

Research Centre

Centre Name:

Research Centre for Heterocycles Chemistry Applied in Nanoscience, Medicine and Environment

Acronym: HETNANMED

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Human Resource

1. Prof. dr. Ionel Mangalagiu
2. Prof. dr. Gabi Drochioiu
3. Conf. dr. Vasile Tura
4. Conf. dr. Ramona Danac
5. Conf. dr. Costel Moldoveanu
6. Conf. dr. Gheorghita Zbancioc
7. Lect. dr. Robert Gradinaru
8. CS III Dr. Vasilichia Bejan
9. As. Dr. Dorina Mantu
10. As. Drd. Dan Maftei
11. ACS dr. Catalina Ciobanu
12. CS dr. Alina Brindusa Petre
13. Ph-D students, master students

Research Fields

The main field of research is related to Chemistry of Heterocyclic Compounds, with three area of expertise:

1. ***Chemistry and Health: Nitrogen Heterocycles Chemistry and Medicinal Chemistry;***
2. ***Chemistry and Nanoscience: Nitrogen and/or Oxygen Macrocycles, Supramolecular Chemistry;***
3. ***Chemistry and Environment: Eco-friendly Reactions using Microwave and Ultrasounds Assisted Reactions.***

Inside of these areas the following main aspects are followed:

a. Chemistry and Health: the development of new useful reactions for the synthesis of heterocyclic compounds, and in particular, reactions involving reactive species such as cycloimmoniu ylides. The main outcomes of these directions are: new nanobiomaterials with and without nitrogen heterocycle moieties, new nitrogen heterocycles biologically active

[potentials drugs (anticancer, anti-HIV, antituberculosis, antimicrobials) and grow up factors for agriculture], modified oligo- and poli- peptides (including anti- Alzheimer), etc.;

b. Chemistry and Nanoscience: in this field our efforts are orientated in the area of oxa- and oxaaza- coronands, nano-electronics and nano-devices, nanobiomaterials (for dentistry including), new highly fluorescent materials, chemical captors (chemosensors);

c. Chemistry and Sustainable Development: microwave and ultrasounds assisted reactions; these technologies allow us to develop environmental friendly methods, with lower waste and environmental friendly impact ["green" chemistry];

Keywords: heterocycles, diazine, ylides, oxa- oxaaza- coronands, microwave, ultrasounds, cycloadditions, fluorescent materials, nanobiomaterials, antituberculosis, antimicrobials, anticancer, anti-HIV, nano-electronics and nano-devices (logic gates, chemosensors), "green" chemistry.

Infrastructure

The main infrastructure of the centre:

- 4 research labs fully equipped for *Fine Organic Synthesis, Macrocycles Synthesis and Heterocycles Synthesis*. Laboratories are equipped with all the "small" devices, required: mixers, ovens, inert gas cylinders, rotary, vacuum pumps, technical and analytical balances etc., including infrastructure adjacent to each laboratory (hoods, working tables, etc..)
- 2 research labs fully equipped for *Toxicology and Toxicological Biochemistry*. Laboratories are equipped with all the "small" devices, required: mixers, ovens, inert gas cylinders, rotary, vacuum pumps, technical and analytical balances etc., including infrastructure adjacent to each laboratory (hoods, working tables, etc..)
- 1 lab for *Microwave and Ultrasounds Assisted Reactions*;
- 1 lab for *Structural Organic Analysis*.

Main equipments:

- NMR Spectrometer 500 MHz, Bruker Biospin;
- Single Crystal X-Ray Diffractometer, Super Nova dual(Cu and Mo);
- GC-MS SHIMADZU QP 2010 (EI, CI pozitiv and negative, direct inlet), Shimadzu, Japan, 2006;
- FTIR 8400s / IR-Prestige – 21 (for both solids and liquids), Shimadzu, Japan, 2006;
- UV-VIS V-1800 Shimadzu, Japapan, 2008 ;
- Microwave Monomode Reactor (under pressure), Monowave 300 Anton Parr, Austria, 2012;
- Microwave Monomode Reactor, STAR-2 CEM, SUA, 1999;
- Ultrasound Generator Sonix VCX 130 Sonisc&Materials, USA, 2005;
- Ultrasound Generator Sonoplus HD 3200 Bandelin, Germania, 2006;
- Liofilizator ALPHA 1-2 LD Plus Christ, Germania, 2006;
- Colling device with recyrculation LAUDA VKL 600 Bandelin, Germania, 2006;

Computers and accesories: Pentium III and IV computers (with soft), Scaners, Printers, Xerox Copy Machines, Stabilizers, etc.

Library: full access to resources of Library Faculty (journal, books, Chemical Abstracts, web resources including Scopus, ISI Thomson, etc.).

Publications

- Last 5 years-

Papers:

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Patents:

1. Iurea, D. (RO); Chintea, P. (MD); Mangalagiu, I.I. (RO); Munteanu, N. (RO); Istrate, M. (RO); Cotenco, E. (MD); Iurea, R. (RO). Biostimulation procedure of Pepper Crop (Procedeu de tratare a plantelor de ardei gras). Patent MD, No. 342/19.11.2010, AGEPI Chisinau, Rep. Moldova.

