PREFACE

Materials Science is one of the important fields of chemistry which has a predominant role in improving the quality of human life. Every aspect of human life is related to it. Human civilization is classified based on the major metals used in that period. Metals had important role in human life. From the instruments used for the cultivation of food to the instruments used for space flights is based on metallic materials. But the metallic materials always had a tendency to return to its original free state in nature. This deterioration of metals is termed as corrosion of metals.

The prevention of corrosion of metals formed the basis of the present study. Mild steel is one of the widely used alloys for a wide range of applications. The preliminary part of the present study dealt with the corrosion prevention of mild steel. The conventional hot-dip galvanization process is modified based on the composite incorporation. A mixed oxide of titania and alumina was incorporated into the hot-dip galvanization bath and the developed coating exhibited high corrosion resistance in nature and high barrier protection. The coating developed can be used as the basic substrate material for hydroxyapatite deposition. This formed the basis of providing a hot-dip galvanized and further conversion coated inter layer for hydroxyapatite coating. The stainless steel substrate is coated with zinc and then it was phosphated to provide the zinc phosphate inter layer.

Electroless nickel phosphorous deposition is another important method used to protect mild steel substrate from corrosion. In the present
study the composite incorporated electroless nickel-phosphorous coating is developed on the metallic substrate and it served as the inter layer for hydroxyapatite coating. The two conventional methods for protecting the mild steel from corrosion is utilized to protect stainless steel from biological corrosion during orthopaedic applications.

The conventional electrodeposition process is also modified based on the concept of throwing power to provide a highly bioactive coating. The method used to protect the metallic coatings from corrosion - composite incorporation - formed the basic of providing a bioactive hydroxyapatite coating. Thus the present study formed an extension of the conventional electrochemical methods in the field of orthopaedic implant development, i.e., the implants having best qualities in terms of biocompatibility and stability.