

THE INSTITUTE FOR RESEARCH IN CHEMISTRY "RALUCA RIPAN"



Brief Presentation

In 1949, on behalf of the Cluj Branch of the Romanian Academy, a research group was created in the Faculty of Chemistry of the „Victor Babes” University. In 1950, the research group constituted the core of the institute that, in 1951, got its own building.

For more than 50 years, the Institute of Chemistry has known a continuous development, by extending its spaces, acquisitions of research equipments and human resources. Moreover, professors from different faculties and universities were directly involved in the institute research activity.

The institute was successively subordinated to Romanian Academy, Ministry of Education, Ministry of Oil and Chemical Engineering, the Ministry of Research and Technology and, finally, Ministry of Education and Research. In spite of all these administrative changes, some of the research directions could be preserved, becoming traditional. This is the case of some fundamental researches initiated by the great chemistry personalities that were involved in the early management of the institute: acad. Raluca Ripan, acad. Tănăsescu, prof. Macarovici, prof. Bodea, and PhD. Hodosan.

Their collaborators continued the research domains developed by them and scholars, which, have taught and are still teaching new research generations. Starting with 1994, the institute bears the name of Raluca Ripan, founder of the institute and its first managing director (1951-1970).

Patrimony

- buildings 5
- total land surface 29490 mp
- built surface 7500 mp

Fields of Activity

- Main activities, CAEN codes: 7310, 2420, 2413, 2442, 2741
- S/T domains, UNESCO codes: 2301, 2303, 2306, 2399

Main Research Directions

• Environmental researches

Chromatographic materials and methods for the determination of organic contaminants in different matrices; Modern methods for the environment quality control and evaluation; Ecological recovery of precious metals from

different wastes; Ozone treatment of waste waters containing organic pollutant; New materials for the treatment of waste waters; Pheromonal materials for eco-system protection

• Technologies and products for the improvement of life quality

Technologies and products for dental applications; Technologies and products for medical use (X-ray intensifying screens; Sensidisks for antibiogrammes); Technologies and new materials for quality life improvement (Luminescent materials; phosphors); New ecomonal compounds with pheromone function for agro-eco-system protection; Development of new investigation methods for pharmaceutical, forensic and biomedical purposes; New catalysts for ozone removal from waste gases.

• Technologies and methods for food security

Non-conventional ecological methods for fruit storage; New HPLC and TLC chromatographic methods for food quality control.

• Green chemistry

Technologies for environmental friendly production of materials with special properties; Non-conventional biotechnics for pest insects control in viticulture and fruit growing.

Organizational Structure

- **Laboratories for Research and Production (R&P):** Inorganic Compounds; Organic Compounds; Analytical and Environmental Chemistry
- **Administrative departments (7)**

RESEARCH AND DEVELOPMENT PRODUCTS AND SERVICES

Certified Laboratories

R&P Laboratory for Analytical and Environmental Chemistry (dr. Virginia Coman)

- *S/T specific domains of competence:* High Performance Liquid Chromatography (HPLC) and Thin Layer Chromatography (TLC); Preparation and characterisation of new adsorbing materials for chromatographic use; Quality control of food (food security); FTIR and UV-Vis measurements of organic materials and high quality results interpretation;
- *Key words:* Chromatographic materials; Adsorbents; HPLC; TLC; Spectroscopy; Chemically modified silicagel (alumina); Chromatographic plates;
- *Reference projects:* Sensidisks for antibiogrammes (VIASAN); Planar Dielectrochromatography. Method and horizontal

Managing Director
prof.dr. **Ioan Silberg**
c.m. of the
Romanian Academy



Human Resources

Total personnel	86
R&D personnel	48
With academic training	48
Researchers	39
out of which	
Scientific researcher I	9
Scientific researcher II	4
Scientific researcher III	9
Scientific researcher	17
Assist. scient. research.	2
PhD. student	18
PhD.	13
Academy members	1



Pheromonal trap before and after the insect capture

dielectrochromathographic chamber. (CERES); Researches regarding the chromatographic and electrochemical behaviour of some chemical compounds that define the authenticity of wines (CERES).