Property Rights Owner: Institutul de Genetica si Fiziologia Plantelor al Academiei de Stiinte a Moldovei, Moldova

2. Iurea, D. (RO); Chintea, P. (MD); Mangalagiu, I.I. (RO); Munteanu, N. (RO); Chirilov, E. (MD); Cotenco, E. (MD); Iurea, R. (RO). Treatment process of Apple Tree (Procedeu de cultivare a marului). Patent MD, No. 383/19.11.2010, AGEPI Chisinau, Rep. Moldova.

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4. Iurea, D. (RO); **Mangalagiu, I.I.** (RO); Munteanu, N. (RO); Mustea, M. (RO); Chintea, P. (MD); Chirilov, A. (MD); Cotenco, E. (MD); Iurea, P. (RO); Iurea, R. Stimulation procedure of Grapes crop (Procedeu de cultivare a vitei de vie). Patent MD, No. 235/31.07.2010, AGEPI Chisinau, Rep. Moldova.

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5. Hagi, B.; Sandu, I.; Lupascu, T.; Vasilache, V.; Tura, V.; **Mangalagiu, I.I.**; Sandu, A.; Gonciar, V. Procedure for obtaining of an injectable silver oil nanodispersion (Procedeu de obtinere a unor nanodispersii uleioase de argint injectabile). Patent MD, No. 4106/03.12.2010, AGEPI Chisinau, Rep. Moldova.

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6. Hagi, B.; Sandu, I.; Vasilache, V.; Tura, V.; **Mangalagiu, I.I.**; Mungiu, O. C.; Filote, C.; Sandu, A. Proces for preparing an oily nanodispersion with tissue regenerative capacity (Procedeu de obtinere a unor nanodispersii uleioase cu proprietati tisulare regenerative). Patent RO, RO127723-A2, 26.11.2010.

Property Rights Owner: Universitatea Stefan cel Mare Suceava, Romania

7. Hagi, B.; Sandu, A.; Lupascu, T.; Chirazi, M.; **Mangalagiu, I.I.**; Sandu, I.; Ciobanu, M.; Vasilache, V. Pouders with homeostatic and regenerative capacity (Pudra avind capacitate homeostatica si regenerativa). Patent MD, No. 4117/30.07.2010, AGEPI Chisinau, Rep. Moldova.

Property Rights Owner: Institutul de Chimie al Academiei de Stiinte a Moldovei, Moldova

Books

1. A. K. Haghi (Ed.), In: Electrospun Nanofibers and Nanotubes: Research Advances, Chapter 14- Electrospinning of gelatin/chitin composite nanofibers, by: V. Tura, F. Tofoleanu, **I. Mangalagiu**, Mindru, T.; Brinza, F.; Sulitanu, N.; Sandu, I.; Raileanu, D.; Ionescu, C., Nova Science Publishers, New York, US (Series: Nanotechnology Science and Technology) 2009, pp. 239-252. ISBN: 978-1-60741-834-4

Web: https://www.novapublishers.com/catalog/product_info.php?products_id=10299

2. G. Drochioiu, M. Murariu, **I. I. Mangalagiu**: "Plantele medicinale si metalele grele"(143 pag.), Ed. Tehnopress, 2011, Iasi. ISBN: 978-973-873-0

3. **I. I. Mangalagiu**, Ramona Danac; Costel Moldoveanu; Gheorghita Zbancioc, CHIMIE SI TOXICOLOGIE JUDICIARA. SEPARATOLOGOLOGIE JUDICIARA, Editura „AIT –SRL Laboratory”, Bucuresti 2011. (217 pag.) ISBN: 978-606-8363-09-7x2.

Grants:

1. Grant FP7- People-2009-IRSES-No. 246902

Title: **Photocatalytic Clusters Complexes for Artificial Photosynthesis Applications**

Finance from: **European Union- FP7 program IRSES**

Directors: prof.dr. Ionel Mangalagiu, Romania/ prof. Dr. Andrew Benniston, UK (coordinator)/ prof.dr. Constantin Turta, Moldova

Duration: 2010-2012, grant no. 246902/2009

Value: Total: 194.400,00 Euro

2. Bilateral Grant Romania-Moldova

Title: **Biologically active compounds with terpenoid and azaheterocycle skeleton through conventional and nonconventional methods**

Finance from: Romanian (ANCS, PN-II program, Modul III) and Moldavian Government

Directors: prof.dr. Ionel Mangalagiu, Romania/ CP I.dr. Aculina Aracu, Academy of Science of Rep. Moldova

Duration: 2010-2012 grant nr. 418/02.06.2010

Value: 41.376 lei (10.000 Euro aprox)

3. Director: **Prof. dr. IONEL MANGALAGIU**

Type of grant: PN II-Ideas, grant PN-II-DE-PCE-2011-3-0038, No. 268/2011

Finance from: **CNCSIS**, Romanian Ministry of Education and Research

Duration: 2012-2014

Title: **New polifunctional nitrogen derivatives (heterocycles, podants and macrocycles) as smart versatile building blocks for multiple tasks**

Value : 350.000,00 €

4. Director: **Prof. dr. IONEL MANGALAGIU**

Type of grant: PN II-Ideas, grant. No. 88/2008

Finance from: **CNCSIS**, Romanian Ministry of Education and Research

Duration: 2009-2011

Title: **Chemosensors with Macrocyclic Skeleton**

1st year: 2009. Value : 25.000,00 €

2nd year: 2010. Value : 35.000,00 €

3rd year: 2011, Value : 45.000,00 €