NATIONAL RESEARCH-DEVELOPMENT INSTITUTE FOR
NON-FERROUS AND RARE METALS – I M N R

• 102 BIRUINŢEI BLVD, PANTELIMON, Jud. ILFOV • P.O. 077145 • Tel +(4021)3522046; 3522048; 3522050 •
• Fax +(4021)3522049 • e-Mail: imnr @ imnr.ro • WEB: www.imnr.ro •

SELF-ASSESSMENT REPORT

Period 2007-2011

Contents

1 Short History of the institute:

On 1st of July 1966, research staffs within ICEM and ICECHIM and designing staffs within IPROCHIM were merged in a single institute: the Institute of Non-ferrous and Rare Metals, IMNR.

Structured on three directions: research, designing, micro-production – technological transfer, the activity of the institute focused on the promotion in industry of hundreds of technologies, feasibility studies, complex projects.

Over 220 new alloys (powders, bands, wires, etc.) were made within IMNR for economic agents from the country and for export as well.

The year 1990 marked the beginning of new basic restructuring within the organizational structure of the institute, within the personnel structure.

Considering that in 1989, 1600 people worked within the institute, less than 100 employees remained today.

Many opportunities disappeared (the ones related to the connections with the state plants) and new ones appeared – fewer, more difficult to approach.

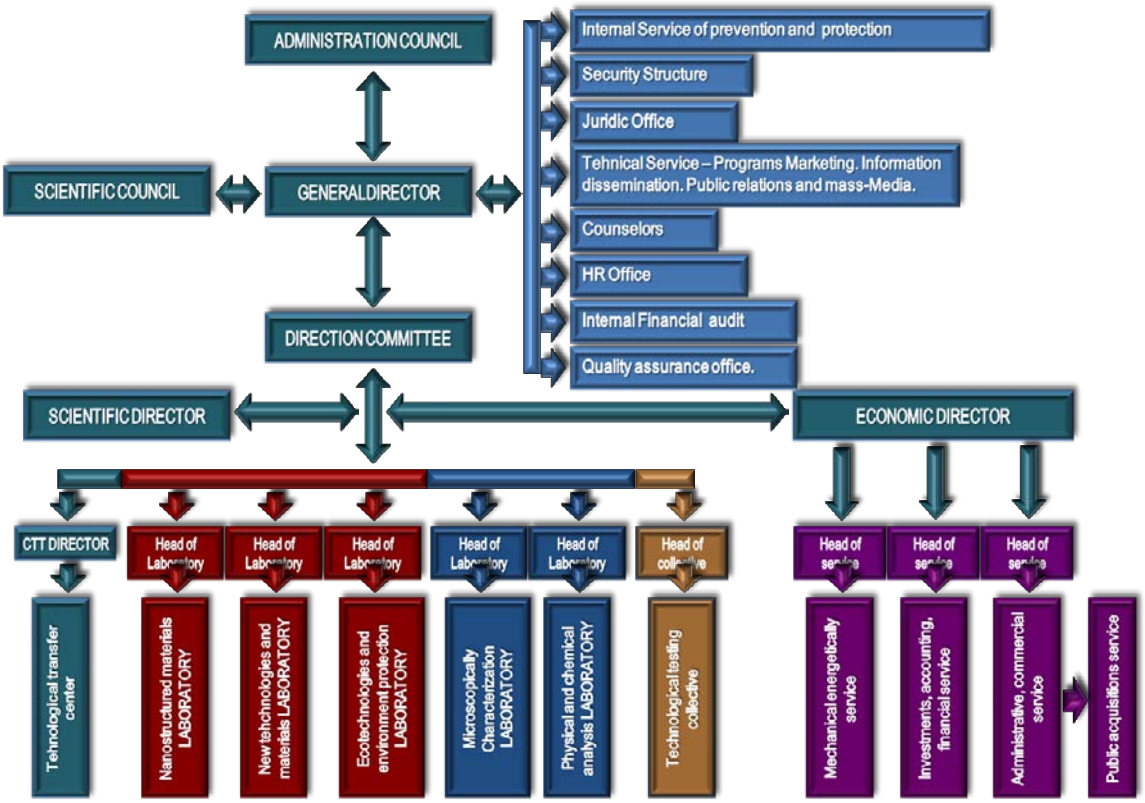
The short and medium-term strategy of redressing and readjustment of the institute with the new reality was successful.

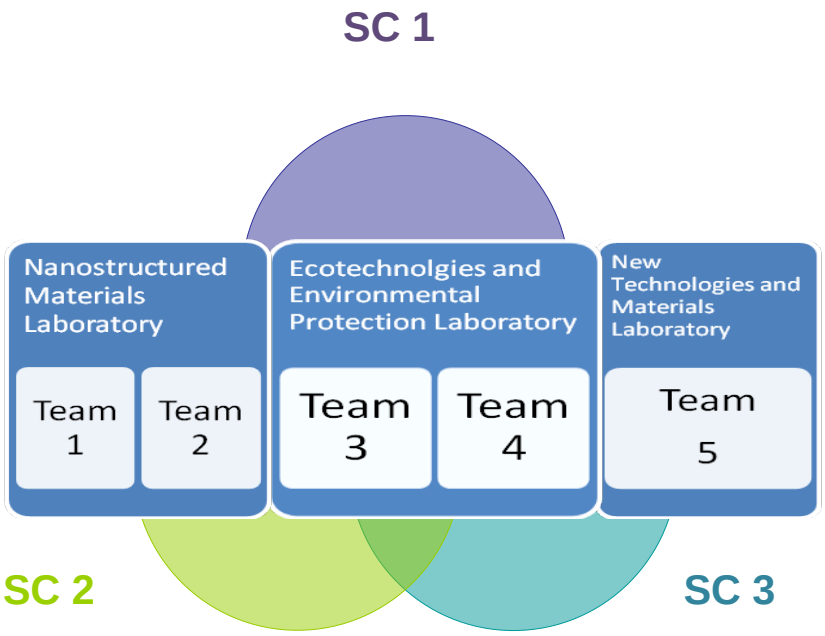
In 2004, IMNR became a national institute.

INCDMNR-IMNR is a strategic institute in the field of nonferrous metals metallurgy.

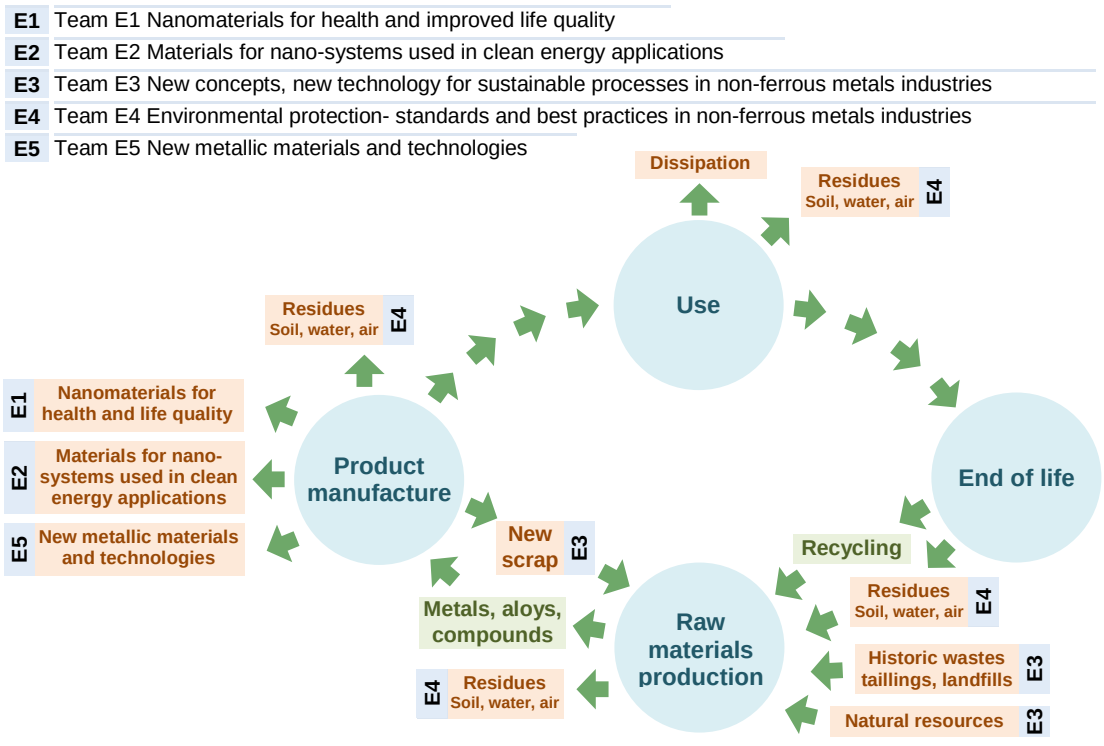
2 Administrative structure diagram of the institution

2.1 The organizational chart (diagram)





Interactions between research teams



Research teams distribution: INCDMNR-IMNR has 5 research teams

2.2 The management structure

General Director: Dr. Velea Teodor
Scientific Director: Dr. Roxana Mioara Piticescu
Economic Director: Ec. Marius Constantin Scrab

Managing Board:

- the president of the managing board is the General Director , Dr.Velea Teodor
- members: president of the Scientific Advisory Board, assignees of the Ministry of Economy, Commerce and Business Environment, assignee of the Ministry of Education, Research, Innovation Sport and Youth-NASR, assignee of Ministry of Labour and Social Protection, assignee of the Ministry of Public Finances.

The main responsibilities of the Managing Board are (HG 2115 from 24.11.2004):

- proposes the modification of organizational and functional structure of the institute
- approves, on the basis of the proposal of Scientific Council, strategy and programs for development of the institute, the top technologies introduction and the modernization of the existing ones according to the general strategy of the own activity domain
- analyses and advises annually financial situations which are proposed for approval to the coordinator ministry, approves the administration report regarding the activities performed in the previous year
- analyses and advises the income and expenditure budget project which is submitted to the coordinator ministry for approval
- analysis the performance criteria realization and the quarterly report regarding the institute activity; approves measures to perform the activity in balanced conditions of income and expenditure budget
- analyses, approves or depending on the situation proposes for approval the investments to be performed by the institute

Director Committee: general director, scientific director, economic director, the heads of the research laboratories, head of Technological Transfer Centre, secretary being the head of Programs, Technical, Marketing, Public relations and Mass media Compartment.

The director Committee has responsibilities and competencies limits which are proposed by General Director and approved by Managing Board. The Director Committee establishes the necessary actions to achieve the objectives from: the IMNR R&D programs strategy, annually R&D program, income and expenditure budget, investment program, and quality management system, others (HG 2115 from 24.11.2004). Director Committee goes together three times monthly whenever the interest of the institute requires. At the director committee meetings the employees' representative participates as invited member.

2.3 The scientific council

Scientific Council:

Dr. Roxana M. PITICESCU	President
Dr. Teodor Velea	General Director of IMNR
CS II Luminita MARA	Vice-president
CS II Mircea GORINOIU	Secretary
Dr. Radu R. PITICESCU	Member
Dr. Vasile Soare	Member
CS II Viorel BADILITA	Member
Prof. Dr. Dragoş TALOI	Invited member
Prof. Dr. Nicolae ANASTASIU Correspondent member of Romanian Academy	Invited member
Dr. Siemon SMID	Invited member

The main responsibilities of the Scientific Council are as follows (HG 2115 from 24.11.2004):

- participates to the elaboration of the R&D activities development strategy and own plans for R&D
- analyse, advises and monitor the achievement of scientific research works
- proposes to the Managing Board the IMNR annually plan of research, development and innovation
- advises the acts which involves the research policy IMNR
- proposes measures for professional training, situation of the research personnel on professional degrees
- organises and coordinates scientific events
- advises the national and international scientific cooperation actions
- advises the fellowships and training stages, in the country and abroad.

2.4 The various departments, research labs or groups,

Initially the institute was organized in heterogeneous small research groups in the frame of a Research Department. An organization change model of the institute was necessary to meet the research market competition based on quality and performance.

The research sector is organized in three laboratories according to the scientific research directions developed by the institute:

- Eco-technologies and Environmental Protection Laboratory
- Nanostructured Materials Laboratory
- Advanced Materials

This structure enables to enhance the performance of the institute according to its mission and general objective by:

- Increase of the clients satisfaction, quality, labour work efficiency and the involvement of the researchers according to their competencies and experience, reduction of highly experienced human resources loss, equipments efficiency which is a decision element when new equipments acquisitions or move out are required
- Increase the capacity to develop new research directions and applications using the specific experience from every laboratory
- Increase the efficiency to plan in detail the resources using the data base of every laboratory
- Creation of new competencies, mainly a multidisciplinary approach of standards and procedures.

The three laboratories jointly develop a research line aiming to the development of the non-ferrous metals based materials for high tech applications, the enhancement of the metal resources use and recovery rate of secondary non-ferrous metals based resources.

