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

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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. That's mind: put in operation platbs, equipments and installations.

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.

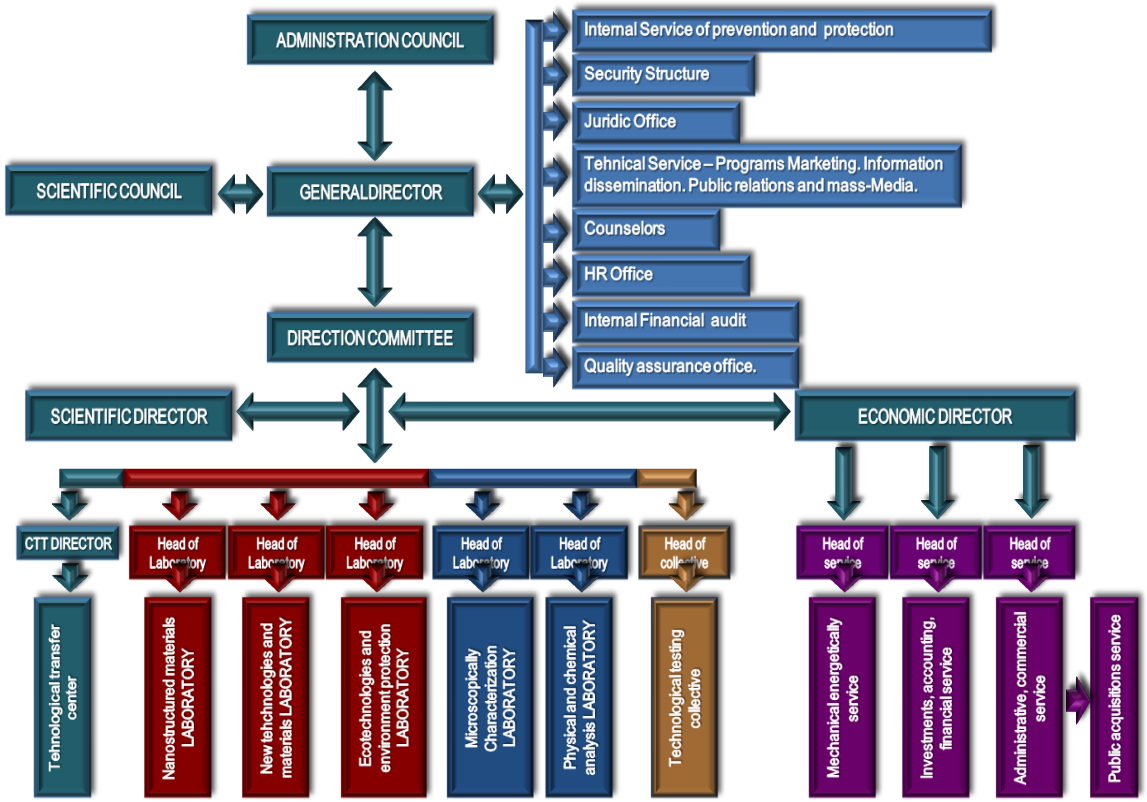
INCDMNR-IMNR is a strategic institute in the field of nonferrous metals metallurgy.

2 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 Administrative structure diagram of the institution

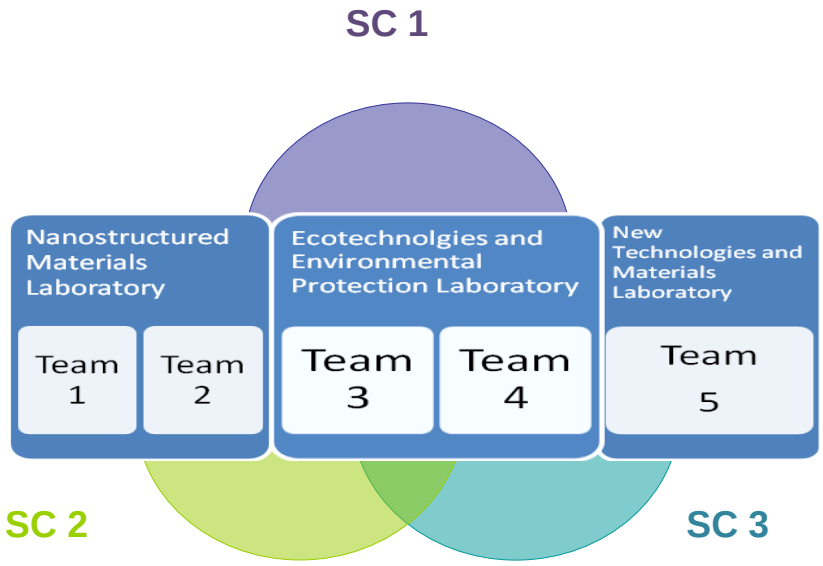
3.1 The organizational chart (diagram)