Others:

- *Micro-production* Silica gel and alumina for thin layer and column chromatography; TLC plates ready-to-use; Chemical mobile-laboratory for campaign or for water analysis; Special electrochemical sensors; HPLC and FTIR analysis for compounds from different matrices.
- *Services as environmental studies and special analysis:* Consulting services for agricultural and industrial activities (MMGA acreditive); Elaboration of analytical methods for water, soil, ashes and sawdust.

R&P Laboratory for Organic Compounds (dr. Lucia Gânscă)

- a) "NATURAL PRODUCTS" Research Group
- *S/T Specific domains of competence:* Synthesis and characterisation of new ecomonal compounds with pheromone function; Technologies for the obtaining and the manufacture of pheromone products with application in pest insects control in agriculture and forestry
 - *Reference projects:* Biomimetic products with application in ecosystem protection (RELANSIN); Pheromonal pesticide used in the ecological control of *Cameraria Ohridella* species, major pest of wild chestnut tree (BIOTECH); Non-conventional biotechnics for the control of the major pests from viticulture and fruit growing (BIOTECH-CEEX);
 - *Key words:* Pheromones; Ecomones; Pest insect control; Mass spectrometry;

Others:

- New Products transferred to the own MP unit (prof.dr.ioan OPREAN): Pheromone products (baits, traps and insect adhesives); Over 25 "ECO-type products" for detection, warning and control of the pest insects damaging fruit growing, forestry, field culture, viticulture and storehouses
- *Services:* Mass spectrometry applications for material investigations

b) "BIOMATERIALS" Research Group:

- *S/T Specific domains of competence:* Elaboration of some new composite biomaterials of medical interest; Preparation and characterisation of some new materials opaque for X-rays

- *Key words:* Biomaterials; Nanofilers; Dental composite; Polymers; Composite materials;
- *Reference projects:* Composite biomaterials based on monomer systems and bioactive inorganic fillers with application in dental prosthetic (VIASAN); Research regarding the elaboration of some new materials opaque for X-rays (RELANSIN); Advanced composite biomaterials with nanofilers and polyurethane used in biomedicine (MATNANTECH)

Others:

- New products transferred to SMEs: Materials used in dental prophylaxis and therapy.

R&P Laboratory for Inorganic Compounds (dr. Elisabeth-Jeanne Popovici)

- "SOLID STATE CHEMISTRY" Research Group
- *S/T specific domains of competence.* Theoretical and applicative knowledge in materials-field: Synthesis of luminescent micro- and nanostructure materials; Synthesis and characterisation of catalytic materials (for ozone decomposition); Preparation of thin films and layers with special properties (luminescence, catalysis); Synthesis, characterisation/uses of organic compounds with host-guest properties (calixarene); Ozone chemistry and uses (waste water treatment, fruits preservation, cellulose bleaching); Spectral characterisation of materials (UV-Vis absorption /reflection/ luminescence); Characterisation of materials and processes by thermal analysis (TG-DTA-DTG; DSC).
 - *Key words:* Phosphors; Catalysts; Thin films/Layers with luminescent and catalytic properties; Calixarene; Ozone; Precious/ Rare Earth Metal Recovery; Luminescence;
 - *Reference projects:* X-ray images intensifying screens (MATNANTECH program); Utilisation of ozone as sanitising agent in apple storage (AGRAL program); Luminescent materials for optoelectronic devices (MATNANTEC-CEEX program)

Others:

- New Products transferred to the own MP unit: Luminescent pigments; Noble and precious metals of high purity; Inorganic product of special quality;
- *Services:* Recovery of precious metals; Special analysis of materials

Services – Collaborations

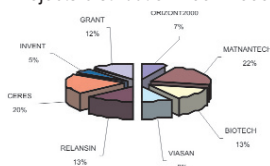
Institute General Offer – R&D Competences Services. Microproduction

1. Specific competences in fundamental and applicative researches for the preparation, characterisation and utilisation of materials
 - Chromatographic materials, equipments and methods. Electrochemical sensors;
 - Special materials for medicins;
 - Composite biomaterials for dentistry.
- Synthesis and characterisation of new ecomonal compounds with pheromonal activity for agro-eco-system protection;
- Solid state chemistry as tool for the synthesis of powder and thin films with luminescent or catalytic properties;
- Micro- and nanosized powders with optical, catalitical and electrical properties:

