It is a natural tendency of microorganisms to attach to wet surfaces and form a slimy matrix composed of an extracellular polymeric substance, known as a biofilm. Since the formation of biofilm is a common phenomenon, it has a significant influence on a broad range of industrial areas, including chemical industry, construction industry, machine industry, food industry, cosmetic industry and medicine. For instance, the formation of biofilm may result in the contamination of food products and medical devices. Therefore, one of the major challenges of surface engineering is to prevent bacteria from attaching and growing on different substrates.

The aim of the project is to design a novel type of electroactive coatings than can be used to control the growth of biofilm. The coating will be based on conducting polymers, which are known to have tunable physical properties and morphology depending on their oxidation state. Conducting polymers can be also used as carriers for different biologically active compounds, e.g. antibiotics. If stimulated with electricity, conducting polymers are able to release these compounds in a highly controlled way. In our project, we plan to use electrical currents that are naturally generated by bacteria to change the oxidation state of a conducting polymer matrix, and to trigger the release of an antimicrobial agent. In this way, we intend to develop a bacteria-responsive antimicrobial coating than can be used to efficiently prevent the growth of bacterial biofilms.