2.5 Technical or auxiliary support structures

Three technical/auxiliary support structures there are in the institute, namely:

- Physical-Chemical Analysis Laboratory
- Microscopic Characterization Laboratory
- RTD Laboratories Technical Support

The technical/auxiliary support structures assure the achievement of the mission of the institute meaning to respond with highest quality services to clients' needs.

3 General activity report of the institution

The institute is organized in five research teams which develop activities in the following fields:
Team E1: Nanomaterials for health and improved life quality
Team E2: Materials for nano-systems used in clean energy applications
Team E3: New concepts, new technology for sustainable processes in non-ferrous metals industries
Team E4: Environmental protection- standards and best practices in non-ferrous metals industries
Team E5: New metallic materials and technologies

3.1 Mission

IMNR has a strategic position in the field of non-ferrous metallurgy. IMNR will be a leader institute in the field of non-ferrous metals metallurgy research and applications, focused on responding with highest quality services to client needs. Innovation and know-how transfer is the core of research activity in IMNR. Integrity and engagement for excellence are the features of our activity and organizational culture.

3.2 General objective of ICDMNR IMNR

The general objective of IMNR encompasses the development of the institute to become a national leader in the field of science and technology of materials based on non-ferrous metals and fully integrated in European Research Area.

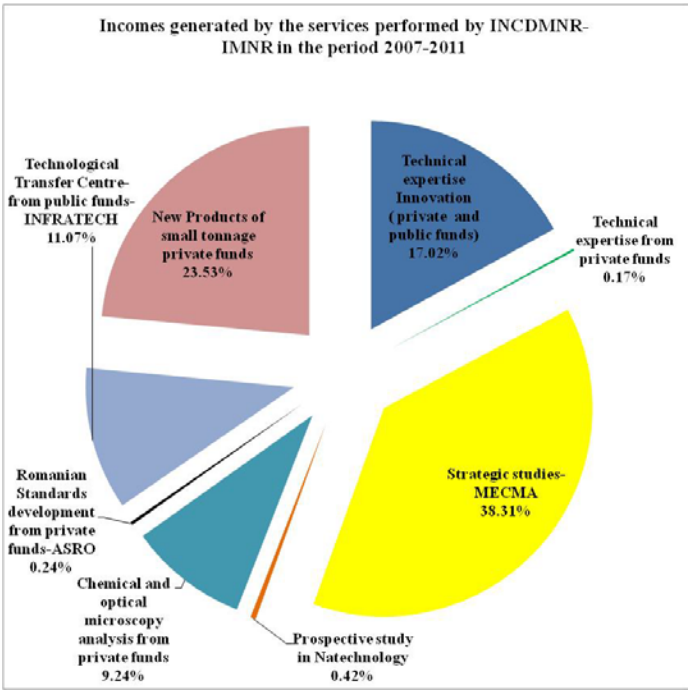
3.3 Offer of services and technological transfer

- Consultancy, technical expertise, in the field of obtaining and using metals and metallic compounds
- Strategy studies, technological and, market studies, case studies for modernizing SME's
- Accredited physical – chemical and optical microscopy structural analysis
- Performing new products of very small tonnage, from non-ferrous based materials and for special purposes
- High-level professional and educational refresher courses young graduates, personnel from industry;
- Romanian Standards development

Direct/Indirect Beneficiaries (selection)

Nr	Activity Domain	Beneficiary type	Services/benefits
1	ASRO (Romanian Association for Standardisation)	Body	Romanian Standards development
2	ROMCONTROL, SC REMAT SA, SC LAROMET SA, SC ELECTROMONTAJ SA, SC RAMI DACIA SA, CARGO STEEL SRL, SC PETROM STEEL COMPANY, SC ALCO METAL SISTEM SRL, SC NUCLEAR NDT& SERVICES SRL, SC GOLD RECOVERY SRL, SC HOEGANES CORP. EUROPE SRL, etc.	SME	Chemical Analysis
3	National Authority for Consumer Protection	Body	Chemical Analysis
4	INDUSTRIAL CHIM	Medium Ind	Chemical Analysis
5	UTCB –Installation faculty	University	Chemical Analysis
6	NEFERAL	Large Industry	Chemical Analysis
7	Apa Nova	Large industry	Chemical Analysis
8	UK Embassy	Body	Chemical Analysis
9	State Treasury	Body	Chemical Analysis
10	UTCB Design and Constructions Research Department	RTD/University	Chemical Analysis
11	TRANSGAZ	Large industry	Chemical Analysis
12	SILCOREX SA, SC.FABRICA DE SITE SRL SC.A-E ELECTRONICS SA , etc	SME	Optical microscopy
13	Ministry of Economy, Commerce and Affairs Environment	Body	Strategic studies in the specific field
14	Ministry of Education, Research, Innovation, Sport and Youth/ NASR	Body	Participation to elaborate the Prospective studies in the field of Nano-technologies

15	SC VELFINA SA, Campulung, Arges, SC PlasmaJet SRL Măgurele INDUSTRIAL PROIECT SRL, SC CEPROCIM SA, SC SITEX 45 SRL, SUDOTIM Timisoara, SC ELEOLIT SRL SC PROEX CONSTRUCT SRL	SME	Technical expertise in the field of nanostructured materials, metallic waste recovery, materials for coatings, process techniques for surface treatment, characterization of volcanic tuff, characterization of some materials from Govora area
16	Technological Transfer Centre of IMNR	National R&D Institute	Training courses on: -optimization of the manufacture processes of non-ferrous based materials -thermodynamics of complex non-ferrous based materials systems
17	ALCO METALS, BRAILA SHIP REPAIR, ICPE SA TELECOMUNICATII CFR GALATI, SUDOTIM SA TIMISOARA, etc.	SME	New products of very small tonnage



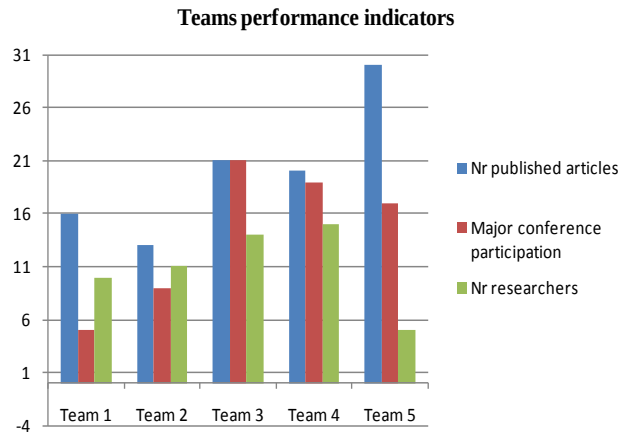
The services offered to the clients are diverse and play an important role in the institute activity. IMNR has to meet the increasing competition of other entities, consequently: i) the enhancement of products quality, ii) high rate of products innovation iii) intensification of the researches in the environmental field iv) enhancement of marketing activities are compulsory.

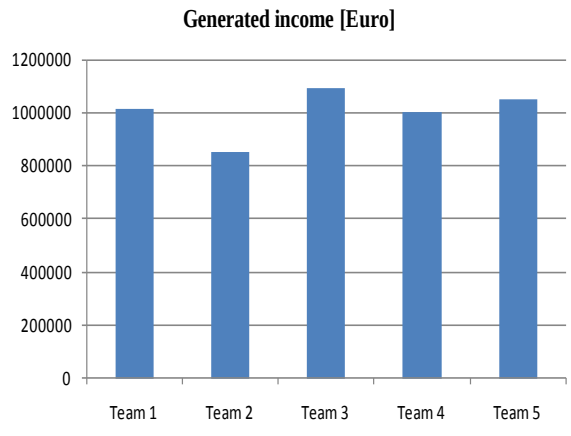
IMNR focused the attention to develop its own research system to have a continuous flow of innovative, unique products being a source of competition advantage.

The incomes from services and technological transfer in the period 2007-2011 are about 1.192.870 Euro.

3.4 Major IMNR achievements

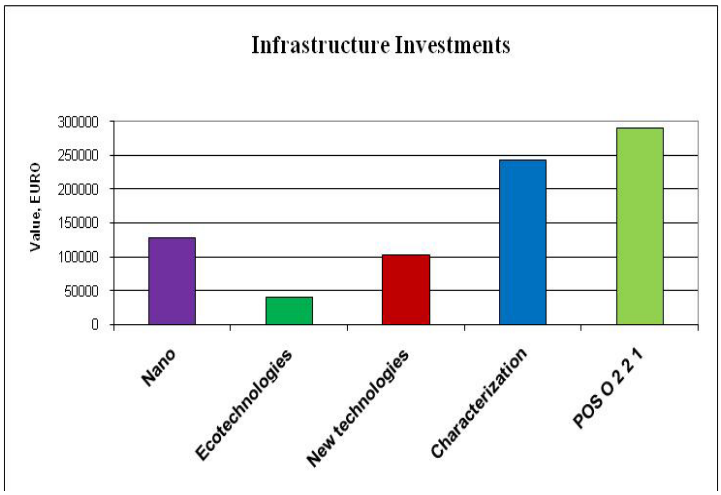
	No. published Articles	Major conference participation	Nr researchers /teams	Income generated EUR
Team E1	16	5	10	1012810
Team E2	13	9	11	853282
Team E3	21	21	14	1090420
Team E4	20	19	15	1004720
Team E5	30	17	5	1048600





The five teams have a balanced contribution in achieving the main performance indicators of the institute.

3.5 Major IMNR investments,



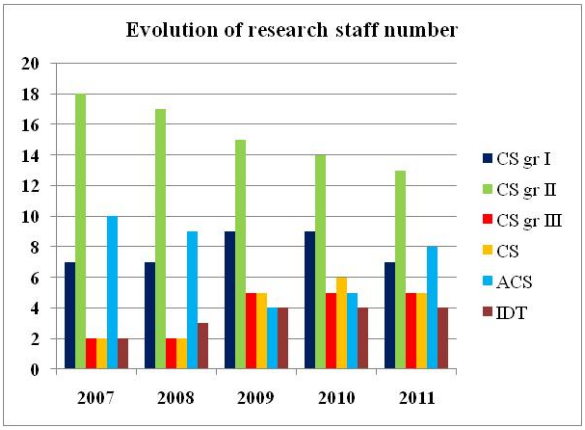
Total investments in the research infra-structure of INCDMNR-IMNR for the period 2007-2011 were 1830132 lei (mean equiv. about 457600 EUR).
Important investments have been done for the characterisation infrastructure enabling to qualify materials and technologies for applications. The investments in the research infrastructure for Nanomaterials and Advanced Materials scientific directions assure the manufacturing chain. In the figure, at the date of the present report the value corresponding to POS 2.2.1 represents the investment in building modernization for Centre for Research Centre "High PTMet". Acquisition of the equipments is in course (about 1.557.650 Euro)

3.6 Human Resources development

At the date of present report INCDMNR-IMNR has a total staff of 81 people hired of which 64 in RTD activities and 17 in administration services. The evolution of research staff directly involved in the research teams for the period 2007-2011 is presented in table below.

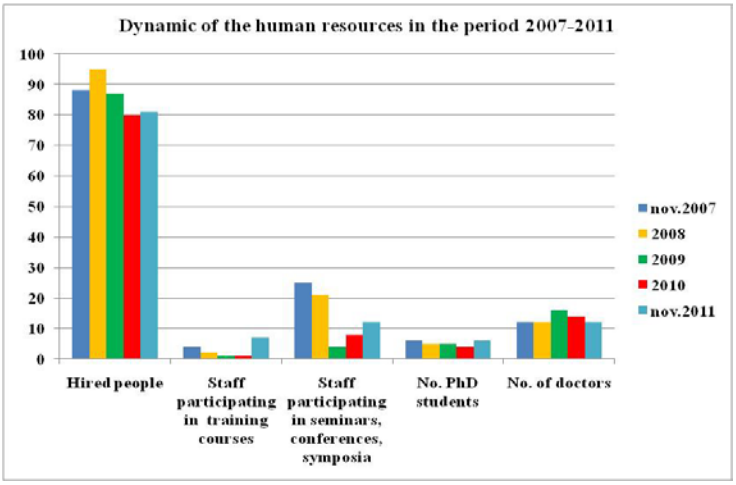
Evolution of human resources number, structure

Type/year	2007	2008	2009	2010	2011
CS gr I	7	7	9	9	7
CS gr II	18	17	15	14	13
CS gr III	2	2	5	5	5
CS	2	2	5	6	5
ACS	10	9	4	5	8
IDT	2	3	4	4	4



Dynamic of the human resources

Year	Hired people	Staff participating in training courses	Staff participating in seminars conferences symposia	No. PhD students	No. of doctors
2007	88	4	25	6	12
2008	95	2	21	5	12
2009	87	1	4	5	16
2010	80	1	8	4	14
2011	81	7	12	6	12



Average research staff age from the institute 49 years

Capacity to attract young graduates in doctoral thesis: 2 PhD students preparing doctoral thesis in collaboration between University POLITEHNICA Bucharest-Faculty of Applied Chemistry and Materials Science- Physical Chemistry Department and IMNR – Nanostructured Materials Laboratory (experimental part, training on-hands).