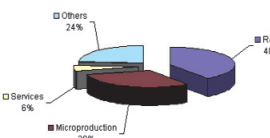


The series of dental products elaborated by Biomaterials research team

Projects distribution 2001-2005



Incomes in 2005



Research & Development activity volume (RON)			
Year	Budget financed activity	Income from other activity	Total activity
2001	401.168	874.695	1.275.863
2002	397.166	1.076.373	1.473.539
2003	636.363	1.382.309	2.018.672
2004	897.034	2.280.226	3.177.260
2005	1.668.054	2.794.346	4.462.400
Income resources			
	From national contracts	From international contracts (euro)	
2001	77.822	0	
2002	168.031	0	
2003	93.443	0	
2004	174.839	0	
2005	326.358	0	

- Crystalline materials with special structural properties –polyoxometallates, calixarenes.
2. Services
- Elaboration and implementation of analytical methods for soils, waters and waste materials;
 - Recovery, purification and valorification of precious metals (Au, Ag, Pd, Pt, Rh) from waste materials;
 - Environmental consulting services for agricultural and industrial activities (**MMGA acreditive**) Monitoring, risk assessment and environmental studies.
3. Production, at request, in the competence field of ICCRR
- Inorganic products with special purity properties;
 - Micro- and nano powders with special optical properties: luminescent pigments;
 - Chromatographic materials: unmodified and chemically modified silica and alumina adsorbents
 - Pheromonal materials: active substance, accessories for pest insects control in viticulture, fruit growing, silviculture;

National and International Programs

National Programs (with number of projects)

ORIZONT 2000 (4), MATNANTECH (13), BIOTECH (8), VIASAN (5), RELANSIN (8), CERES (12), INVENT (3), CNCSIS/ANSTI (7)

International Programs

- Inter-governmental cooperation: Bilateral Romanian-Hungarian project (COPBIL programme) „Sensors based on tin oxide thin layers”
- LEONARDO DA VINCI project (Convention RO/99/2/07268/PI/II.1.1.c/FPC, 2000-2001) „Centre Regional d Expertise et Formation en Recyclage et Protection de l'Environnement

Participation to Consortia, Networks, Technological Platforms

- Associate member to: “Nanotechnologies and nanosciences, knowledge-based multifunctional materials, and new production processes and devices FP6-2004-NMP-NI-4 “;
- National partnerships with: National R&D institutes; Research Institutes of the Romanian Academy; Universities; Economical and agro-industrial units etc.
- Scientific Consortia, on legal ground, between ICCRR, UBB and Institute of Biology (Cluj-Napoca)

RESULTS OF RESEARCH-DEVELOPMENT ACTIVITY

Products, Technologies, Prototypes

- Total technologies: 32 (14 certified technologies)
- Certified products, by specialised national organisms: 13
- Certified products, by ICCRR as manufacturer, and product users: 5
- Prototypes. Models. Installations: 6

Illustrative technologies

- „Technologic process for manufacture of composite material with nanofilers based on zirconia for reconstruction of dental crowns”
- “Technologic process for obtaining a composite biomaterial based on superior oligomers of epoxiresins with use in restorative dentistry”
- „Technology for obtaining the pheromonal product used for the advertisement and prognosis of insect *Lymantria monacha*, major pest insect for spruce fir
- Technology for manufacture of sensidisks for antibiogrammes. Technological line
- Technology for ozone treatment of apples for storage
- Technology for manufacture of roentgenoluminescent pigment based on gadolinium oxysulphide

Illustrative products

- 10 new dental products certified by Sviam: Anopacryl; Dualcim; Fotoseal; Radopacril; Sigilar S/L; Entadez; Dentadez Foto; “Acidenta; Restacril AL; „Restacril AP/P; ”
- 3 new certificated pheromone products: atraLYMON plus; atraSYN; atraCAM;
- 1 product for medical application: Sensidisks for antibiogrammes
- 4 products with special properties: Catalyst K50; RoentgenoLuminescent Pigment “PRLM type GOS”; Zinc oxide of pharmaceutical quality; Calcium hydroxide for dentistry use.

