

National Institute for Research and Development in Electrochemistry and Condensed Matter (I.N.C.E.M.C. Timisoara), located in 144 Diaconu Coresi Street, Timisoara, was established by the decision no. 1315 from 25.11.1996 of the Romanian Government, on the basis of the statements of the law 51/1996.

INCEMC is founder of:

- Romania Photovoltaic Group, part of the *European Photovoltaic Technology Platform*
- Technological Platform for Constructions
- Romanian Electrochemistry Society
- Romanian Association for Applied Electrochemistry
- Western Association for Multidisciplinary Research (ACMV)

Member of:

- *ROEuMAT*;
- *MANUFUTURE*.

The management plan was set on the following **strategic directions**:

1. Internal organization
2. Human resources
3. Material/financial resources
4. Research areas
5. Partnerships

Human Resources – Objectives

- Employment of young graduates with remarkable results, in order to improve the average age of employees
- Stimulation of professional promotion for the improvement of staff qualifications
- Stimulation for obtaining the PhD degree by employment of the PhD students under contracts for supply of services
- Monitoring the final-year students and the master students, in order to involve them in contractual research activities with the possibility of employment after graduation
- Attracting of Romanian researchers from abroad and attracting of foreign researchers

Research directions

Together with the traditional research directions of the institute:

- Chemical/electrochemical technologies
- Nanotechnologies
- Environmental protection and clean technologies,

the following areas are added, as a consequence of their ascendant trend:

- Renewable energies
- Medicine and quality of life

Material/Financial Resources

- to develop a micro production laboratory in the field of fine synthesis of organic intermediates (focusing on electrochemical methods);
- to associate with SMEs;
- to apply for spin-off and start-up projects (there are 3 technologies in development) within Scientific and Technological Park TIM SCIENCE PARK.

Partnerships

- to activate the Romanian Association for Applied Electrochemistry;
- to make permanent partnerships with universities, SMEs, local and foreign research institutes, targeting the approached research areas;
- increasing the visibility through:
 - organization/participation at scientific seminars;
 - encouraging publication in journals with a high impact factor;
 - patenting the significant results of the research

Program IDEI -PN-II-ID-PCE-2011-3- Director Prof. Dr. Ion Neda
“IMMUNOMODULANTE FLUOROGLYCOPEPTIDE MOLECULAR ARCHITECTURES”

1. Topic of the project and its practical relevance

Valorification of the Carpathian flora and fauna of the Black Sea through:

- Identification, isolation, structural characterization and synthesis of natural biologically active compounds from the Carpathian flora and respectively the Black Sea's fauna;
- Functionalization of the natural products isolated from plants, sponges and bacteria with known biologically active compounds in order to achieve a new “Drug-Targeting” concept for the treatment of cancer and HIV.

2. Project Objectives

- Synthesis of asymmetric derivatives based on calixarenes with variable cavities;
- Utilisation of the specific recognition properties/potential of chiral cavities in selective extraction processes of amino acids and peptides and other natural products from plants (structural and functional control through storage in the cavity);
- Structural identification of natural products extracted from multi-component mixtures by physico-chemical methods of analysis;
- Complete synthesis of the compounds that showed biological activity;
- The use of natural compounds (such as amino acids, peptides and heterocyclic compounds) as selective carriers for some biologically active compounds already used in treating cancer and HIV;
- Synthesis of derivatives of monosaccharides, amino acids and peptides by functionalizing them with natural products based on cinchona alkaloids, in order to obtain fluoroglycosidic or fluoropeptide molecular structures with fluorescent properties and applicability in medicine (diagnosis).

3. Potential application

- Development of new drugs and diagnostica;
- Obtaining new intermediates in the organic synthesis of compounds with applications in various economic fields.

PROJECT TITLE : Renewable Energies – Photovoltaics – Laboratory

ID/SMIS: 907/14678

- The present project is cofinanced by The European Regional Development Fund, Sector Operational Program The Increase In The Economic Competitiveness, Priority Axis 2 – CDI: Operation 2.2.1. : Competitiveness Via Research, Technological Development Or Innovation; Intervention field D.2.2 „ Investments in CDI infrastructure and development of administrative capability”; Operation O2.21. Developing the available C-D infrastructure and creating a new C-D infrastructure (labs, research centres); Thematic area ENERGY
- Location of the project – Timișoara, duration – 46 month, financing contract no. 249/28.09.2010 with The National Authority for Scientific Research.
- Project Main Objective: Development of the *Renewable Energy – Photovoltaic Research Laboratory* within INCEMC Timisoara, by building up proper spaces and endowment them with last generation CD equipment (value 20.511.000,00 lei).
- Project Specific Objectives:
 - Developing the infrastructure conditions necessary for establishing a *Renewable Energies – Photovoltaics – Laboratory* by building up a B + GL + 2F structure with the purpose of enlarging the activity area and, implicitly, of opening new research directions.
 - Equipping the *Renewable Energies – Photovoltaics – Laboratory* with advanced tools and equipment, at international standards, in order to increase the competitive level of the scientific research at international scale.
 - Staff training in order to properly and effectively use the new equipment and technologies.
- Project total value: 36.922.000,00 lei, from which 30.000.000,00 lei represents eligible project value, and 6.922.000,00 lei is non-eligible project value.
- Solicited non reimbursable financial assistance is composed by 26.529.000,00 lei, from European Union (by The European Regional Development Fund) and 3.471.000,00 lei, from National State Budget.
- *Renewable Energies – Photovoltaics – Laboratory* will allow participation at scientific research projects, depending on specific projects and will increase the Laboratory’s prestige at national and international level and attracting new valuable researchers both from Romania and abroad.
- *In the Renewable Energies – Photovoltaics – Laboratory* will be will be developed through different technologies, materials, structures and finally photovoltaic cells; then, these will be studied from morpho-structure characteristic point of view, elemental composition, optoelectronic properties and specific performances; finally these will be integrated in photovoltaic/hybrid systems and studied comparably with the top available systems at commercial level on the international market, as a possible alternative energy supply system for buildings (offices, living spaces, etc.).
- The *Renewable Energies – Photovoltaics – Laboratory* will have a new building (1703 mp) and will be structured in 3 units:
 - UNIT 1. Photovoltaic Materials, Structures, Cells Development: elaboration of new nanostructured materials through solution methods; deposition of thin layers in vacuum; deposition of thin layers through methods which do not necessitate vacuum; realization of thin layers photovoltaic cells and structures;