Research stages abroad:

- 17 stages, short term missions and summer schools in the field of nanobiomaterials;
- 13 stages, short term missions and summer schools in the field of nanostructured materials for clean energy applications;
- 7 stages and trainings abroad in the field of sustainable processes in non-ferrous metallurgy;
- 5 stages and training abroad in the field of eco-technologies

Participation in major training programmes:

- Analytical Laboratories - RENAR Certification according to SR EN 17025 (6 researchers);
- Management of the European Funded Project: post-university course (2 researchers);
- IPR Management (1 researcher);
- Training of trainers: CNFPA Certified course (3 researchers)
- Financial and economic audit (4 people)

Gender issue: In the institute there is no gender discrimination in the evaluation of professional performances and promotion. A number of 6 women have leader positions in the institute.

Technological transfer activities

Major IMNR technology transfer activities

- Total number of National patents in the period 2007-2011: **10**
- Total number of National patent requests in the period 2007-2011: **31**(in different stages of verification at OSIM)
- The patent request „Bandage impregnated with triglycerides and ZnO nanoparticles with Ag, recipe and process for producing sterile bandage" was implemented to VELFINA S.A who tested and launched the new product on the market; the IMNR revenues from selling Ag-doped ZnO nanopowders according to the patent were in 2011 of 1000 EUR.
- Two confidential agreements were signed based on one patent, with "Outokumpu" Finland and "Tecnicas Reunidas" Spain; the purpose of the agreements is represented by the effort to apply the patent in industry in Europe and worldwide. This patent (technology) is proposed to be applied in one (from 10) demonstrative pilot that will be built with money from EC, in the period 2013 – 2016 ("Roadmap for securing a sustainable raw materials supply basis for Europe" – EPM SRM 2011).

3.7 Dissemination and promotion

- Diploma and gold medal, the special prize of the Prime Minister of Belgium and a diploma granted by University of Hong Kong for the best invention. Inventika" Salon Brussels 2007, the special prize of the Prime Minister of Belgium and a diploma granted by University of Hong Kong for the best invention.
- Diploma and gold medal at "The Belgian and International Trade Fair for Technological Innovation", Brussel, Eureka, 2008 S. Andrei, M. Beda, L. Sârbu, A. L. Radu, S. O. Dima, L. Mara, T. A. Abagiu, S. Motoc " *Process for the obtaining of silicon nitride having tailored structure* "

- Diploma and gold medal at INVENTIKA, Bucharest, 2008; L. Gherghe, T. Velea, V. Predica, M. Gheorghiţa „ *Process for Pb valorisation from secondary sulphate-oxide containing lead.*
- Diploma and siver medal at INNOVA Eureka Bruxelles (13-15 nov. 2008) and Inventika Bucharest 2008: R. M. Piticescu, C. G. Chiţanu, M. Albulescu, R. Negriu **„***Process for obtaining hybrid nanostructured powders based on hydroxyl -apatite and maleic acid copolymers for regenerative medicine"*
- Diploma and silver medal at INVENTIKA, Bucharest, 2008; V. Soare, C. Gurgu, M. Burada, I. Surcel, M. Târcolea, S. Ciuca „ *Process and installation for obtaining metallic Titanium by electrochemical proceesses* "
- Diploma and bronze medal at INVENTIKA, Bucharest 2008; M. Gheorghiţa, L. Mara, T. Velea, C. Gornic, A. Covrig, D. D. Ilie, T. G. Tabăra „*Catalyst for Depolluting Gas Emissions from Motor Vehicles and Process for Preparing The Same*'
- Diploma at "4-th Edition du Saloon Europeen de la Recherche & de l'Innovation", Paris, 5 - 7 June 2008; R. M. Piticescu, G. C. Chiţanu, M. Albulescu, R. Negriu „ *Hybrid Organic-Inorganic Nano-Bio-Material Obtained In-Situ by a High-Pressure Low Temperature Innovative Procedure* "
- Diploma and gold medal INVENTIKA, Bucharest, 2009;"Process for purification of waste sulphuric acid and its valorisations pure gypsum"
- Diploma and silver medal Geneva Exhibition, 2009;"Processus De Purification Avancee Des Eaux Contenant Des Metaux Lourds"
- Diploma and silver medal INVENTIKA, Bucharest, 2009,"Process for the obtaining of silicon nitride having tailored structure"
- Diploma and silver medal INVENTIKA, Bucharest, 2009,"*Mezoporous silica and process for its obtaining"*
- Diploma of Excellence for Participation and Stand presentation at INVENTIKA, Bucharest, 2009 and INVENTIKA 2010 Membership in European Technological Platforms and Joint Technological Initiatives European Technology Platform on Sustainable Mineral Resources - dr. ing. Teodor VELEA member in the Steering Committee;
- NANOfutures JTI – dr. Radu R. Piticescu member in the workgroup Technology Transfer and founder of NANOfutures Romania Mirror Group;
- ETP Nanomedicine: dr. Roxana M. PITICESCU member in the Workgroup for Regenerative Medicine;
- Romanian Association for Standardization - ASRO: IMNR has been founder member of ASRO since 1998;
- Member in ASRO Technical Committee CT 378 - Nanotechnologies (representative of IMNR-dr. Roxana Mioara Piticescu); IMNR is the President of the ASRO CT 171- Heavy Metals and Alloys
- Other INCDMNR-IMNR affiliations: Balkan Environmental Association B.EN.A.; Romanian and European Ceramic Society; Balkan Metallurgical Society; European and Romanian Analytical Society-EURACHEM; Romanian Society for Biomaterials; Romanian Society for Metallurgy; UGIR 1903

Activity	**2007**	**2008**	**2009**	**2010**	**2011**
Technology Transfer	Hannover Messe 17-18.04.2007	Salon de Recherche 5-7 July 2008, Paris	Research Exhibition Geneva,1-5.04.2009	Brokerage Event NMP, 15.09.2010 Brussels	**Nanoforum 2011 31.05-01.06.2011 Budapest, Hungary**
	6th Innovation Forum, 20-21.03.2007, Bucharest	7th Innovation Forum, 20-21.03.2008, Bucharest	8th Innovation Forum, 24-25.03.2009, Iasi	9th Innovation Forum, 25-26.05.2010 Bucharest	**10th Innovation Forum, 05-07.10.2011, Bucharest**
	National Research Exhibition & Inventika Bucharest, 04-07.10.2007	National Research Exhibition & Inventika Bucharest, 7-11.10.20078	National Research Exhibition & Inventika Bucharest, 28-31.10.2009	National Research Exhibition & Inventika Bucharest, 07-10.10.2010	**National Research Exhibition & Inventika Bucharest, 05-08.10.2011**
	Infratech Training Mission Germany-Austria, 18-25.11.2007	EUREKA Exhibition Brussels, 14-15.11.2008		Exhibition Opening Renault Technical Centre, 15.09.2010	**Regional Exhibition Bacau, Romania 07-09.07.2011**
Workshops & Conferences Organised	2nd Functional Nanomaterials 05.10.2007	3rd Functional Nanomaterials 07.10.2008	4th Functional Nanomaterials 01-02 July 2009	5th Functional Nanomaterials 22 April 2010	**6th Functional Nanomaterials 06 October 2011**
		Nat. Conf. Metallurgy &Mat.Sci. ROMAT 25-26.09.2008			

4 Management efficiency and quality of the research environment

4.1 Existence of transparent mechanism to evaluate the personnel and financial stimulation of the performing personnel on the basis of merit and real professional performances

The scientific and technical development of the institute and the necessity to increase its competitiveness requires the personnel evaluation on the basis of performance criteria. In the institute the personnel is evaluated according to its own Methodology approved by the Managing Board. The performance appreciation takes place once a year and is initiated by the Human Resources Department. The performance measurement will be focused on the following quantitative indicators:

- Quality and complexity of the elaborated papers (technical level, clarity, concision)
- Productivity (number of papers/year, related to their complexities
- Level of dependency in solving problems
- Coordination capacity
- Extraordinary actions to support the research team and activity
- Deadline oriented
- Management level of the activity

4.2 Efficiency of the administrative procedures implemented in the institute

The institute is certificated ISO 9001 and implements OMFP 946. Consequently, the efficiency of administrative procedure is permanently monitored, there are procedures and specific, clear defined objectives for each department.

4.3 The satisfaction degree of the research and development personnel with respect to the support offered by administrative, auxiliary and technical compartments

In order to maximize the efficiency from administrative point of view within research project implementation each research team has a dedicated person dealing with all administrative issues of the projects. The dedicated persons have been trained in all necessary competencies (project management, financial issues, acquisition law and reporting procedures) thus leading to an easier project implementation.

4.4 Transparency degree in taking the decisions and funds allocation in the institute

Director Committee decides on the actions to be performed in order to fulfil the institutes' strategic objectives. These decisions are communicated to all personnel via intranet system and detailed explained by the heads of the departments to all interested parties.

4.5 Implication level of the personnel in taking decision process

Heads of departments organise weekly meetings in order to analyse department activity status but also to receive feed-back related to possible problems risks, or new ideas. The feedback received is communicated formally during the Scientific Committees meetings, but also, if the situation requires through informal meetings with the top management. The researchers are allowed to communicate directly with the top management, anytime they feel like.

4.6 Ethics Domain

Even no significant ethics events appeared during the reporting period the Ethics Committee is deeply preoccupied like the institute activity to be performed according to ethics principles.

A special attention is given to IPR issues, the Technological Transfer Centre is hosting a special trained person in this sensitive area.

4.7 Adherence to the good practices in the institutional management field at European and international level

Due to the ISO 9001 certification process certain internal procedures have been developed based on the European Charter for Researchers, the Code of Conduct for the Recruitment of Researchers, MIT guide for research data management.

5 Activity report by team (maximum 3 pages per team)

5.1 Team E1: Nanomaterials for health and improved life quality

Team leader: Dr. Roxana Mioara Piticescu

A. DESCRIPTION OF THE TEAM ACTIVITIES

The team was born in 2006 after the recognition and reorganization of IMNR as National Institute, based on the specific expertise and original results on high pressure synthesis of biocompatible (bio-inert, bio-degradable) hybrid nanomaterials. The team is developing the following types of activities using the frame of Laboratory for Nanostructured Materials:

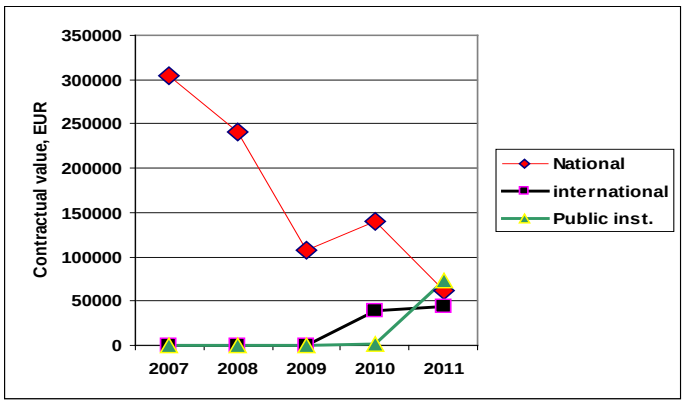
A1: applied scientific research

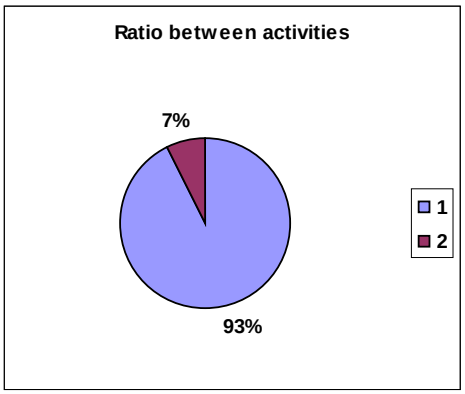
A2: scientific and technological services

The evolution of activities in time is presented in the synthetic table below.

Year	Activity Type	Contracts from National Projects (EUR)	Contracts from International Projects (EUR)	Contracts with public institutions (EUR)
2007	A1	303878		
2008	A1	240738		
2009	A1	107850		
2010	A1	140599	38478	
	A2			900
2011	A1	62437	44021	
	A2			73909
TOTAL	**A1**	**855502**	**82499**	**0**
	A2	**0**	**0**	**74809**

Total team E1: 1012810 EURO





The evolution of the contractual values from National Projects shows an important decrease from 2007 to 2009, followed by some recovery and stabilization in 2010 - 2011. This is the result of the reducing contract values by National Authority (NASR).

Partially the effect of decreasing National Funds was diminished by:

a) accessing the FP7-NMP project IP 28814 „Supersonic Deposition of nanostructured surfaces" started in December 2010. This project was a source for generation a new research direction in studying bioactive nanostructured ceramic coatings. The project is planned to finish in November 2013.

b) accessing structural funds – Human Resources Development project POSDRU /81/3.2/S/58103-PROFMEC for knowledge transfer in advanced materials for coatings toward industrial specialists in the mechatronics (biosensors) field, opening new links with the industry (in-course, 2010-2013).