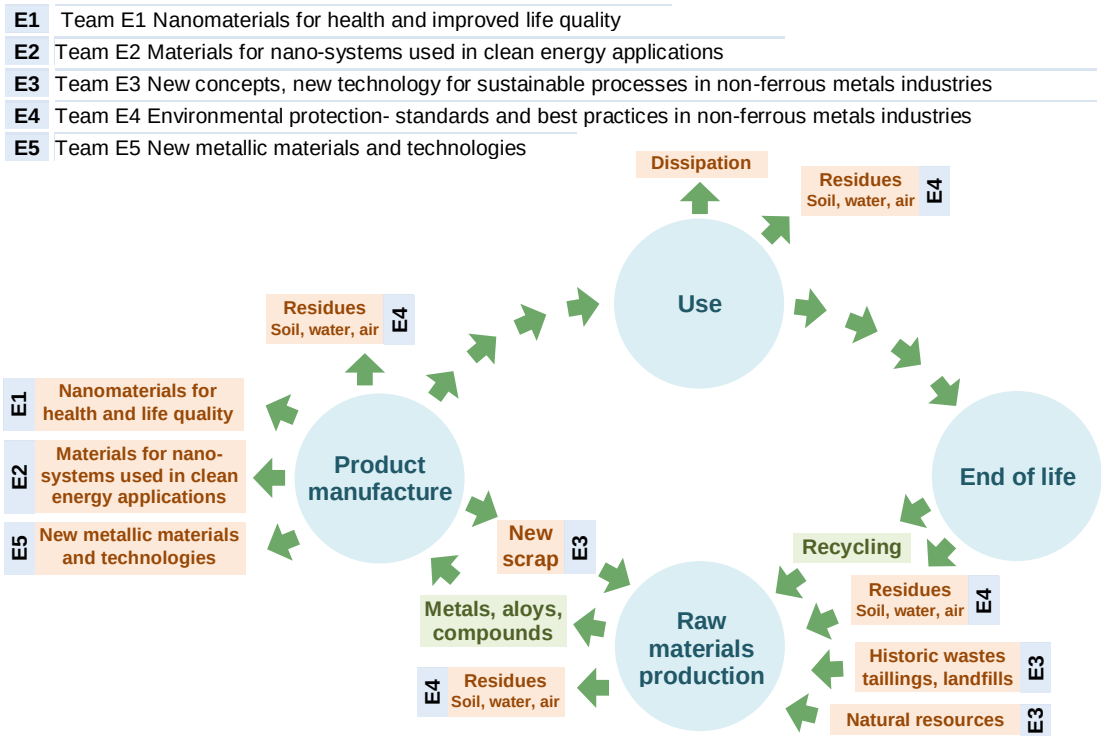
3.2 Teams.

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



Interactions between research teams



Research team distribution

The diagram above reveals that the activities of the five research teams from IMNR are joinlly integrated in order to develop eco-efficient and high technologies materials within the fife cycle of products

3.3 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.

3.4 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.

4 Activity report for the last 5 years (by teams)

4.1 Nanomaterials for healts and improve life quality

Team leader: Dr. Piticescu Roxana

Main research directions:

- Regenerative medicine: hibrid nanostructured materials;
  - ✓ Bioactive nanoparticle coating on the surface of implants;
  - ✓ Assessment of toxicity.
- Nanotechnology based Diagnostics and Imaging;
  - ✓ Developing of new consrast agents;
  - ✓ Miniaturized devices: nanoscale sensors.