- UNIT 2. Photovoltaic Materials, Structures, Cells Characterization: morpho-structural characterization of elemental composition and optoelectronic properties of the materials; characterization and evaluation of solar cells performance parameters;
- UNIT 3. Photovoltaic / Hybrid Systems for Electrical Energy Production; Electrical Energy Storage Systems: electrical energy buildings supply; storage of energy peaks.
- At the end of the project in *Renewable Energies – Photovoltaics – Laboratory* there will be working 35-45 persons, from which 19 will be permanently employees of INCEMC Timisoara and the other will be Romanian or foreign specialists, employees of direct beneficiaries.



Laboratory of Electrochemistry and PATLAB Bucharest

Laboratory of Electrochemistry and PATLAB Bucharest, INCEMC is partner in FP7 project “**Developmental neurotoxicity assessment of mixtures in children**” – **DENAMIC**, financed 75% by the EC and 25% by UEFISCDI (Contract nr. 186/23.10.2012). Project Leader (PL) from INCEMC is CSI Dr. Raluca-Ioana van Staden. Project duration in months is 48 months (2012-2015). Budget of INCEMC: 70000EURO. Website of the project at EC: <http://www.denamic-project.eu/>. Grant agreement no: 282957. Theme - ENV.2011.1.2.2-1.

Various recent epidemiological studies have indicated that exposure to low doses of environmental biologically active contaminants during human development can alter gene expression and have effects on cognitive development in childhood. One of the main aims of DENAMIC – on which INCEMC is contributing - is to develop tools and methods for neurotoxic effects of mixtures of environmental pollutants at low levels. With 14 partners from ten different countries DENAMIC has a true international character. It is a comprehensive, multi-disciplinary project. To date, there are two papers accepted in ISI journals: 1. Flow-injection analysis systems with different detection devices and other related techniques for the in vivo and in vitro determination of dopamine as neurotransmitter. A review., J.F. van Staden and R.I. Stefan-van Staden, *Talanta*, 102 (2012) 34-43; 2. Influence of the physical immobilization of dsDNA on the carbon based matrices of electrochemical sensors, LA Gugoasa, RI Stefan-van Staden,

AA Ciucu, JF van Staden, Current Pharmaceutical Analysis, 10(1), 000, 2014, and other 3 submitted to ISI Journals.

Direction:

- biomedical analysis, contributions to the early detection of cancer and personalized treatment of cancer

Objective:

- Development of new tools and methods for biomedical analysis, especially for the early detection of cancer and hepatitis

Program: MNT-ERANET

Advanced piezoelectric materials functionalized for the quality and security control of food

General objectives of the project

- o development of new advanced piezoelectric materials by complex methods: hydrothermal method using high pressures and temperatures.
- o manufacture of new bio-sensitive devices.
- o functionalizing and testing of the bio-sensitive devices and elaboration of comparative studies regarding their efficiency depending on physical and material characteristics.

Obtained results:

- o 2 type of single crystals with α -quartz structure ($\text{Si}_{1-x}\text{Ge}_x\text{O}_2$ si $\text{Si}_{1-x}\text{Sn}_x\text{O}_2$);
- o Biosensitive devices based on QCM;
- o Research Network Euroregion

Program:Marie Curie Actions network FP7, October 2008 -September 2012

Spin and Orbital Physics: Research of Advanced New Oxides (SOPRANO)

The aim of SOPRANO project is to explore the remarkable physical properties of transition metal oxides results from the strong interactions between orbitals, charges, spins and lattice. This project involves a high quality international network which consists of *CRISMAT Laboratory, ENSICAEN, Caen, France, ICMCB, Bordeaux, France, Universitätzu Köln, Germany, Max-Plank-Gesellschaft, Germany, Universidad Complutense de Madrid, Spain, University of Liverpool, United-Kingdom and INCEMC Timisoara*, Romania. In according with this topic and aims, 5 PhD theses were supervised at INCEMC which have the following topics:

- “Hydrothermal synthesis and characterization of ACrO_2 (A = Cu, Ag) with delafossite structure” (Indian PhD student);
- Hydrothermal synthesis and characterization of undoped and doped CuYO_2 with delafossite structure” (Moldavian PhD student);

- “Hydrothermal synthesis and characterization of layered cobalt oxides” (Indian PhD student);
- “Hydrothermal synthesis and characterization of ABO_3 (A = Pb, Bi and B=V,Cr) compounds” (Italian PhD student);
- “Hydrothermal synthesis of vanadium dioxide polymorphs” (Indian PhD student).