Corrosion is a destruction process of materials under the influence of external environmental factors. Between the material and the surrounding environment, the chemical or electrochemical reactions occur which results in material original properties loss. There is a creation of aforementioned reactions products. The term environment generally refers to the atmosphere or electrolyte solution with which the material comes into contact. Mainly metals, metal alloys, plastics and concrete are subjected to this detrimental processes. The problem of the corrosion occurrence in nature, industry and everyday life is very strenuous. Every year a huge number of components is exchanged or renewed because of the devastation caused by this phenomenon. The annual cost of worldwide losses are estimated at 2.2 trillion dollars, which is more than 3% of world GDP.

Corrosion protection of metals, metal alloys and steel is mainly based on the use of electrochemical protection, corrosion inhibitors and various metallic, non-metallic and organic coatings. Until recently, one of the most effective, and therefore the most widely utilized corrosion protection means were chromate coatings because of their strong oxidizing properties. However, the toxicity and carcinogenicity of Cr(VI) compounds induce strict limitations in their use in recent years.

One of the most promising alternative to chromate coatings seems to be organosilicon compounds coatings. The greatest advantage of these compounds is the presence of the central silicon atom in their structure which is capable to form covalent bonds with both organic and inorganic moieties. As a result, those compounds are organic-inorganic hybrids, capable of bonding to surfaces of metals, metal alloys and steel. In addition, the presence of the hydrophobic alkyl chain, attached to silicon atom, makes the thus modified surface of the protected substrates more hydrophobic i.e. resistant to aggressive, corrosive environment. Organosilicon compounds coatings are deposited from solutions in which sol-gel processes are utilized. The reactions between reactants contained in the solution, form a well-developed network composed of O- $[Si-O]_n$-Si bonds. As a result, the sol solution undergoes gelation. Depending on the process conditions, coatings with different composition and properties are obtained. It has a major influence on their anti-corrosive properties.

The aim of this project is to investigate the effect of sol-gel processes performance on the anti-corrosive properties of coatings, obtained by means of this processes. Project involves the preparation of a certain number of solutions with different composition, taking into considerations variety of factors influencing the carried out processes which will has a huge impact on the quality of the obtained coatings. Anti-corrosive properties of the resulting products will be characterized on the basis of electrochemical techniques studies i.e. measurement of the open circuit potential, linear polarization, cyclic potentiodynamic polarization and electrochemical impedance spectroscopy.