4.2 Materials for nanosystems used in clean energy applications

Team leader: Dr. Piticescu Robert

Main research directions:

- Elaboration of synthesis methode enabling to control the interfacial properties of nanomaterials for clean energy applications;
- Understanding structure-property-processing relationships of nanopowders;
- Thermal/functional assessment of nanostructured reactive powder systems and coatings.

4.3 New concepts, new technologies for sustainable processes in nonferrous metals industry.

Team leader: dr.Teodor Velea

Main research directions:

- Developing new innovative technologies and solution 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.

4.4 Environmental protection standards and best practices in nonferrous metals industry.

Team leader: dr. Liliana Gherghe

Main research directions:

- Promoting complete recycling and reuse of secondary materials using innovative methods
- Promoting environmental sustainability
- Promoting initiatives, including legislation and standards.
- Promoting cooperation with key actors from Europe and World.

4.5 New metallic materials and technologies.

Team leader: dr. Vasile Soare

Main research direction:

- Metal and alloys synthesis by electrochemical processes
- New technologies for special alloys and composites obtaining.

5 Results of activities for 2007 – 2012

5.1 Incomes

	CONTRACTUAL VALUES FROM NATIONAL PROJECTS €	CONTRACTUAL VALUES FROM INTERNATIONAL PROJECTS €	CONTRACTUAL VALUES WITH PUBLIC INSTITUTIONS €
T 1	1056157	134917	74809
T 2	759331	237459	109566
T 3	1013960	128000	2500
T 4	993957	29000	2450
T 5	984000	-	11500

5.2 Visibility

- Nr. of articles: 123
- Nr. of patents: 46
- Nr. of conferences participationes: 204

INSTITUTIONAL DEVELOPMENT PLAN 2012-2015

A. Strategic scientific objectives and directions

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.

Scientific directions strategic objectives

Considering the experience of three groups: Ecotechnology and Environmental Protection, Nanostructured Materials and New Advanced Materials and Technologies with the support of Physical-Chemical Analysis and Microscopic Characterization, a joint research line was formulated in IMNR 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.

The following scientific directions and strategic objectives are targeted:

Scientific direction 1: Environmental protection and sustainable supply of non-energy metal resources

The specific strategic objective of this scientific direction is to *implement new concepts, new technologies for sustainable processes in non-ferrous metals industry and environmental protection (standards and best practices in non-ferrous metals industry)*

This scientific objective aims to focus on the following broad lines of activities:

- ✓ Research to develop mew innovative technologies and solutions for sustainable growth of resources and for the substitution of critical metals and materials
- ✓ Research to identify innovative recycling and re-use technologies for non-ferrous metals based raw materials which are the key for smart and sustainable growth of non-ferrous metals industry. Multidisciplinary approaches involving science, technology, and the economic aspects are envisaged.
- ✓ Research to develop new technologies and materials for waste water purification in order to improve metal recovery and reduce hazardous emissions
- ✓ Research to identify innovative solutions for waste prevention and minimization in non-ferrous metals industry and rehabilitation of sites polluted from metallurgical activities
- ✓ Participation in standards technical committee

The performance indicators for a period of 4 years are:

2 patent; 8 ISI papers in journals with relative influence score ≥ 0.3

4 technologies; 4 products; 2 European projects proposals; 5 National projects; 2 finalized doctoral theses

Scientific direction 2: Nanomaterials

The specific strategic objective of this direction is the Development of high-added value non-ferrous metals based nanomaterials for medical, energy and extreme conditions field applications.

