on her qualification and large experience in the synthesis field and magnetic nanostructured materials, she will be involved in the synthesis and optimization of up scaling of bio functionalized mono/multi domain magnetic architecture.

If you are interested in a particular call, please indicate the Reference of the call/ Topic of interest—potential contribution.

Have you already participated in an EU funded project? If so, provide some references.

Project FP6 – “Nanostructured and Functional Polymer-Based Materials and Nanocomposites” (NANOFUN-POLY) – Network of Excellence (NoE) nr. 500361-2 , Prioritatea 3-NMP, finanțat de Comunitatea Europeana 2004-2008.

Project FP7 No. 229335 MAGPRO²LIFE – “Advanced Magnetic nanoparticles deliver smart Processes and Products for Life, FP7-NMP-2008-LARGE-2

Project COST - Action TD1402 „Multifunctional Nanoparticles for Magnetic Hyperthermia and Indirect Radiation Therapy” (RADIOMAG)”