



CHAPTER I

Introduction

Corrosion is one of the major problems in industrial. This problem is a cause of material deterioration, economic loss and so on. The coating is a covering of the coating material on an object (substrate) to protect substrate or change its appearance. The Coating process is a considered as the effective method to overcome such problem.

There are many types of coating methods such as thermal process, sputtering, chemical vapor deposition and ion implantation. The later one is the most popular coating method. Ion implantation is a process by which ions are accelerated to a target at energies high enough to bury them below the target's surface. The coating and basement material are connected by physical bond.

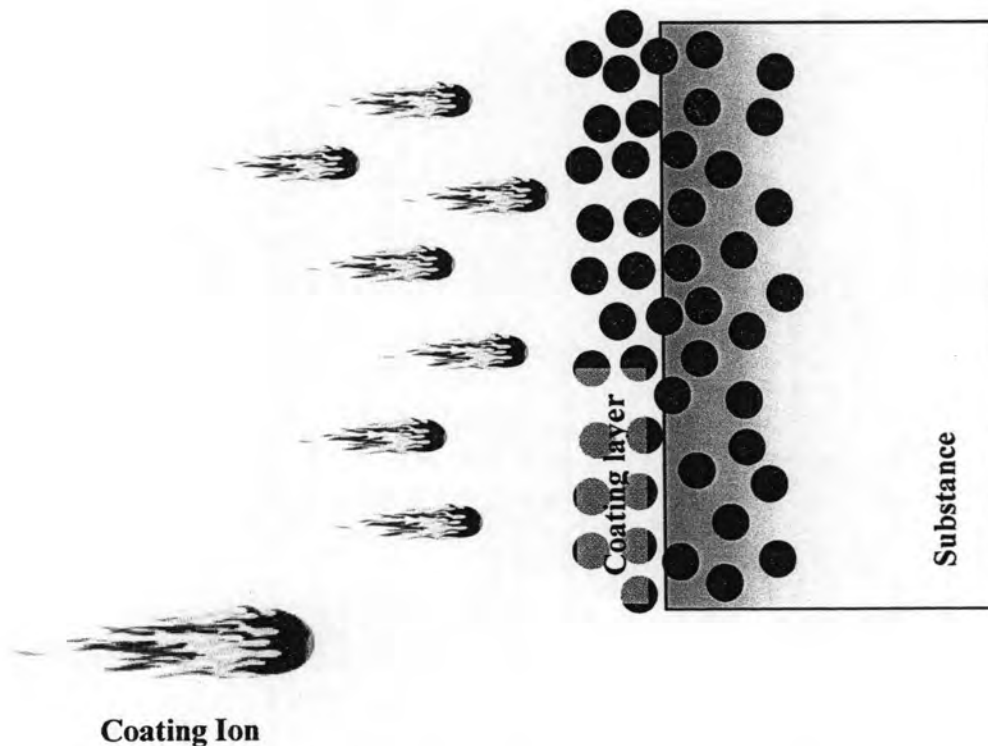


Fig. 1.1 Schematic of implantation for coating concept

In the early 1970s, it was found that ion implantation of metal surfaces could improve friction and corrosion properties, which was divided into types. It is Beam line ion implantation and Plasma source ion implantation (PSII).

Ion implantation into surface of three-dimensional targets is achieved by forming the ionized plasma about the target within an enclosing chamber and applying a pulse of negative high voltage between the target and the conductive wall of chamber. Ions from the plasma are driven into the target object surface from all side simultaneously without the need for manipulation of the target object. Repetitive pulse of high voltage causes the ion to be driven deeply into the target. The plasma may be formed of a neutral gas introduced into the evacuated chamber and ionized therein with ionizing radiation so that a constant source of plasma is provided which surrounds the target object during the implantation process. Significant increases in surface hardness and wear characteristics of various materials are obtained with ion implantation in the manner.^[1]

For this research, Plasma source ion implantation will be studied to observe the optimum condition for coating.

1.1. Objective

To develop a computer code that simulates and analyzes the process of plasma source ion implantation in simple configuration.

1.2. Scope of research

1.2.1. Develop a three dimensional code based on particle model for simple configuration plasma source ion implantation.

1.2.2. Verify and benchmark the developed code with the available data and results from the other codes.

1.3. Methodology

1.3.1. Study the theory of plasma, plasma coating and relating subjects.

1.3.2. Design the model and simulate the model of plasma coating.

1.3.3. Compare the numerical result with the available data and the results from the other codes

1.4. The expected results of this study

Obtain a computer code that helps simulate and analyze the plasma source ion implantation.