Technological Transfer

- Dental technologies and products to the SMEs SC Ponetti srl and SC REMED srl Bucuresti;
- Technologies and pheromonal products to the ICCRR MicroProduction unit;
- Technologies referring to ozone applications to SC RAAL SA and RAAL Farm Bistrita;
- Technologies for the manufacture of materials with special properties ICCRR to the MicroProduction unit.

Patents

- Total patents and patent applications: 21, out of which:
 - Patent applications: 14
 - Licensed patents: 7

Organization of National & International Scientific Events

“NAPOCA BIODENT” to be held yearly in Cluj-Napoca Romania 1st edition of *International Congress of Dental Materials*, 10-12 November 2005, Cluj-Napoca, Romania.

Outstanding Results Obtained at Fairs & Exhibitions

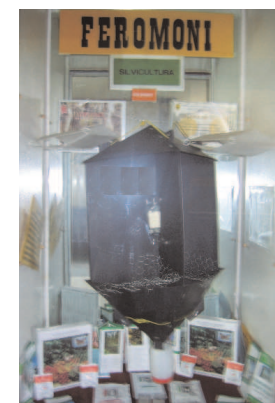
Public presentation of results from specific domains, in scientific manifestations and exhibitions in over 200 attendances to conferences, symposia, exhibitions from country and abroad.



prof. PhD. Ioan Oprean, the coordinator of the “Pheromones” program



Photoluminescence measurements (Spectrofluorimeter Wave, JASKO FP-6500)



Pheromone products and materials elaborated in the ICCRR MicroProduction unit

National and International Affiliations

- Romanian Chemical Engineers Association
- Romanian Society of Biomaterials
- Romanian Chemists Society.

Infrastructure Units for Technological Transfer: 0

Scientific and Technique Awards

- 1st Award: M. Moldovan et., al Romanian Symposium MATNANTECH, July 2003, Neptun,
- 2nd Award: A. Colceriu, Romanian Symposium MATNANTECH, Sinaia, October 2004, Section „Young Researchers in Matnantech Program”
- 3rd Award: Amalia Hristea, Romanian Symposium MATNANTECH, Sinaia, October 2004, Section „Young Researchers in Matnantech Program”
- 1st Mention: Ana-Maria Vălean, Romanian Symposium MATNANTECH, Sinaia, October 2004, Section „Young Researchers in Matnantech Program”
- 2nd Award: G. Furtos, Romanian Symposium MATNANTECH, Jupiter 2005, Section „Young Researchers in Matnantech Program”



Representative R&D Equipments. Infrastructure

- Spectrofluorimeter Wavel, JASKO FP-6500 (2005)
- FTIR Spectrophotometer JASCO 610 (1998);
- UV-Vis Spectrometer UV4 UNICAM (1998) with integrating sphere;
- GC-MS System HEWLETT-PACKARD 5872/5890II
- High performance liquid chromatography, HPLC JASCO PU-980 (1998);
- Thermogravimeter with DTA measurement -1600 and DSC cell, METTLER-TOLEDO TG851 (2005);
- Instruments for ozone determination and monitoring in water and air: HACH-LANGE Sensor and controler; HACH-LANGE Pocket colorimeter II Ozone(2005); ANSEROS Ozomat (2002);
- Equipment for analytical purposes (2005): HACH-LANGE Multimeter; TLC Device AS-30 DESAGA
- Optical microscope with images acquisition (L2003A 2005);
- Universal Instrument for mechanical tests, LLOYDS INSTRUMENTS (2005);
- Laboratories for material synthesis and analytical procedures; Micro-pilot installations.