The major types of activities developed in the period 2007-2011 were applied research. About 7% represents scientific and technological services related to the ***elaboration of National strategic directions in the field of Nanotechnologies in Romania*** (NANOPROSPECT), financed directly by NASR in the period September 2010-May 2011. (work-groups for Nano-bio-systems and Nanotoxicology) and POSDRU-PROFMEC.

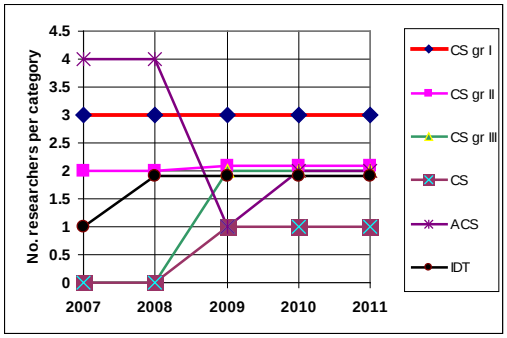
The team has unique know-how in the synthesis of new hybrid inorganic-organic nano-bio-materials under high pressure in solutions. For such procedures the team has NO competitors on the RTD Romanian market. At international level there are only few groups in USA, Japan, France, Germany, England. The niche market for these materials is still in initiating stage, there is a large place for new research, and the team cooperates with most of the groups to push the applications ahead.

B. Main research directions:

1) **Regenerative Medicine**: hybrid biocompatible nanostructured materials for dental, orthopedic or knee implants with finely tuned composition and architecture.
   a) Bioactive nanoparticle coatings on the surface of implants, to enhance bonding of the implant to the adjoining tissue and significantly prolong the implant lifetime.
   b) Assessment of toxicity: role of size, shape and chemistry of nanoparticles which interact with cells, especially of human origin.
2) **Nanotechnology based Diagnostics and Imaging**:
   a) Developing of new contrast agents based on dendrimers and nanoparticles for diagnosis and therapy, adjusted to respond efficiently to requirements such as sensitivity and specificity.
   b) Miniaturized devices: nanoscale sensors based on biosensing elements and their integration into microscale devices for oncology, neurodegenerative diseases or chronic diseases.

C. The evolution of human resources

Type / year	2007	2008	2009	2010	2011
CS gr I	3	3	3	3	3
CS gr II	2	2	2	2	2
CS gr III	0	0	2	2	2
CS	0	0	1	1	1
ACS	4	4	1	2	2
IDT	1	2	2	2	2
Total	10	11	11	12	12



The group grew slightly. At the end of 2008 a no. of 3 ACS successfully obtained the promotion examination to higher scientific degrees. In 2010 a new young researcher was hired.

The **average age** of the team in 2011 is **43** years.

Competencies:

CS gr. I (2)	Hydrothermal and sol-gel colloidal synthesis of nano-materials; hybrid nanostructures; Project management; training of trainers
CS gr. I (1)	Mathematical modeling and process optimization
CS gr.II (2)	Nanomaterials processing and design of experimental set-up
CS gr.III (2)	Synthesis of hybrid nanostructures; FT-IR spectrometry of biomaterials
CS (1)	Synthesis of hybrid nanostructures; spin coating deposition
ACS (2)	Characterisation of nanomaetrials (zetaseizer);
IDT	Laboratory samples preparation; DSC characterization;

Mobilities, Stages, Fellowships, Personnel Exchanges, Summer schools

YEAR	Stages	Fellow-ships	Personnel Exchanges	Summer schools	Total
2007	1 (COST D030)		1 (COST D030)		2
2008				2 (NN2008 Thesaloniki)	2
2009			3 (Bilateral China)		3
2010	2 (COST-TD0802) CNRS/SFERA	1 post doc	1 (COST TD0802)		4
2011	1 (JRC –ESPRA)		1 (COST TD0802)	4 (1COST-TD0802, 3Postdoc)	6

D. Major achievements (2007-2011):

Some relevant achievements in RTD activities are summarized in table below.

Year	Portofolio of competences	Research projects	Value, EUR	Related achievements	Beneficiaries
2007	4 Chemists, 6 Mat. Sci.	F14: ReteBdent F13: RoNanoMed	158650 15135	2 technologies; 2 ISI papers	NASR
2008	4 Chemists, 7 Mat. Sci.	F15: BiomatLab F1: SINAPS	212160 120270	1product; 2 ISI papers; 2 accredited methods	NASR, RENAR
2009	4 Chemistry, 7 Mat. Sci.	F16: TecoRemed F21: Hinamasens	54701 117905	2 technologies; 1 ISI paper; 1 patent request	NASR, AMCSIT
2010	4 Chemists, 8 Mat. Sci.	F24: PANSAG F22: Tecnanoeco	90250 64155	1 product; 1 ISI paper, 2 patent requests	AMCSIT, UEFISCDI
2011	4 Chemists, 8 Mat. Sci.	CF3: Supersonic CF6: ProfMec	88590 348890	2 methods, 2 ISI papers, 1 patent request	EU-DGR, FSE-POSDRU

The results (1 patent already producing revenue, 3 request patents, 8 ISI papers, over 10 technologies/products) and involvement in the elaboration of National Strategy for Nanotechnologies (Nanoprospect) may be considered as good for a young team (5 years activity) in a new research direction.

E. INTERDISCIPLINARITY

The team works together with biochemists, physicists (High resolution structural characterization) and doctors from Romania and abroad to assess biocompatibility using cooperative research projects (National and EU) and ESDF-COST Network TD0802.

F. TECHNOLGY TRANSFER RELATED ACTIVITIES

One patent was granted (Decision 3/393/30.12.2008) and 3 National Patent Requests are under certification. The patent request „Bandage impregnated with triglycerides and ZnO nanoparticles with Ag, recipe and process for producing sterile bandage" was implemented to VELFINA S.A who tested and launched the new product on the market; the IMNR revenues from selling Ag-doped ZnO nanopowders according to the patent were in 2011 of 1000 EUR.

G. OTHER RELAVANT INFORMATION

One PhD thesis presented (M.L.Popescu) „Hybrid nanocomposite materials based on hydroxyapatite and maleic copolymers" (2008)

One Postdoc („Hybrid nanostructured materials based on ionic polyurethanes and calcium phosphates with potential applications in tissue engineering") in the frame of Postdoctoral programme „Cristofor I Simionescu", POSDRU ID 55216, 2010-2013.

EU Network: COST Action TD0802: Dendrimers in Biomedical Applications (2009-2013). Dr. Roxana M. Piticescu member in Management Committee.

ETP Nanomedicine: Dr. Roxana M. Piticescu representative for IMNR in the ETP.

STSM: Participation in JRC Nano Event and 2nd ENPRA Stakeholders Workshop "Challenges of Regulation and Risk Assessment of Nanomaterials" (10 – 12 May 2011), COST D030 (2007) and COST-TU0802 (2011)

Training Schools: ZnO doped nanomaterials, CNRS/PROMES-SFERA Programme, 2010; Thermal analysis and Calorimetry, Craiova (Sept.2011); Dendrimers as Composites of Advanced Drug Delivery nano-Systems-Biomedical applications-COST TD0802, Athens, Greece, 3-8 October 2011; Trends in synthesis and characterization of advanced materials for applications in biology and medicine, Postdoc, Timisoara, Romania, 27-30 July 2011; Biomaterials:Actual trends and outlook, Postdoc POSDRU ID 55216, Busteni, Romania, 09-13 November 2011.

5.2 Team E2: Materials for nano-systems used in clean energy applications

Team leader: Dr. Radu-Robert Piticescu

A. DESCRIPTION OF THE TEAM ACTIVITIES

The team was born from the group of Ceramic Materials (Nanostructured Materials Laboratory from 2006 after the recognition and reorganization of IMNR as National Institute), based on the specific expertise in chemical synthesis and nanostructured materials assessment. The team is developing the following types of activities using the frame of Laboratory for Nanostructured Materials:

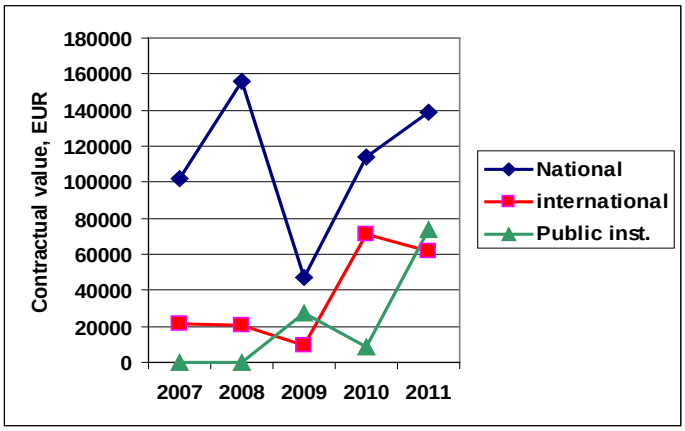
A1: applied scientific research

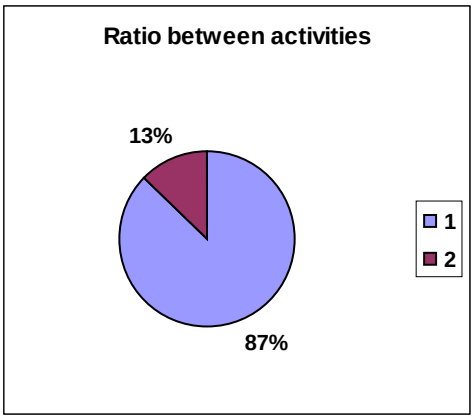
A2: scientific and technological services

The evolution of activities in time is presented in the synthetic table below.

Year	Activity Type	Contractual values from National Projects (EUR)	Contractual values from International Projects (EUR)	Contractual values with public institutions (EUR)
2007	A1	102136	21739	
2008	A1	156264	20334	
2009	A1	47015	9772	
	A2			27000
2010	A1	114025	71300	
	A2			8657
2011	A1	139196	61936	
	A2			73909
TOTAL team	A1	558636	185081	0
	A2	0	0	109566

Total team E2: 853282 EURO





The evolution of the contractual values from National Projects shows an important decrease in 2009 (due to the reducing values allocated by NASR), followed by recovery in 2010 and an increase in 2011 due to two new contracts: FP7-NMP project IP 28814 „Supersonic Deposition of nanostructured surfaces" started in December 2009 (end planned 2013) and Structural Funds-Human Resources Development Project POSDRU /81/3.2/S/58103-PROFMEC for knowledge transfer in advanced materials for coatings toward industrial specialists in the mechanics field, opening new links with the industry (in-course, 2010-2013).

The major types of activities developed in the period 2007-2011 are applied research. However starting with 2010 the role of scientific and technological services increased to 13 % related to: (a) elaboration of National strategic directions in the field of Nanotechnologies in Romania - NANOPROSPECT, financed by NASR in the period September 2010-May 2011 (workgroups for Nano-Energy and Technology Transfer) and (b) POSDRU-PROFMEC.

The team has unique know-how in the hydrothermal and hydrothermal/electrochemical synthesis of nanostructured powders and thin films. For such procedures the team has NO competitors on the RTD

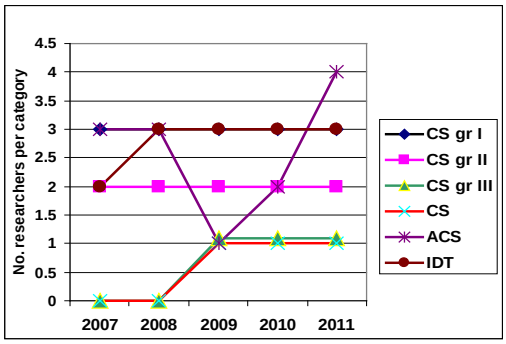
and Poland with similar procedures. However the development of these methods as an innovative procedure for energy applications is still in the initial stage, there is a large place for cooperation with most of the groups in the frame of European High Pressure Research Group.

B. Main research directions:

a) Elaboration of synthesis methods enabling to control the interfacial properties of nanomaterials for clean energy applications. Applications involved mainly photo-catalysis in UV and VIZ light for industrial water cleaning, new efficient materials for building and restoration and energy storage systems.
b) Understanding structure-property-processing relationships of nanopowders and their influence on the macro-scale behaviour of bulk materials. The main achievements are related to elaboration of database and models for laser sintering in rapid manufacturing platforms and grain growth modelling of nanostructured materials.
c) Thermal / functional assessment of nanostructured reactive powder systems and coatings
d) Main achievements: hydrothermal technology for the synthesis of core/shell nanostructured powders for thermal barrier coatings in co-generation of energy, thermal assessment of reactive powder systems for abrasion resistance and high temperature solid lubricants.

