

## **Nanobiomaterials**

PhD Student: Eng. Alexandra Elena Oprea (Stoica)

PhD Supervisor: Prof. PhD. Eng Ecaterina Andronescu

### **Abstract**

The aim of the present study was to obtain and characterize (structural and functional) of nanostructured membranes with fibrillar consistency obtained using electrospinning technique with applications in tissue engineering (TE).

The first section of this thesis provides a literature background, describing concepts referring to nanomaterials and nanofibrous materials for TE (bone tissue engineering and wound dressing applications), as well as electrospinning method, from basic concepts to challenges in electrospinning and nanofibrous scaffolds for tissue regeneration.

First, the thesis introduces the synthesis and evaluation of silica ( $\text{SiO}_2$ ) nanofibrous mats produced through electrospinning and subsequent calcination with tetraethyl orthosilicate (TEOS) and polyvinyl alcohol (PVA).

Second, the present doctoral thesis focuses on the manufacture and characterisation of an electrospun nanofiber mesh composed of polyvinyl alcohol, chitosan, and usnic acid. The primary objective of this study is to investigate the potential applications of this nanofiber mesh in the field of wound healing.

The third objective of this study was to acquire and analyze nanostructured membranes with a fibrillar texture, which were composed of recycled polyethylene terephthalate (PET) and nanoparticles ( $\text{Fe}_3\text{O}_4@UA$ ).

The obtained materials, in the form of nanofibrous mats, have potential applications in the fields of bone tissue engineering and wound dressing. Also, the optimization of parameters done in this work holds great value for the electrospinning deposition process of different types of materials.