Metallic orthopedic implants are well-established in medical practice for bone repairing, with hundreds of thousands of operations performed annually. The traditional concept of metallic biomaterials requires metals with improved corrosion resistance in the body. The typical lifetime of the titanium implant is around 15 years, thus, a majority of the patients require at least one revision or replacement surgery. After decades of developing strategies to minimize the corrosion of metallic biomaterials, there is now an increasing interest in using corrodible metals emerging as an alternative for biomedical implants. These biodegradable metals are expected to corrode gradually *in vivo*, releasing corrosion products metabolized by the human body. Such implants will assist tissue healing and then dissolve completely with no implant residues. The recently developed Mg-based biodegradable alloys corrode too fast, which results in a dramatic decrease in the implant stiffness before the completion of the tissue-healing process and generating high volumes of hydrogen gas. Lack of surface modification approaches for biodegradable metallic materials is chiefly one of the main barriers limiting further development of that technology. One of the possible ways to modify the surface of materials to increase their corrosion resistance is to cover them with a suitable polymeric protective layer, Chitosan is a natural polymer, which is increasingly used in biomedical applications due to its nontoxicity, excellent biocompatibility, biodegradability, antibacterial activity, film-forming ability, mechanical properties, and low cost.

The proposed project focuses on the development of the scientific background for the process of electrodeposition of a new type of multifunctional chitosan-based composite coatings on the surface of magnesium alloys with enhanced corrosion resistance and antibacterial functionality. In this regard, the main aim is to develop new electrochemical deposition approaches, optimize the key process parameters, which are deposition regime, bath composition, substrate pre-treatment, and systematically characterize coatings' properties. A full set of *in vitro* corrosion experiments in the solutions mimicking physiological conditions will be performed. Along with corrosion resistance, the *in vitro* antibacterial performance of the developed coatings towards common implant-related Gram-positive bacteria, such as *Staphylococcus aureus* and *Staphylococcus epidermidis* will be examined.

The synthesized materials will be characterized by improved surface morphology, adhesion, mechanical, *in vitro* corrosion, and antibacterial properties. The new scientific information obtained in this project will allow evaluating the applicability of chitosan-based composite coatings as components of biodegradable implants. Materials for implants coatings developed within this project are expected to have a crucial impact on the development of biodegradable implants, thereby resulting in decreasing implant rejection and, ultimately, increasing the life span and life quality and of a patient.