Success Stories: 0

Publications

Papers published in ISI quoted journals **58** (out of which the most quoted)

1. *Fluoride release from dental resin composites.* Furtos, G, Cosma, V, Prejmerean, C, Moldovan, M, Brie, M, Colceriu, A, Vezensenyi, L, Silaghi-Dumitrescu, L, Sirbu, C, Materials Science & Engineering C-Biomimetic And Supramolecular Systems, 25(2), 231-236, 2005.
2. *Synthesis and characterisation of rare earth oxysulphide phosphors. I. Studies on the preparation of Gd2O2S: Tb phosphor by the flux method.* Popovici, EJ, Muresan, L, Hristea-Simoc, A, Indrea, E, Vasilescu, M, Nazarov, M, Jeon, DY, Optical Materials, 27 (3), 559-565, 2004.
3. *New organotin derivatives of trilacunary keggin polyanions.* Tomsa, AR, Koutsodimou, A, Falaras, P, Bernard, MC, Rusu, M, Synthesis And Reactivity In Inorganic Metal-Organic And Nano-Metal Chemistry, 35 (8), 651-659, 2005.
4. *Planar dielectrochromatography - A perspective technique,* Coman, V, Kreibik, S, JPC-Journal of Planar Chromatography-Modern TLC, 16 (5), 338-346, 2003.
5. *Exo- and endohormones. XXII - Synthesis of methyl (2E,4Z)-2,4-decadienoate, the pheromone synergist of the bark beetle Pityogenes chalcographus,* Maxim, S, Gansca, L, Oprean, I, Budae, I, Revue Roumaine De Chimie, 47 (6), 543-544, 2002.

Papers published in the proceedings of important international conferences (out of which the most quoted) **44**

1. *Photo-and cathodoluminescence investigation of CaWO4:Eu,Tb phosphors,* E.-J.Popovici, M. Nazarov, D.Y.Jeon, L.Muresan, T.A. Nazarova, E.Indrea & A. Hristea-Simoc SPIE Proceeding Series, ROMOPTO 2003 (Bellingham, USA), 2004, vol 5581, 754-761
2. *Manganese Containing Alumina Washcoatings with Catalytic Properties,* A-M Kaszoni Pricop, E-J Popovici, R Grecu, E Indrea & M.Zaharescu, Proceedings of the XVIIIth Congress of Chemists and Technologists of Macedonia (sept.2004; Ohrid)- electronic substrate CD;

3. *Horizontal Planar Dielectrochromatography. Preliminary Results,* Şt. Kreibik, V. Surducan, V. Coman şi C. Măruţoiu, Proceedings of the International Symposium on Planar Separations "Planar Chromatography 2002", Héviz, Hungary, May 11-13, 2002, p. 307-314.

Papers published in the main flux of publications **57** (out of which the most quoted)

1. *Lattice parameter and luminescence properties of europium activated yttrium oxide,* Nazarov, M.V, Kang, J.H, Jeon, D.Y, Popovici, E-J., Muresan L, Tsukerblat, B.S., SOLID STATE COMMUNICATIONS, 133 (3), pp. 183-186, 2005.
2. *Characterization of some chemically modified acidic alumina T samples for TLC,* Filip, M, Coman, V, Grecu, R, Albert, K, Moldovan, Z, Journal of Planar Chromatography-Modern TLC, 17 (6), pp. 424-430, 2004.
3. *Structure and properties of inorganic fillers for dental composites,* Tamas, C, Moldovan, M, Prejmerean, C, Colceriu, A, Furtos, G, Vezensenyi, L, Prodan, D, Grecu, G, Simon, V, Journal of Optoelectronics and Advanced Materials, 7(6), pp. 2849 - 2852, 2005

Scientific books published in Romania **2**

1. *Chimie anorganică. Nemetale şi semimetale,* Gh. Marcu, M. Rusu şi V. Coman, Editura Eikon, Cluj-Napoca, 2004, 693 pagini.
2. *Interacţiuni moleculare în lichide şi în soluţii studiate prin spectroscopie vibraţională, în Aplicaţii ale spectroscopiei vibraţionale (T.Iliescu, S. Cântă Pînzariu, D. Maniu, R. Grecu, S.Aştilean), Casa Cărţii de Ştiinţă, Cluj-Napoca (ISBN 973-686-292-5); 2002,376 pagini.*

Scientific books published abroad **1**

1. *Selection and Optimization of the Mobile Phase for PLC in Preparative Layer Chromatography,* V. Coman in Chromatographic Science Series, vol. 95 (Editori T. Kowalska şi J. Sherma), Taylor & Francis/CRC Press Book, Boca Raton, Fl., 2006, p. 61-98 (ISBN 084934039X)