C. The evolution of human resources

Type / year	2007	2008	2009	2010	2011
CS gr I	3	3	3	3	3
CS gr II	2	2	2	2	2
CS gr III	0	0	1	1	1
CS	0	0	1	1	1
ACS	3	3	1	2	4
IDT	1	2	2	2	2
Total	9	10	10	11	13



The no. of team members increased constantly, 2 young scientists ACS have been hired in 2010 and 2011 (one reintegrated doctor from Ecole des Mines St.Etienne, one MSc). In the end of 2008 2 ACS have successfully obtain the promotion examination to higher scientific degrees. In 2010 a new young researcher was hired. The average age of the team is 38 years.

Competencies:

CS gr. I (2) Hydrothermal and sol-gel colloidal synthesis of nano-materials; core/shell nanopowders; Project management; training of trainers
CS gr. I (1) Mathematical modelling and process optimization
CS gr.II (2) Nanomaterials processing and design of experimental set-up
CS gr.III (1) Synthesis and characterisation of nanopowders
CS (1) Synthesis of nanopowders; deposition
ACS (4) Characterisation of nanomaterials (zetaseizer, DTA-TG);
IDT (2) Laboratory samples preparation and processing; Thermal properties measurements;

Mobilites, Stages, Fellowships, Personnel Exchanges, Summer schools

YEAR	Stages	Personnel Exhanges	Summer schools	Total
2007	1 (COST D030)	1 (COST D030)	1 (MEMS, IMT Bucharest)	2
2008			2 (NN2008 Thesaloniki)	2
2009		1 (COST TU0802)		1
2010	1 COST TU0802 ; 1 CNRS /SFERA	1 (COST TU0802)		3
2011	2CNRS /SFERA	1 (COST TU0802)	2 (COST TD0802-TACC)	5

D. Major achievements (2007-2011):

Some relevant achievements in RTD activities are summarized in table below.

Year	Portofolio of competences	Research projects	Value	Related achievements	Beneficiaries
2007	2 Chemists, 7Mat. Sci.	F3-Nanoche F5-MATSOL	54050 40540	2 technologies/ products; 2 papers	NASR
2008	2 Chemists, 8Mat. Sci.	F7-NANOGRAF F4-NanoMAT	121621 54054	3 products; 2 ISI papers	NASR
2009	2 Chemists, 8Mat. Sci.	F21-Fotocomplex F9-FP6 Manudirect	30500 90140	1 technology; 2products, 1 method; 2 papers;	NASR, EC-DGR
2010	2 Chemists, 9Mat. Sci.	F23-Grazir CF2–FP7 Supersonic	55074 277360	2 products; 2 methods; 1 guide; 1 database; 1 paper	UEFISCDI, EC-DGR
2011	2 Chemists, 10Mat. Sci., 1 geologist	CF4: ID 106 CF6: PROFMEC	244184 348890	2 technologies, 2 ISI papers, 1 patent request	UEFISCDI, FSE-POSDRU

The results (1 patent, 3 ISI papers, over 10 technologies/products, 1 database, 3 methods and models) and involvement in the elaboration of National Strategy for Nanotechnologies (Nanoprospect), participation in 1 FP6 and 1FP7 project with strictly IPR rules, may be considered as good for a young team (5 years activity) in a new research direction.

E. INTERDISCIPLINARITY

The team works together with physicists (High resolution structural characterization), mechanical engineers (mechanical testing) and energetic engineers from Romania and abroad to qualify materials properties using cooperative research projects and ESF-COST Network TU0802.

F. TECHNOLGY TRANSFER RELATED ACTIVITIES

1 Patent request „Hydrothermal process for the synthesis of nanostructred powders based on titanium dixide anatase doped with cobalt". As partners in 1 FP6 and 1 FP7 projects in the field the group had to obey the Consortium Agreement regarding patent, dissemination and protect its know-how.

G. OTHER RELAVANT INFORMATION

One PhD thesis presented (A.M.Motoc) „Reseaches regarding the influence of the additives upon the characteristics of zirconia based nanocomposite materials" (2007)

One New FP7 project to start expected January 2012 („FP7-Energy 2011-2–296006-Sugar Alcohol based Materials for Seasonal Storage Applications "SAM-SSA) aiming new nanocoatings to control heat transfer and hydrophobicity.

EU Network: COST Action TU0802: Next generation cost effective phase change materials for increased energy efficiency in renewable systems in buildings (2009-2013). Dr. Radu R. Piticescu member in Management Committee.

Participant in European Joint Technological Innitatives NANOfutures (R.R. Piticescu member in WG Research & Technology), founder and coordinator of National Mirror Group Nanofutures Romania (www.nanofutures.ro)

Short TermTraining Missions:

- Cristina Rusti at Bordeaux -STSM COST TU0802,
- A.M.Motoc, C.Rusti, S. Valsan-CNRS/PROMES France, FP7 project „SFERA"

Participation in working group „Nano-Energy" of the strategic project „Nanotechnology in Romania: a prospective study"

Elaboration of a best practice guide for technology transfer in the field of advanced materials (PN II 92-096 Clustinova)

5.3 Team E3: New concepts, new technologies for sustainable processes in nonferrous metals industry

Team leader: Dr. Teodor Velea

A. DESCRIPTION OF THE TEAM ACTIVITIES

The past and the future society without metals, without resources is unthinkable.

The team was and is aligned to respond to the National and EU strategy in the field.

A1 – applied scientific research, industrial research and experimental development

A2 – scientific and technological services, technological innovation

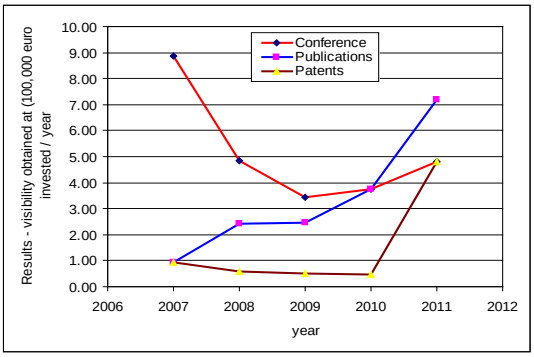
The evolution of the activities in time is presented in the synthetic table below:

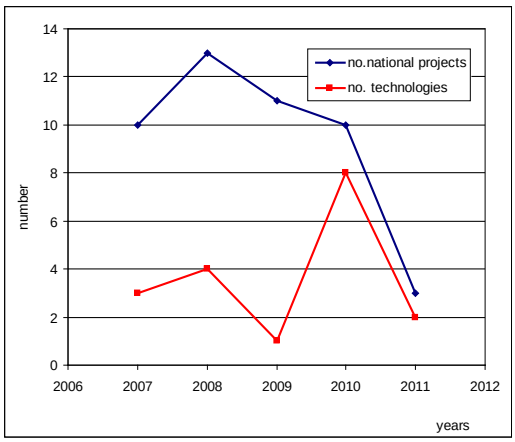
Year	Activity type	Contractual values from National Projects (EURO)	Contractual values from International Projects (EURO)	Contractual values from Public Institutions (EURO)
2007	A1	211450	65120	12500
2008	A1	278630		
	A2	5000		
2009	A1	258420		
	A2	55750		
2010	A1	54820	37270	
	A2	16250		
2011	A1	26820	21770	

B. Objectives and main research directions:

- Developing new innovative technologies and solutions for sustainable raw and critical materials and for the substitution of critical metals and materials.
- Improving materials knowledge, infrastructure base and innovative engineering.
- Process intensification in mineral and metals processing
- Increasing the competitiveness and the quality of the life, whilst drastically reduction resources and energy inefficiency and the environmental impact of industrial activities.

C. Major achievements (2007 – 2011)

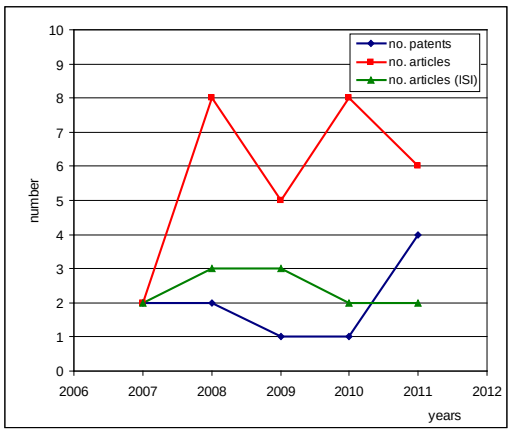




During 2007 - 2011 the team developed 13 national projects with a total value of 759.66 thousand euro and 5 international projects with a total value of 330.76 thousand euro. 18 technologies, 13 new products, 14 models and 10 patents resulted from the above mentioned projects.

The visibility was assured through the publication of 30 articles in scientific journals (18 in scientific journals with ISI quotation), 54 scientific communications at congresses, symposiums, workshops, 29 international congresses, 23 fairs, expositions and salons of inventions.

Comments: The last national competitions have been in 2007 and 2008, when *each experienced researcher has been gained at least one project*. During 2009 – 2011, the lack of national competitions was balanced by participation at European competitions: 3 project proposals at FP7, 2 project proposals at LIFE+, 1 project proposal at program financed by Switzerland. Also, it has been gained a competitiveness project (Economy, Trade and Business Environment Ministry) and by co-participation.



Comments: Even the financing decreased during 2008 – 2011, the number of patents and articles increased because in 2010 and 2011 they had been finalized the projects which have been started in 2007 and 2008.

The next main technologies were the key to fulfill the strategic objectives.

Objective: Developing new and sustainable technologies: Metal factory for the future.

Technology: "Technological concept radically changed in extractive industry of non-ferrous metals for a cleaner, safer and eco-efficient production".

The patent for this technology obtained at "Inventika" Salon Brussels 2007 the gold medal, the special prize of the Prime Minister of Belgium and a diploma granted by University of Hong Kong for the best invention.

Technology: "BIOMINE: Biotechnology for Metal Bearing Materials"

This is a European integrated, multidisciplinary project (consortium formed of 37 partners from Europe and South Africa) within FP6. The project is promoting/encourages the use of biotechnologies in nonferrous metals metallurgy and mining.

Technology: "Obtaining technology of high purity gallium for high-tech applications"

The technology recovers gallium from bauxite, in the Al_2O_3 obtaining circuit through Bayer process. Gallium used in electronic industry is considered a "critical" metal. The gallium extraction yield is over 90 % while the purity of the obtained gallium is higher than 99.999 %.

Objective: Developing new innovative solutions for the substitution of critical materials (metals)

Technology: "New microcrystalline advanced materials with applications in electric energy use"

The complex and interdisciplinary project lead to the obtaining of a composite material: copper-molybdenum-zirconium-yttrium for the replacement of the "critical" metal – silver – in electric contacts.

Technology: "New materials and systems for prosthetics and dental implantology"

The project's goal is the obtaining of composite high-tech materials of titanium, titanium alloys, zirconium, zirconium di-oxide and special alumina; "Critical" metals: Au, Ag, Pt, Pd are thus completely replaced in such applications.

Innovative technology for the obtaining of ceramic foams from polymeric nano-composites with use in the de-pollution of gaseous fluxes from thermal station

Objective: Studies development for the Governmental Sector

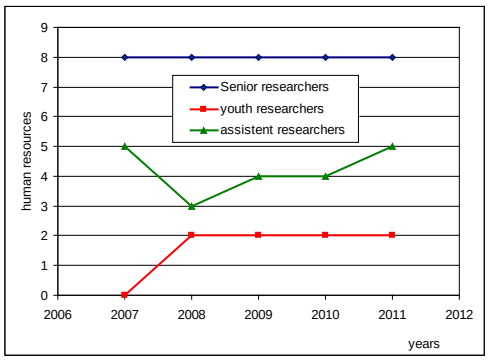
Study: "Solutions for the viability of the main metallurgical Romanian companies according to the European performance criteria"

Objective: Promoting cooperation with key actors from Europe and World wide

At the same time, the team leader is part of the High Level Group of European Technology Platform on Sustainable Mineral Resources – HLG-ETP SMR, where he participates at the elaboration of the European Strategies in the domain.

D. Human resources

Evolution of human resources



Comments: Though from the known reasons, the research contracts from 2009, 2010, 2011 had the diminished financing with 65% per year, it was succeed the maintenance of research team and the young people have been involved for doctoral studies, in international projects and in actions for advance professional.

Mobility, stages, fellowships, specialization, training 2007 – 2011: Bilateral cooperation 2, Stages 5, Fellowships 9.

Experience of the team members

- High-tech technologies for metals obtaining: Zr, Ti, Cu, Zn, Pb, In, Cd.
- Advanced technologies in metallurgy and recycling.
- New technologies in non-ferrous metals processing.
- Science of materials, recycling, water purification
- Advanced techniques at high temperature, at high pressure or vacuum
- Advanced technologies for materials coating
- Aluminium, alumina advanced technologies and materials. Critical metals technology
- Management of European projects
- Teaching lectures in Politehnica University, faculty of Materials Science and Engineering

E. Interdisciplinary

Technologies and techniques for metals recovery from resources are very complex. It is necessary to apply knowledge from: science of materials, chemistry, physique, biology, geology. The specialists from the team demonstrated their multi interdisciplinary competences. Young employees are specialized all the time in new fields.

