**ABSTRACT**

The natural articular cartilage (hyaline cartilage) comprises the most important part of a joint and its main function is to protect the articular surface of bones from abrasion, while it is capable of distributing movement loads evenly. Cartilage is an avascular and aneural tissue and its repair and healing when damaged is not easy in a physical way. Tissue Engineering is an interdisciplinary area, based on the combination of cells, scaffolds and growth factors aiming at the regeneration of articular tissue. This diploma thesis is the first stage of the program "NanoArthrochondros", part of which will be the construction of an implant for cartilage regeneration where the articular cartilage is damaged. Before the reformation of the articular tissue, it is important that an appropriate scaffold is prepared so that chondrocytes grow and proliferate. The first stage, though, of such a project is the preparation and study/characterization of the material as a thin film, which will be used as a reference. So the aim of this diploma thesis is the optimization of the conditions under which the thin films of chitosan and blends of chitosan/gelatin in different proportions are deposited onto a metallic substrate by spin coating, as well as the study of their surface properties and their biological behavior. The study of polymeric thin films topography was conducted by Atomic Force Microscopy (AFM) and their surface wettability properties by Contact Angle measurements. The quantitative analysis of the cell proliferation was conducted by the MTT protocol, while Scanning Electron Microscopy (SEM) gave the cells imaging results. The interdisciplinary aspect of Tissue Engineering in articular cartilage renders the combination of expertise, as well as the techniques used, important so that a new and innovative material will be achieved, which will be used in articular cartilage regeneration and other biomedical applications.