Since the formation of biofilm is a common phenomenon, it has a significant influence on a broad range of industrial areas. Currently, one of the major challenges is the prevention of the growth of bacteria. It is of a significant importance in food and biomedical industry, because the formation of biofilm may result in the contamination of food products and medical devices. On the other hand, biofilm formation is highly appropriate in several biotechnological applications, where naturally-immobilized microorganisms are expected to perform their desired function, e.g. in bioreactors. Regardless the formation of biofilm is expected or undesirable, there is an urgent need to design new methods allowing the control of this process, either facilitating or preventing the attachment and growth of microorganisms.

The aim of the project is to design a novel type of electroactive coating 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 the synthesis conditions. The enhancement of anti-fouling properties of coatings will be realized by the use of conducting polymer coatings as carriers for selected antimicrobial agents, such as metal nanoparticles and antibiotics. The as-formed coatings will be extensively characterized by means of electrochemical, spectroscopic and microscopic techniques. The investigations will involve the optimization of synthesis procedures to obtain mechanically and electrically stable conducting polymer coatings with easily switchable properties. Selected coatings will be used to serve as platforms for the growth of bacteria, in order to determine the ability of conducting polymers to modulate the process of biofilm formation.