F. Technology transfer related activities

In the period 2007-2011, more than 15 SME were partners in the related projects and the results are ready to be applied in their enterprises.

Within three projects, (Innovation Program) two equipments were developed and those started functioning in industrial installations. The total value of the equipments is 800.000 euro.

Two confidential agreements were signed based on one patent, with "Outokumpu" Finland and "Tecnicas Reunidas" Spain; the purpose of the agreements is represented by the effort to apply the patent in industry in Europe and worldwide. This patent (technology) is proposed to be applied in one (from 10) demonstrative pilot that will be built with money from EC, in the period 2013 – 2016 ("Roadmap for securing a sustainable raw materials supply basis for Europe" – EPM SRM 2011).

G. Other relevant information

Collaboration in projects with more than 20 universities and institutes of the Romanian Academy.

Training:

- Silviana Onisei, 29 years old, will sustain on 19th of December 2011 her doctoral thesis "On the oxidation of non-ferrous metal sulphides under pressure and on the alkali activation of the resulting slag for the production of building materials"
- Elena Sirbu is in a "Marie Curie" stage at Nottingham University in England and she is in an advanced step for finalizing her doctoral thesis

5.4 Team E 4: Environmental protection-standards and best practices in nonferrous metals industry

Team Leader: Dr. Liliana Gherghe

A. Description

Waste prevention and minimization and recycling from waste are an essential part of the response to securing Europe in strategic raw materials.

A1 – applied scientific research, industrial research and experimental development

A2 – scientific and technological services, technological innovation

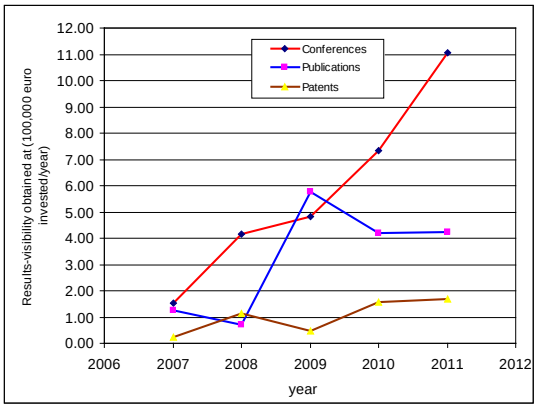
The evolution of the activities in time is presented in the synthetic table below:

Year	Activity type	Contractual values from National Projects (EURO)	Contractual values from International Projects (EURO)	Contractual values from Public Institutions (EURO)	Contractual values from Private source (EURO)
2007	A1	254730	5330	76500	
2008	A1	361530		72250	1250
2009	A1	112240		95520	
2010	A1	130440		60950	
2011	A1	65530	22400	28500	1200

B. Objectives and main R&D targets

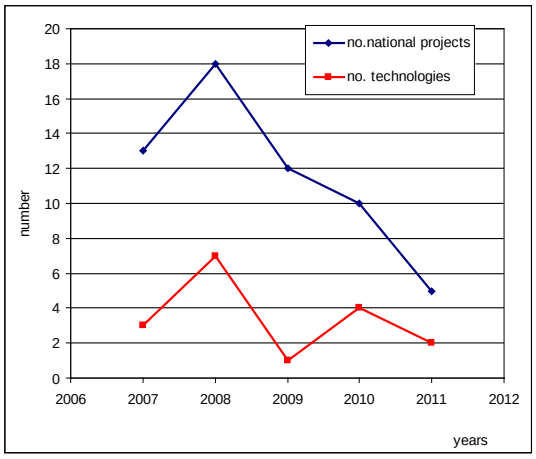
- Promoting complete recycling and reuse of secondary materials using innovative methods, for making value of wastes
- Promoting environmental sustainability
  - Define conditions for using technologies taking under consideration the limitations resulting from environmental conditions
  - Identification and separate the main sources of pollutions
  - Treatment of waste water streams in order to improve metal recovery and reduce hazardous emissions
  - Rehabilitation of sites polluted from metallurgical activities.
- Promoting initiatives, including legislation and standards (like BAT) targets needed to be implemented.
- Promoting cooperation with key actors from Europe and World to ensure short time implementation of the advances techniques and technologies.
- Collaboration with public authorities and the private sector to promote guidance for innovative technologies

C. Major achievements (2007 – 2011)

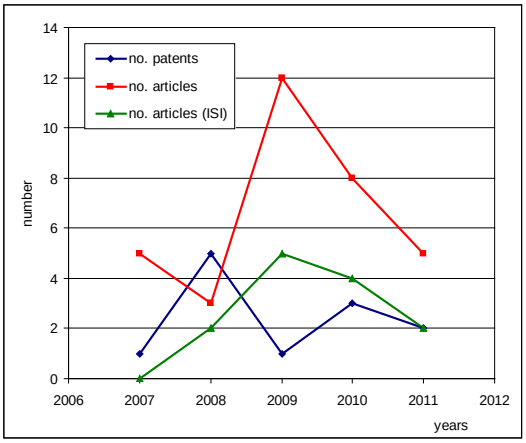


During 2007-2011 period the team developed 19 national projects with a total value of 981.95 thousand euro and 2 international projects with a total value 22.77 thousand euro, 17 technologies, 29 models and products and 12 patents resulted from the above mentioned projects.

The visibility was assured through the publication of 33 articles in scientific journals (13 in scientific journals with ISI quotation) 62 scientific communications at congresses, symposiums, workshops, international congresses, fairs, expositions and salon of patents.



Comments: The last national competitions have been in 2007 and 2008, when *each experienced researcher has been gained at least one project*. During 2009 – 2011, the lack of national competitions was balanced by participation at European competitions: 3 project proposals at FP7, 2 project proposals at LIFE+, 1 project proposal at program financed by Switzerland. Also, it has been gained a competitiveness project (Economy, Trade and Business Environment Ministry).



Comments: Even the financing decreased during 2008 – 2011, the number of patents and articles increased because in 2010 and 2011 they had been finalized the projects which have been started in 2007 and 2008.

The next technologies were the key to fulfill the main objectives.

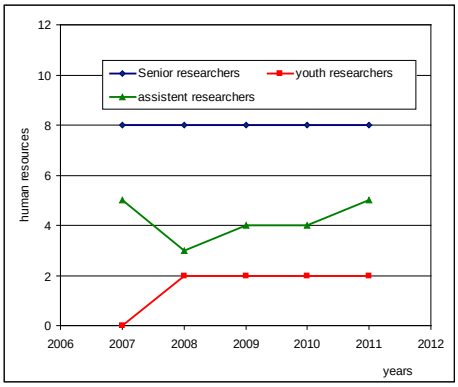
Objective: Domain approach by developing innovative solutions and technologies
Technology: "Developing a new concept "clean-lead" factory for Europe" – CLEAN LEAD
The project was developed within the European programs FP5 and FP6.
Consortium: 10 institutions and universities from Spain, England, Portugal, Poland, Romania, Holland, Czech Republic.
For the new process it uses minimal energy, virtually no raw materials, generate zero waste and consequently greatly reduce the operating cost.
Technology: "Microwaves eco-friendly alternative for a safe treatment of medical waste" – MEDWASTE
The European program: "LIFE" 2011-2013. It is cooperation with a Bulgarian partner. An innovative method and apparatus for decontamination of medical waste are applied using high frequency microwave energy.
Technology: "The estimation of the pollution degree of water and soil in the vicinity of the industrial area NEFERAL – Bucharest and the impact upon the heath of the people living in this area" –NEPOLL
Project financed by the Swiss National Science Foundation – ESTROM Program
The project results were a powerful signal for the plants in the area for people and authorities.

Objective: Water purification
Technology: Water purification from metallurgical plant
The technology is promoting new purification techniques for waste water provided by the metallurgical industry: cold plasma, electro-plasma, electro-coagulation and plasma plus electromagnetic field with efficient synergic effects. Heavy metals and organic substances are removed.

Objective: Promoting initiatives including legislation and standardization targets needed to be implemented: Collaboration of public authorities and the private sector to promote guidance for innovative technologies.
Technology: Two innovative technologies were done for polluted soils with heavy metals rehabilitation. Both of them are clean, non-polluting and efficient.

D. Human resources

Evolution of human resources



Comments: Though from the known reasons, the research contracts from 2009, 2010, 2011 had the diminished financing with 65% per year, it was succeed the maintenance of research team and the young people have been involved for doctoral studies, in international projects and in actions for advance professional.

Mobility, stages, fellowships, specialization, training 2007 – 2011: Bilateral cooperations 1, Marie Currie 1, Stages 4, Fellowships 9.

Experience of the members of the research team

- Water purification.
- Recycling processes, water purification.
- Soil remediation,
- Waste recycling processes
- Science of materials, recycling, water purification
- Soil and water remediation
- Recycling of waste processes
- Management of European Projects

E. Interdisciplinary

The researchers from the team have interdisciplinary competences: bioprocesses, green chemistry, geology, mathematic, metallurgy, science of materials. Young people have new competences, doing stages in Greece, Spain, Sweden, England in the field of new materials from raw materials and from wastes.

F. Technology transfer related activities

In the period 2007-2011, more than 14 SME were partners in the related projects and the results are ready to be applied in their enterprises.

Two new equipments with 250.000 euro value are in operation, with the participation of the specialists from the team.

The team is "present" in all the initiatives of European Platform ETP SMR, in the field of recycling and substitution of critical metals.

G. Other relevant information

Collaboration in projects with more than 20 universities and institutes of the Romanian Academy.

Training:

- Silviana Onisei, 29 years old, will sustain on 19th of December 2011 her doctoral thesis "On the oxidation of non-ferrous metal sulphides under pressure and on the alkali activation of the resulting slag for the production of building materials"
- Elena Sirbu is in a "Marie Curie" stage at Nottingham University in England and she is in an advanced step for finalizing her doctoral thesis

5.5 Team E5 : New metallic materials and technologies

Team leader: Dr.eng. Vasile Soare

A. DESCRIPTION OF THE TEAM ACTIVITIES

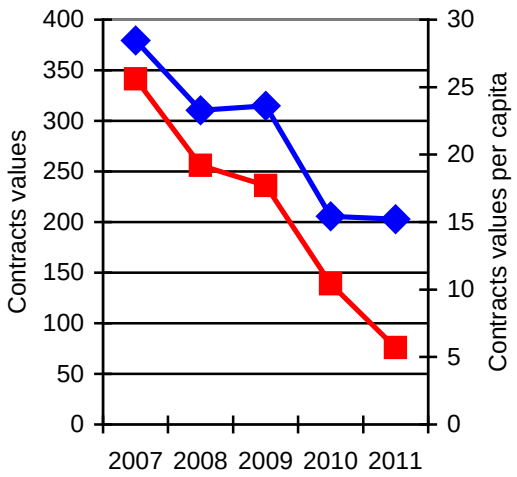
The team E 5 has been setting up in 2006 , as a result of IMNR reorganization as National R&D Institute. From the beginning of its activity, based on the scientific and technological expertise of the researchers in the field of alloys and composites, the activity of the team has focused on scientific and applied researches for new metallic materials synthesis (special alloys and composites, thin films, non-conventional technologies). In the last five years, the team has accomplished the following types of activities:

A1: fundamental scientific research

A2: applied and technological research

The evolution of activities in time is presented in the synthetic table below:

Year	Activity Type	Contracts (EUR)	Contracts / Researcher (EUR)
2007	A1	254879	2845
	A2	86500	
2008	A1	206670	2329
	A2	49500	
2009	A1	236110	2361
	A2		
2010	A1	138850	1542
	A2		
2011	A1	76100	1522
	A2		
Total	A1	912600	
	A2	136000	
Total Team		1048600	



The evolution of the year total contractual values shows an important decrease from 2007 to 2011. This is the result of two elements: the reducing contract values by National Authority and the important decrease of the team scientist's number because of their retirement. For this reason, reorganization was necessary, including the adjustment of the research fields of the team. Despite these facts, the contract value per capita indicates stabilization in 2010 – 2011.

The team E5 has developed in the period 2007-2011 as main activities fundamental scientific researches in the field of electrochemical processes in molten salts and aqueous media and especially applied technological activities for the synthesis of special nonferrous alloys and metallic matrix composites by means of new and efficient technologies.

The scientific staff of the team has a remarkable expertise and an unique know-how in the obtaining of metals and alloys by electrochemical co-deposition in molten salts (Al based alloys, Mg alloys, Li and Lanthanides alloys, etc.) and in the synthesis of new alloys and composites with high characteristics (Hydrogen storage alloys, soldering and brazing alloys, Al and Cu matrix composites).

B. Main research directions:

B1. Scientific and applied researches for metal and alloys synthesis by electrochemical processes

- New approach for Ti and other refractory metals synthesis by electrochemical dezoxidation in molten chlorides media
- Obtaining of reactive metals and their alloys by electrolysis in molten fluorides, chlorides.
- Modelling of the co-deposition electrochemical processes in the alloys obtaining by means of electrolysis methods.

