

Head Laboratory, Research Professor Marioara Moldovan, Ph.D.

"Polymeric Composites" Laboratory

RESEARCH FIELDS AND THEMATICS

1. ECO-NANOTECHNOLOGY AND ADVANCED MATERIALS

- ✓ New biomaterials used in bone tissue engineering;
- ✓ New luting cements with graphene used in dentistry;
- ✓ Controlled release systems of bioactive agents;
- ✓ New advanced, intelligent giomer type biomaterials with various applications in dentistry;
- ✓ Elaboration of glass fiber reinforced composites with improved mechanical performance used in maxillofacial surgery;
- ✓ Thin biofilms with adhesive properties polymerizable by UV radiation or visible light;
- ✓ Biocompatible materials for dental implants;
- ✓ Nano and microstructured composites for medical applications;
- ✓ New generations of biomaterials for cosmetic dentistry (natural whitening agents).

2. BIOTECHNOLOGIES

- ✓ Antiagregante plachetare naturiste in preventia primara cardio-vasculara;
- ✓ Natural platelets antiaggregants in primary cardiovascular prevention;
- ✓ Developing nutraceutical functional products with applications in healthy nutrition and regenerative medicine, obtained through the use of innovative and sustainable technologies;
- ✓ Optimizing the process of obtaining certain amino acids chelates in order to obtain materials with new applications in medicine.

3. HEALTH

- ✓ The development of innovative fiber reinforced composite materials for CAD/CAM applications in dental medicine;
- ✓ Researches on the behavior of oral mesenchymal cells in relation to new composite materials in modern regenerative periodontal therapy;
- ✓ Photodynamic therapy with natural photosensitizers used in oral biofilm control;
- ✓ Cranio-facial implants personalized obtained through innovative 3D prototyping made of glass-reinforced composite materials.

4. ENVIRONMENT

- ✓ The development of eco-friendly composite materials based on geopolymers and reinforced with waste fibers

Obiectivele principale de cercetare sunt:

SINTEZE ALE COMPUSILOR ANORGANICI SI TRATAMENTE SPECIFICE: Sinteza sticle cu continut variat de microelemente cu actiune specifica asupra tesuturilor dentare (sticle cu Ba, Sr,

La, Yt, Zn,Zr, etc.); **Sinteze nanoparticule** (silice, hidroxiapatita biocompatibila, oxid de zirconiu, etc.); **Sinteza nanosisteme mixte** (hidroxiapatita si oxizi metalici); **Nanoumpluturi, microumpluturi si macroumpluturi**; **Tratamente de suprafata** (agentul de cuplare, de regula un organo-silan) aplicate pulberilor anorganice sintetizate, cu scopul compatibilizarii lor cu matricea organica polimerizabila; **Sintetize sticle superficial active** pentru cimenturi ionomere.

SINTEZE ALE COMPUSILOR FAZEI ORGANICE: Monomeri di si polimetacrilici cu contactie mica la polimerizare; **Analogi de BIS-GMA** fluorurati fotopolimerizabili; **Acizi polialchenoici** conventionali si modificati; **PLLA** - Sinteza acidului polilactic din zer

The main research objectives are:

SYNTHESIS OF INORGANIC COMPOUNDS AND SPECIFIC TREATMENTS OF THEM: **Synthesis of glasses** with a variety of microelements with specific activity on dental tissues (Ba, Sr, La, Yt, Zn, Zr, etc.); **Synthesis of nanoparticles** (silica, biocompatible hydroxyapatite, zirconium oxide, etc.); **Synthesis of mixed nanosystems** (hydroxyapatite and metal oxides); **Nano, mycro and macro-powders**; **Surface treatments** (coupling agent, usually an organosilane) applied to the synthesized inorganic powders in order to be compatible with the polymerizable organic matrix; **Synthesis of glasses with superficial active surface** for ionomeric cements.

SYNTHESIS OF ORGANIC MATRIX COMPONENTS: Monomers di and polymethacrylics with low polymerization shrinkage; Photopolymerisable fluorinated **analogs of BIS-GMA**; Conventional and modified polyalchenoic acids; **PLLA** - Synthesis of whey polylactic acid.