

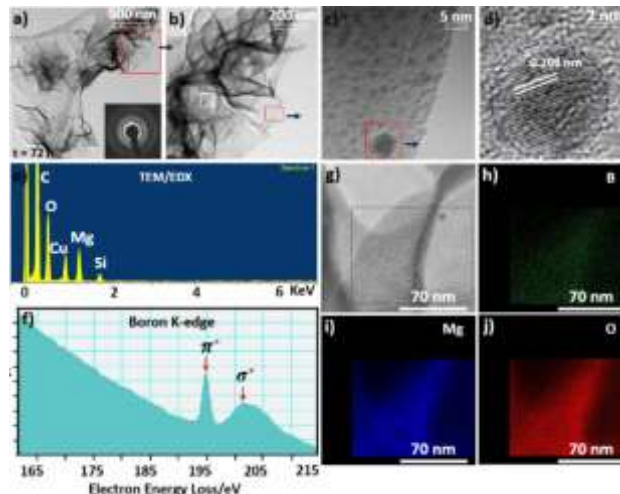
PRACTICAL SKILLS ACQUIRED DURING THE MASTER'S PROGRAM

- developing skills in sciences, particularly, processing, design, characterization, and testing of 0-3D materials (deepening and broadening of knowledge, skills, and abilities necessary for the absolvents of this master program);
- acquisition of multiple skills by studying interdisciplinary sciences during the master's program; the core of the master program being the need of processing of materials and to develop materials and devices for household, medical, environmental, energy, electric and electronic applications;
- formation of skills related to interpersonal communication, teamwork, rapid insertion of human resources on the market;
- empowerment and improvement of university graduates with specialized knowledge (fundamental science - applied science) able to adapt for the need of the market being able to use their knowledge in various fields, as presented above;
- acquiring skills to identify the challenges in the fields of materials sciences and various connected fields (which are using materials) and solve these issues based on the acquired theoretical knowledge and practical skills:
 - developing knowledge, the capacity of modern documentation and practical skills necessary for the design and manufacture materials for household applications;
 - developing knowledge, the capacity of modern documentation and practical skills necessary for the design and manufacture materials for biomedical applications;
 - developing knowledge, the capacity of modern documentation and practical skills necessary for the design and manufacture materials for energy applications;
 - developing knowledge, the capacity of modern documentation and practical skills necessary for the design and manufacture materials for electronic applications;

- theoretical and practical Skills will enable student's work in adequate conditions in research laboratories and innovation in the fields mentioned above, but also in any industrial areas dealing with materials;
- correlation of the properties and performances of the materials with the morphology, composition, and routes of the processing;
- Determine or check the main structural and compositional characteristics of the materials, by using advanced characterization methods and techniques;
- Linking concepts of materials science with notions of physics, mechanic, biology, electric characteristics and evaluation of the performances of these materials according to the envisaged applications;
- Ability compiling research projects and exploitation of research results
- Practicing communication skills and problem-solving (questioning)

Details about admission:

<http://ing.pub.ro/admission/master/>



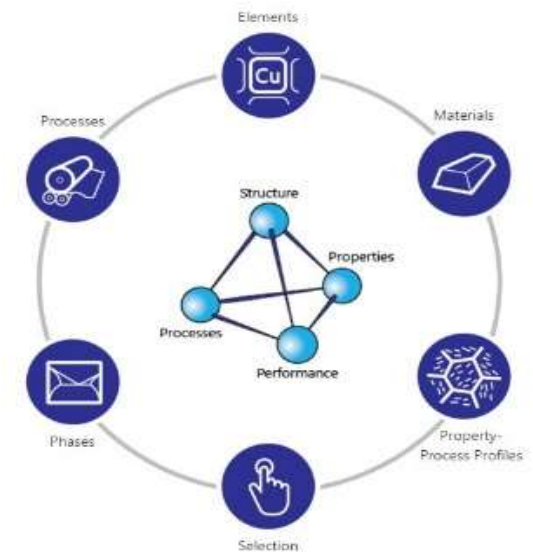
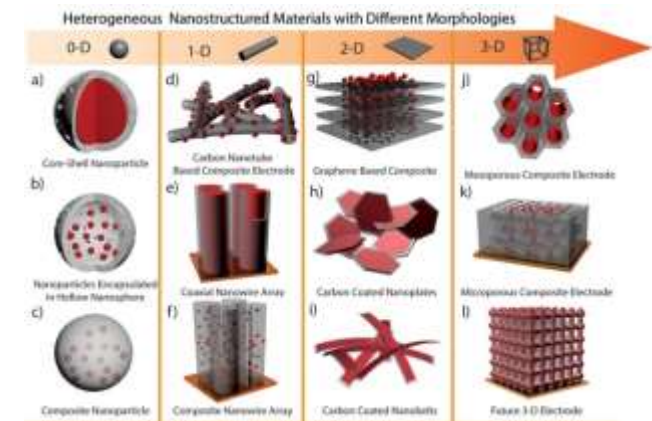
Legend: TEM/HRTEM/SAED/EDX/EELS/STEM analysis of a nanoflake/nanosheet obtained at 72 h of aging a filtrate sample: a) typical TEM image and corresponding SAED pattern of a nanosheet prepared by aging the filtrate sample for 72 h and b) TEM image of the selected red box in panel a; c, d) HRTEM images of the selected red box in panels b and c, respectively; e) TEM/EDX, f) boron EELS (192–214 eV), and g–j) element mapping of the selected dashed white region of the nanosheet in panel b.