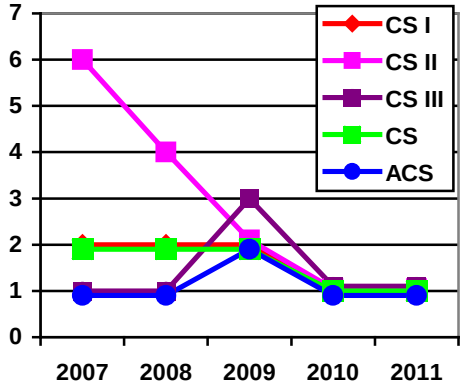
- Mathematical modelling of the chemical-metallurgical processes for the Al alloys matrix composites obtaining.
- Thin films alloys for photovoltaic and corrosion resistance applications obtained by electrochemical processes.

B2. New technologies for special alloys and composites obtaining.

- Al alloys matrix composites by in-situ processes
- Free toxic alloys for soldering and brazing
- Rapid solidification technologies for micro and nanostructured alloys synthesis
- High temperatures technologies for special alloys obtaining (hydrogen storage alloys, memory shape Ti based alloys).

C. The evolution of human resources

Type/year	2007	2008	2009	2010	2011
CS gr I	2	2	2	2	1
CS gr II	6	5	3	2	1
CS gr III	1	1	2	2	1
CS	2	2	1	2	1
ACS	1	1	2	1	1
Total	12	11	10	9	5



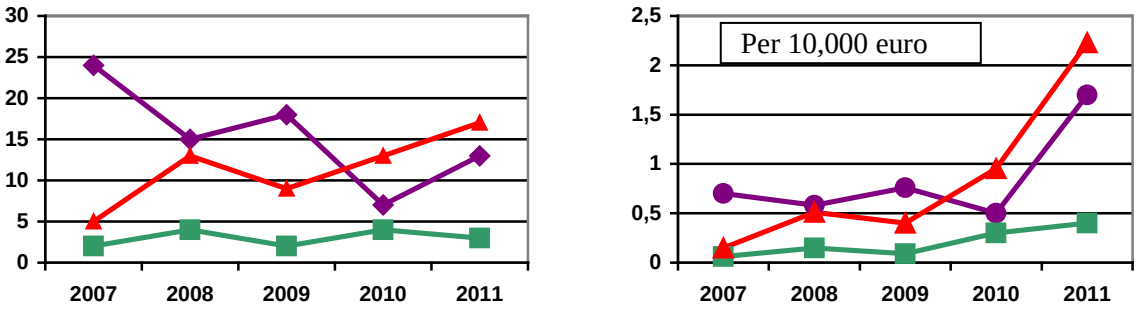
The number of scientists slightly decreased in the period 2008- 2010, and dramatically in 2011, because of the researchers retirement . In the end of 2008 a no. of 2 researchers have successfully obtain the promotion examination to higher scientific degrees, and in the same year, two new young researchers were employed. In 2011 the team has **average age** of **42** years, and combines the experience and expertise of senior researchers with the energy and enthusiasm of the younger scientists. Thus, team leader, *dr. eng. Vasile Soare*, in his 30 years of research experience, has coordinated as director several national and international projects in the field of the metals, alloys and thin films obtaining and participated at different short and medium training stages at prestigious research institutes from Greece, Norway, Germany, France. *PhD student Dumitru Mitrica* has experience in the field of alloys and metal matrix composites (Al, Ti) obtained by nonconventional methods. He graduated a Master degree at Arizona University Al alloys characterization, and e*ng. Marian Burada* followed training courses in molten salts electrochemistry to NTN University (Norway) and Patras University (Greece).

D. Major achievements (2007-2011):

Year	Portofolio of competences	Research projects	Value, EUR	Related achievements	Beneficiaries
2007	2 Chemists, 10 Mat. Sci.	F30: BIOCOB F31: CEEX 260	27500 29600	2 technologies; 7 papers, 2 products , 1 patent	NASR
2008	1 Chemist, 10 Mat. Sci.	F35: GR 39 F36: GR 64	26500 23250	2 ISI papers; 2 methods :2 patent requests,	CNCSIS
2009	1 Chemist, 9 Mat. Sci.	F37: Sectorial 8 F39: Electrociscell	25.000 62.500	2 technologies; 2 ISI papers ; 2 patent requests	NASR, Electroarges
2010	1Chemist, 8 Mat. Sci.	F38: SITCOM F40: TECMOT	19.700 13.000	2 product; 2 ISI paper, 1 patent requests	UEFISCDI, Rancon
2011	1 Chemists, 4 Mat. Sci.	CF7: Nanostral CF8: Corzifilm	37250 35750	5 technologies, 5 products, 5 ISI papers, 2 patent requests	UEFISCDI, Rancon

In the table and diagrams below, are presented the main categories of results (total papers and proceedings, technologies, products and methods , patents) obtained in the period 2007-2011.

Indicators	2007	2008	2009	2010	2011
Contracts value, thousand EUR	341,37	256,17	236,11	138,85	76,1
Bilateral projects			1	1	
No. of SMEs partners	5	5	3	2	1
Publications	15	8	15	4	9
Conferences	9	7	3	3	4
Patents (requests)	1(1)	1(3)	0(2)	1(3)	0(3)
Certified technologies		4	2	3	5
New products		3	3	5	5
New methods and models	5	6	4	5	7
Young Researchers involved	1	2	2	2	1
PhD students	1	2	2	1	1



: Publications ; : Patents ; : Technologies, products

The graphs show that the quantified results of the team research activities had generally a positive evolution despite the decrease of contract annual values. This is clearer from right diagram where the obtained results are assessed for ten thousand euro contract value.

The increasing evolution of the results in 2010-2011 for a small research team being in a reconstruction period as well as the research area in which is involved (new materials for renewable energy applications, automotive industry, thin films, etc.) and that is among the prior research directions for the European Union, may be considered as valid arguments for a positive development of the team **E5** in the frame of IMNR.

E. INTERDISCIPLINARITY

In all the period 2007-2011, the team has been involved in the achievement of complex scientific projects in which the consortium had high degree of complementarities and interdisciplinary. In this context, the team works with mathematicians from universities from Romania for mathematical modelling of chemical and metallurgical processes, with physicists from Romania, Austria and France for high resolution structural characterizations and electric and electronic assessments of photovoltaic thin films , with specialized electrochemists for specific chemical analysis as well as with geologists and mineralogists for microscopic determinations.

F. TECHNOLGY TRANSFER RELATED ACTIVITIES

Five patents were granted in the related period, in the field of metal matrix composites, Nd-Mg alloys, Nd-Fe-B magnetic alloys and Ti based alloys, and **9 National Patent Requests** are under certification.

6 Representative project

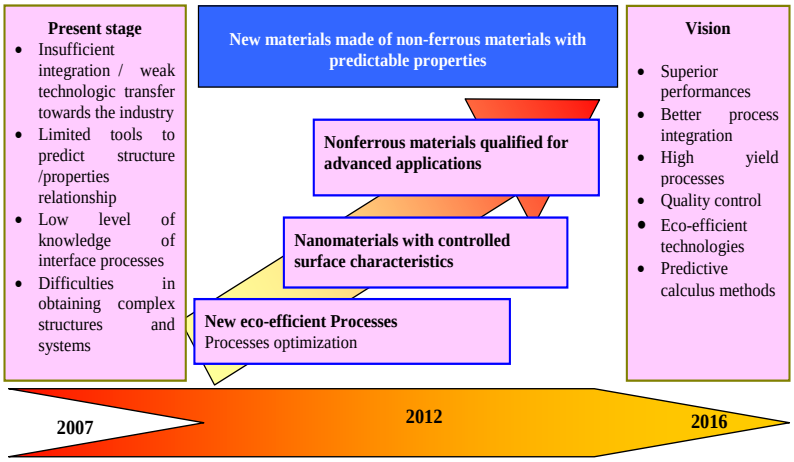
Project Title: Unlocking the research potential of IMNR in the field of sustainable non-ferrous metals metallurgy

In the period 2000-2002 IMNR had a major success in starting operation of the metallurgical plant ZIROM Giurgiu, company fully design using the technologies developed in IMNR for obtaining Ti and Ti alloys by specific e-beam melting processes at high temperatures under advanced vacuum.

Starting with 2005 IMNR became National Research and Development Institute. This was the launch for a new organizational structure and new horizons for the scientific and technological approach of the institute.

6.1 Conception.

The period 2005-2006 was characterized by the transition to National Plan II. In Research for Excellence Programme IMNR had developed more projects exploring new metallurgical technologies and advanced micro/nanomaterials.



Starting from the unique expertise gain in the metallurgy and non-ferrous metallic materials, the **major goal** of the institute for the period 2007-2011 was to create an integrated experimental platform to strengthen the existing research potential of the Institute for approaching ***new research fields along the whole processing chain from metal resources to advanced multifunctional materials with predictable structures and properties.***

Strategic Directions

The RTD activities of the institute were developed in 3 technological laboratories and 2 major support team for analysis and characterization. The main **strategic directions** proposed were:

- S.D.1. Development of eco-efficient metallurgical products and processes;
- S.D.2. Development of multifunctional metallic, ceramic and composite materials with pre-design properties;
- S.D.3. Recycling the by-products and wastes from non-ferrous metallurgy processing;
- S.D4. Elaboration and certification of investigation methods for controlling the technologies and products from nonferrous metals metallurgy;

To fulfill development of these directions, the activity of the institute was oriented toward following **specific objectives**:

- S.O.1. Attract non-refundable resources for improving the research infrastructure of the laboratories: equipments for high yield solution recovery of non-ferrous metals from non-energetic resources at larger scale, high pressure synthesis of nanomaterials in solutions and certifying nanomaterials characteristics; equipment for the elaboration of new non-ferrous alloys; equipments for chemical and structural characterization of advanced metallic and composite materials.
- S.O.2. Participation in National and International projects related to the activity domain to ensure the financial resources for maintaining highly qualified research personnel and knowledge development;
- S.O.3. Dissemination of the original projects results by publication of a relevant number of papers (min. 10 /year) and patents (min. 2/year).

6.2 Elaboration

To develop the strategic directions proposed the following activities were made:

- Participation in project calls in the frame of National Research Programme PN II: Partnership, Innovation, Ideas and Human Resources;
- Elaboration of themes in the frame of Basic Fund Programme (Nucleus Programme) along the major scientific directions for the period 2006-2008 (PN 06 23) and 2009-2011 (PN 0924)
- Participation in project proposals in the frame of FP7 European Programmes

– Elaboration of structural funds projects POS O2.2.1 – call 1 from 2007 and call 2 from 2009 - for procurement of modern high tech equipment for developing the research infrastructure

6.3 Execution

Following the elaboration phase, an internal analysis was done leading to selection the main scientific directions (SD). The projects were implemented and developed in 5 multidisciplinary teams.

S.D.1: New eco-efficient processes for valorization of non-ferrous metals resources	Team: New concepts, new technologies for sustainable processes in nonferrous metals metallurgy
	Team: Environmental protection-standards and best practice implementation in non-ferrous metals industry
S.D.2: Synthesis and processing of nanomaterials with controlled surface characteristics	Team: Nanomaterials for health and improved life quality
	Team: Materials for nano-systems used in clean energy applications
S.D. 3: Advanced non-ferrous metals and alloys	Team: New metallic materials and technologies

The major projects financed for each of the scientific direction are presented in tables below. Some major projects on each direction jointly contributed to gain technological knowledge and develop the research infrastructure for the high tech applications.

S.D.1: New eco-efficient processes for valorization of non-ferrous metals resources			
Project title	Short description	IMNR Value EUR	Major achievements and infrastructure
Obtaining gallium complexes and eco-efficient in order to exploit the bauxite	A technology to recover Ga from bauxite, in the Al_2O_3 obtaining circuit through Bayer process was developed for future applications in electronic industry.	138000	Ga extraction yield>90 % while the purity of the obtained gallium is higher than 99.999 %. Design and execution of a zonal melting system.
Technological concept radically changed in extractive industry of nonferrous metals for a cleaner, safer and eco-efficient production	An innovative hydrometallurgical eco-technology for recovery the nonferrous metals from complex ores.	174000	Gold medal, special prize of Belgium Prime Minster; at "Inventika" Brussels 2007. Two confidential agreements signed with companies "Outokumpu" Finland and "Tecnicas Reunidas" Spain for promoting technologies in industry. Completion of laboratory plant for multi-stage leaching.
Biotechnology for Metal Bearing Materials – BIOMINE	In the frame of an FP6-IP-multidisciplinary project (37 partners from Europe and South Africa). The project developed and promoted the use of biotechnologies in nonferrous metals metallurgy and mining.	146000	Advanced knowledge on new processing methods. Completion of laboratory plant for multi-stage leaching.
Microcrystalline advanced materials with applications in electric energy use	The complex and interdisciplinary project lead to the obtaining of a composite material from Cu-Mo-Y alloys by E-beam deposition for applications in electric contacts.	148000	Electric contacts with enhanced performances and lifetime. Completion of laboratory plant for advanced vacuum crystallization.

