

## Diploma work

### Film forming, bionic, environmentally benign corrosion inhibitions.

Diploma work at Division of Surface and Corrosion Science, Royal Institute of Technology (KTH)

#### Aim

Development of novel environmentally benign corrosion inhibitors.

#### Background

Metallic materials are one of the cornerstones of our modern society. Metal corrosion is a natural degradation process that cannot be stopped, but must be controlled in a satisfactory way, e.g., through corrosion inhibitors or by a protective surface layer/coating. Corrosion inhibitors are used either directly in aqueous systems to reduce the corrosion rate, or in a surface coating to obtain an enhanced corrosion protection. Today, because of environmental impact and health risk issues, many of the traditionally used corrosion inhibitors (chromate and heavy metals, amines and imidazoline, etc.) and coating components have to be phased out, and there is an urgent need to develop new corrosion control strategies that are “green”, safe, smart and multifunctional.

Bionics is learning from nature, i.e. the application of biological methods and systems found in nature to the study and design of engineering systems and modern technology.

This project will investigate the possibilities to develop methods of functionalizing surfaces inspired by the extraordinary adhesion ability of mussel feet protein. To optimize new corrosion control strategies requires a deep fundamental understanding of the interfacial layers and processes.

The research program specifically aims at increasing the fundamental understanding of the inhibition properties and to address scientific problems that have to be overcome in order to develop the general applicability of the concepts.

#### Work plan

By advanced electrochemical measurements for carbon steel in a salt solution with sea water salinity, evaluate corrosion inhibition efficiency of the inhibitors, and to investigate the film forming process and its influence on the corrosion inhibition effect, aiming at ranking of the corrosion inhibitors tested. The electrochemical measurements include open circuit potential (OCP), linear polarization resistance (LPR), electrochemical impedance spectroscopy (EIS) and Potentiodynamic polarization measurement.

In addition to the experimental study of the corrosion inhibitors, the diploma work will also consist of a literature survey, and writing of the diploma thesis. The project will start as soon as possible.

#### Contact detail

Prof. Jinshan Pan will be the scientific supervisor and the examiner for the diploma thesis.

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