UNIVERSITATEA POLITEHNICA
BUCUREȘTI
Facultatea de Inginerie în Limbi Străine



ADMITERE MASTERAT
2020

Advanced Materials Processing and Design (chemical engineering)



EDUCATIONAL PLAN

1st year of study

Semester I

Advanced methods of synthesis of substances and materials

Advanced Methods of Surfaces and Interfaces Functionalization

Correlations of composition – synthesis – processing – properties in term of functions of use of materials

CAD of Materials with Predetermined Morpho-Structural Features

*How to prepare a scientific work
Scientific research*

Semester II

Multifunctional and smart oxide materials

Advanced manufacturing techniques of 3D mat.

Advanced manufacturing techniques of 2D mat.

Advanced manufacturing techniques of 1D mat.

Advanced manufacturing techniques of 0D mat.

Scientific research

2nd year of study

Semester III

Advanced microscopy techniques

Advanced Techniques of Spectrometric Analysis

X-Ray Diffraction and Fluorescence

Complex thermal analysis

Design and manufacturing of materials with special applications

Standards for testing and certification of materials in terms of targeted application/evaluation of their performance

Scientific research

Semester IV

Scientific research

OBJECTIVES OF THE PROGRAMME

The master program proposed the following general objectives:

(a) Specialization and improvement of bachelor graduates in the field of processing, characterization, and testing of the materials. The following candidates are eligible for admission:

- engineers, especially chemical, materials science, medical engineers, bioengineers, etc.

- chemists from different topics including analytical chemists, environmental chemists, etc which are extensively using materials in their activity;

- biochemists

- medical doctors, both human and veterinary divisions,

- biologists

- pharmacists

- experts in the above-enumerated categories.

(b) Empowering and improving the need of undergraduate/ graduates of Bologna cycle for carrying out research, to search quality consultancy and expertise in the field of processing and testing the quality of the developing materials and devices.

With the proposed courses - which include teaching, practice and research – the master program ensures both fundamental and applied training in materials processing, design, characterization, and testing of materials and derived devices in the field of industrial, medical, environmental, energy, electric or electronic applications. The program is mainly focused on developing knowledge and skills to enable graduates to identify current problems/challenges and especially to propose solutions and to manufacture materials appropriate to the desired application.

The master program brings together basic and applied sciences disciplines. The structure of the study plan is specially developed to assure one semester of mainly basic disciplines. In contrast, most of the second semester of the first year is devoted to the main processing techniques to manufacture 0-3D materials according to their envisaged applications. The first semester of the

second year will be devoted to the discovery of the most important characterization and testing techniques and such, allowing in the second semester full-time involvement for research activities and finalizing the dissertation.

In the context of European and Global Requirements related to the development of novel or improved materials, with increasing standards and diversity, with an accentuated degree of decentralization it is important to teach young master students to develop materials with imposed characteristics and performances. Currently, by our knowledge, in Romania, there is no such master fully devoted to processing and design of materials, and absolvents can easily find positions in existing SMEs or, with the aim of the Start-up Nation or other programs to develop their proper business.

Worldwide, small and medium enterprises are present, each such entity having special needs from the point of view of the skills of the employees. It is well known that there is a lack of engineers and technical peoples able to provide solutions for SMEs. In this context, the master will develop young MSc Eng able to think free and to adapt to the need of the industry. At the national level, there are a lot of SMEs working in the field of processing and design materials and products, some of them being in contractual relations with UPB. Some of these SMEs are: Monofil SRL Savinești, ICEFS Savinesti, RONERA Pitesti, Sanimed Impex Srl, Process Innovation Nucleus SRL, Technology, and Eco-Innovation, along with a wide range of research centers, including National R&D Institutes, etc.

This program aims to combine chemistry, engineering, materials science with biomedical, environmental, energy, electric or electronic applications.

Any other details and info:

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