Microwaves eco-friendly alternative for a safe treatment of medical waste	EC-Life+ project. An innovative method and apparatus for decontamination of medical waste will be applied. using high frequency microwave energy.	406000	High frequency microwave technology and apparatus will be design and engineered for applications in eco-friendly digestion of wastes.
Management methods and innovative technologies for detoxification of hazardous wastes and treatment of levigate containing toxic elements from heavy non-ferrous metallurgy	New purification techniques for waste water from metallurgical industry: cold plasma, electro-plasma, electro-coagulation and plasma plus electromagnetic field with efficient synergic effects.	81000	Heavy metals and organic substances have been removed with high yields. Completion of the laboratory plant for leaching at constant and high pressure.
S.D.2: Synthesis and processing of nanomaterials with controlled surface characteristics			
Certification of a Laboratory for Chemical and Physical Analysis for Nano-Bio-Materials Characterization	Acquisition of equipment for characterization of nanobiomaetrials and certification of the methods	196000	New XRD for structural characterization and AAS for chemical analysis equipments were bought and putted in operation.
Research and Services Network for the Synthesis of Nanostructures for Advanced Applications in Textile Industry, Protective Coatings and Environmental Protection	Development of hydrothermal technology for obtaining ZnO and TiO2 nanopowders and characterization services for innovative SMEs.	111000	ZnO and TiO2 nanopowders. Acquisition of modern Direct Scanning Calorimeter for measuring thermodynamic properties of materials.
Hybrid Nano-structured Materials for Sensors with Potential Use in Therapy and Diagnosis	Hydrothermal/electrochemical technologies for obtaining nanopowders and thin films on Si substrates for in-vitro studies of cell adhesion and growth.	118000	Nanopowders and thin films from hybrid HAP-polymer composites. Acquisition of high performance FT-IR for characterization of hybrid nano-biomaterials. Partial payment of Laser granulometer.
New Technological Concepts Regarding the Development of Some Nanomaterials with Low Environmental Impact	New hydrothermal methods for recovery of fly ashes in core/shell nanocomposites, study of the potential applications in building materials and the nano-toxicological study of the procedures described.	64000	Feasibility study of the technology for applications in special materials for restoration of buildings. Completion with a new autoclave of the installation for hydrothermal synthesis of nanocrystalline materials.
Compresses Impregnated with Triglycerides and Ag Doped ZnO Nanoparticles for the Treatment of Wounds with Suprainfection Risk	Innovation Programme: Hydrothermal technology for synthesis of Ag-ZnO nanoparticles used in external medical devices.	90000	Patent request valorized in first revenues for the institute in 2011. Completion of the FT-IR system with new software and spectral database.

Doping and Dimensional Effects upon the Magnetic, Structural and Morphological Properties and Spin Dynamics in Ferromagnetic Oxide Micro and Nanostructures	Ideas Programme: New diluted magnetic semiconductors for with ferromagnetic properties for spintronics	263000	Hydrothermal synthesis of doped TiO2/ZnO nanomaterials (powders, films). Partial payment of new autoclave and micro scratch tester.
Supersonic deposition of nanostructured surfaces	Development of nanostructured reactive powder systems for enhancing interface reactions in thermal deposition with preserving the nanosizes.	366000	Methods for thermal characterization of nano-systems. Payment of new components and software to improve the DTA-TG system.
S.D. 3: Advanced non-ferrous metals and alloys			
Modernization and accreditation of the microscopical characterization laboratory for evaluating the conformity of metallic materials, composites, minerals, ceramics.	Development of accredited methods for microstructure characterization.	111000	New confocal metallographic microscope and systems for samples preparation.
Nanostructured aluminium alloys with high physical-mechanical characteristics	Development of metallurgical methods for obtaining Al alloys with controlled properties	91000	Homologated technology for nanostructured Al alloys. Partial contribution to acquisition of TDA-TG system.
New protection method against corrosion of steel materials by thin film electro-deposition of Zn-Ni-P ternary alloys.	Development of technologies for electrodeposition of Zn-Ni based alloys.	94000	Homologated technology and products. Modernization of electrochemical deposition installation.
New methods for the synthesis of metal matrix composites by in situ processes	In suit gas reactive method for obtaining in-situ by reactive gas reactions metal matrix composites with high mechanical properties	132000	Homologated technology. Partial contribution for acquisition of an induction melting installation.

6.4 Final stage

In 2010 the IMNR Infrastructure Project from the 2nd POS O2.2.1 call was successfully evaluated and from September 2010 entered in force for financing and execution for a period of 2 years. The aim of the project is to implement the Research Centre for the Study and Intensification of Metallurgical Processes at High Pressures and Temperatures-"High PTMet".

In High PTMeT project scientists from inter-disciplinary fields (materials science, physical-chemistry, inorganic chemistry, physics, energetics) will be integrated in a unitary structure orientated to researches which aim to identify new materials based on non-ferrous metallic elements and to develop these materials in order to be technologically applied.

The high pressure module "P" (consisting of different types of autoclaves with different temperature/pressure ranges) will be the source of materials consisting of non-ferrous and nanostructured metallic – ceramic composite powders obtained from different primary and secondary sources of non-

ferrous metals. These materials with pre-established composition and structure will be further used in the high temperature module "T" where a 5 e-gun system unique in Romania and Balkanic region will open the basis for the combinatory synthesis of a great number of alloys, inter-metallic compounds and metallic-ceramic composites. The structure and properties of these materials will be further investigated and qualified for extending and developing the research services range that could be provided to enterprises, higher education entities and research institutes which use non-ferrous materials.

The estimated results for IMNR after 5 years of the accomplishment of the project are:

INDICATORS	Estimated Value
New RTD jobs created (number)	15
Among which, specialists from abroad (number)	5
Working places maintained in the RTD sector due to the project (number)	35
International projects in which the new infrastructure will be involved (number)	14
National projects in which the infrastructure will be involved (number)	8

6.5 Valorization of results

Impact on careers' and IMNR development

Since the field of non-ferrous metal based materials have been marked by a strong growth in demand, especially from emerging economies, together with a more recent augmentation of trade barriers imposed by third countries affecting supply to European Union, we expect that the creation of the integrated experimental platform will speed up the research and thus positively affect the level of competencies of the newly recruited researchers and of the existing ones because of the unique concept. A network between partners from industry and academia (research entities and universities) is envisaged to be developed. A training network with sufficient critical mass can induce an avalanche of knowledge concerning non-ferrous metals industry in the rest of scientific community and thus set new methods/ technologies/micro (nano) materials for this developing field. Multidisciplinary research and training activities are envisaged: the universities and other research entities in the field of materials, physics, and chemistry will have access to new performance equipments and the unique chance to better understand the correlation between phenomenon at micro and nanoscale, the manufacturing processes and the applications of non-ferrous metals based materials. A high impact on the know-how of the institute and in the same time of the academia environment is expected. The researchers and students will have the possibility to acquire skills and knowledge that will help them to pursue competitive goals both in their research interests and their employment pursuit activities.

The benefits for the society can be summarised as follows: impact on increasing the attractiveness of the institute and in particular of the Region Bucharest Ilfov by promoting innovation and creation of new high tech jobs. In the innovation strategy of the Bucharest – Ilfov region it is clearly stated the need for innovation based on research in order to improve processes and products, thus creating the premises to introduce innovation in enterprises. Assimilating new technologies and supporting technological innovation are key elements for business competitiveness, taking into account the relatively low regional productivity and the increased level of total power consumption *[source: Innovation Strategy of Bucharest- Ilfov region – RIS Bucharest –Ilfov, established by the Regional Development Agency – ADRBI]*.

Economic impact

Advanced non-ferrous materials may be found along the whole production chain in practically all industrial domains from high tech (automotive, electronics, medical field) to the traditional ones (consumer goods). European Union is a leader in production of innovative materials in a volume of estimated to 44 billion euro. Advanced non-ferrous materials are regarded as an indicator of the competitiveness and efficiency of industrial production. In the next five years, the advanced materials production is expected to increase mainly in applications for energy (19 billion euro), environment, health (tissue engineering implants, implants), transportation, ITC. Actually the Romanian industry produces mainly products with low added value and high energy and raw material consumption. However the entrance on the markets of innovative SMEs and multinational companies already started to change the application of non-ferrous materials in: sensors systems for automotive industry, machines and electrical equipments, implants, drugs, materials for production and energy storage. The future industrial requirement forecast has an ascendant trend based on new products development, market demand, structural reorientation and clients' behaviour.

In this context, we consider that the achievements of the major project developed by IMNR will be a strategic support for the sustainable development of the non-ferrous materials industry.

GLOSSARY

AROTT	*Romanian Association for Technology Transfer*
ASRO	*Standardization Association in Romania*
ACS	*Assistant Researcher*
CALIST	*Funding programme of National Plan for Research, Development and Innovation - National Programme of Quality and Standards*
CAPACITIES	*Funding programme of National Plan for Research, Development and Innovation that relates to developing research capacity, by RDI system by opening the international scientific environment and connection to the national socio-economic*
CEEX	*Research Excellence Program*
CIP programmes	*Competitiveness and Innovation Framework Programme*
CNCSIS	*National Council of Scientific Research in Higher Education*
CNFPA	*National Council for Adult Vocational Training*
CNMP	*National Centre for Programme Management*
CORINT	*Funding programme of National Plan for Research, Development and Innovation that relates to international cooperation and partnership*
COST	*Intergovernmental framework for European Cooperation in Science and Technology, allowing the coordination of nationally-funded research on a European level*
CS	*Scientific researcher*
CSI	*Scientific researcher with first degree*
CSII	*Scientific researcher with second degree*
CSIII	*Scientific researcher with third degree*
EC	*European Commission*
EN	*European standard*
EPO	*European Patent Office*
EU	*European Union*
EU HORIZON 2020	*Horizon 2020 is the financial instrument implementing the Innovation Union and Europe 2020*
FEDR	*European Fund for Regional Development*
FP7	*Seventh Framework Programme*
HG	*Government decision*
ICECHIM	*former Institute for Research in Industrial Chemistry*
IDEAS	*Funding programme of National Plan for Research, Development and Innovation that relates to obtaining scientific and technological results, consistent with those of Europe reflected by increasing visibility and international recognition of Romanian research*
IDT	*Technological Development Engineer*
IMNR	*National Research and Development Institute for Nonferrous and Rare Metals*
INFRAS	*Funding programme of National Plan for Research, Development and Innovation that relates to the consolidation of standardisation and quality infrastructures*
INNOVATION	*Funding programme of National Plan for Research, Development and Innovation that relates to increased capacity for innovation, technology development and uptake of research results into production, to improve the competitiveness of national economy and quality of life*
IPROCHIM	*former Institute for Design in Chemical Industry*
ISO	*International Organization for Standardization*
INSME	*International Network for Small and Medium Sized Enterprises*

INTERREG IVC	*European funding programme that supports Innovation & Environment Regions of Europe Sharing Solutions*
MATNANTECH	*Funding programme of National Plan for Research, Development and Innovation that relates to New Materials, Micro and Nanotechnologies*
MECMA	*Ministry of Economy, Trade and Business Environment*
NASR	*National Agency for Scientific Research*
NUCLEU Programme	*National Authority for Scientific Research programme*
OSIM	*State Office for Inventions and Trademarks*
PARTNERSHIP	*Funding programme of National Plan for Research, Development and Innovation that aims to create conditions for better cooperation between different entities of RDI, business and / or government units to address the problems identified*
PhD	*Doctor of science*
PN	*National plan*
PNCDI	*National Plan for Research, Development and Innovation*
POS	*Operational Sectorial Programmes (Financed by Structural Funds)*
POSCCE	*Sectorial Operational Programme Increase of Economic Competitiveness*
POSDRU	*Human Resources Development Operational Programme*
POS O2.2.1	*Operational Sectorial Programme for Enhancing Economic Competitiveness – Operation Research Infrastructure Development*
R&D	*Research and Development*
RDI	*Research – Development and Innovation*
RELANSIN	*Funding programme of National Plan for Research, Development and Innovation that relates to Economic Recovery through Research and Innovation*
RENAR	*Accreditation Association Romania - National Accreditation Body*
ReNITT	*National Network for Innovation and Technological Transfer*
RO	*Romania*
RTD	*Research and Technological Development*
SC1	*RTD Laboratories Technical Support Team*
SC2	*Physical-Chemical Analysis Team*
SC3	*Optical Microscopy Laboratory Team*
SME	*Small and medium-sized enterprises*
SR	*Romanian standard*
T I	*Technician first level*
T II	*Technician second level*
TS	*Technician*
TT	*Technological transfer*
UEFISCDI	*Executive Unit for Financing Higher Education, Research, Development and Innovation*