This scientific objective aims to focus on the following broad lines of activities:

- ✓ Efficient synthesis and manufacturing of nanomaterials by new environmentally friendly operations, smart integration of new and existing processes to ensure the efficient transfer of knowledge into industrial innovation. This will enable the transition towards a green economy that takes into account the sustainable use of resources.
- ✓ Fundamentally new products enabling sustainable solutions in medical, energy and extreme conditions field applications
- ✓ Advancing scientific knowledge of the potential impact of nanomaterials on health or on the environment, and identifying tools for risk assessment along the life cycle
- ✓ Develop the capacity to measure/characterize the properties of non-ferrous metals based nanomaterials and predictive modelling of their manufacturing processes enabling their rapid introduction on the market

The performance indicators for a period of 4 years are:
3 patents; 12 ISI papers in journals with relative influence score ≥0.3
4 technologies; 4 products; 6 European projects proposals; 4 National projects; 2 finalized doctoral thesis; 2 new methods for assessment of nanostructured materials

Scientific direction 3: Advanced Materials

The specific objective of this direction is to develop materials with new functionalities and improved in-service performance, that minimize the impact on the environment and the consumption of resources.

This scientific objective aims to focus on the following broad lines of activities:

- ✓ Research on functional materials, multifunctional materials and structural materials, for innovation in energy and extreme conditions industrial sectors
- ✓ Research and development for innovative techniques of manufacturing advanced non-ferrous metals based materials and to identify solutions for the substitution of raw materials by economically attractive alternatives with a lower environmental impact
- ✓ Characterization, non-destructive evaluation and predictive modelling of performance for progress in non-ferrous metals based materials science and engineering

The performance indicators for a period of 4 years are:
1 patents; 8 ISI papers in journals with relative influence score ≥0.3
2 technologies; 4 products; 2 European projects proposals; 4 National projects; 1 finalized doctoral thesis.

Institutional Development Plan in guaranted by:

- The human resources;
  - Recruitment policy;
  - Personal training;
  - Mobilitz;
  - Mechanism for the personnel;
  - Gender policy.
- Mechanisms for stimulating the apperance of new research directions;
  - Collaborations with universities;
  - Participation in Research Networks and in the European Technological Platform;
  - The role of user in creating new research directions;
  - Scientific Advisory Board;
  - Exploratory workshops.
- Financial analysis;
- Technology transfer;
- Strategic partnerships and visibility;
- Risk analisis.

B. Conclusions.

The institutional development plan of the institute is elaborated on the basis of the external analysis environment, scientific SWOT analysis, financial SWOT analysis and mission of the institute.

The institutional development plan takes into account the following specific characteristics: target area (non-ferrous metals industry), staff size, composition and structure, program areas, relationship with the private sector and with the major national public entities.

Experience accumulated in the implementation of previous RTD projects, capacity to attract European and structural funds covering all the research domain of the institute, continuously improvement of the infrastructure, existence of a technological transfer centre, complementarily human resources experience, involvement of young researchers, the existence of a well-defined managerial strategy in the economical-financial field constitute the guaranty that the institutional development plan is feasible and the objectives are achievable.

The institutional development plan will be carefully monitored and evaluated to rapidly decide corrections and improvements if is the case.

PROJECTS WITH SIGNIFICANT IMPACT
FOR SUSTAINABLE DEVELOPMENT OF NATIONAL ECONOMY

1. Zirconium obtaining tehnology for nuclear aims and titanium obtaining tehnology for aeronautic.
2. Biotechnology for Metal Bearing Materials - BIOMINE, *FP6*
3. Reaserch centre for study and intensification of metallurgical processes at high pressure and temperature**,** *Increase of Economic Competitiveness*
4. Microwaves ecofriendly alternative for a safe treatment of medical waste - MEDWASTE, *LIFE Program*
5. Supersonic deposition of nanostructured surfaces, *PC7-Capabilities*
6. Nanostructured titanium dioxide sensors for biomedical measurements, *Program Partnerships in priority areas, project type: ERANET*
7. Doping and Dimensional Effects upon the Magnetic, Structural and Morphological Properties and Spin Dynamics in Ferromagnetic Oxide Micro and Nanostructures, *PN II Ideas*
8. Study regarding to present and future stage of Romanian metallurgy in European context, *Sectorial Plan for R & D in Industry*
9. Hybrid Nanostructured Materials for Sensors with Potential Use in Therapy and Diagnosis, *PNCD II-2007 Competition 1-Partnerships*
10. Implementation of clean energetical technologies by developing a thermal engine based on hydrogen absorbing metallic alloys usig solar energy or residual energies, *PNCD II-2007 Competition 1-Partnerships*