PREFACE

Ion Implanatation has been emerged as an important technology for surface engineering in 1970s and showed that implantation of nitrogen, carbon or boron into steel and other alloys resulted in increased resistance to wear, and corrosion. Subsequently, the invention of plasma source ion implantation by Conrad et al. in 1987 proved to be a cost effective non-line-of-sight implantation technique for surface modification of metallic materials. Around the same period, Collins and his co-workers developed plasma immersion ion implantation (PIII) that enabled simultaneous implantation and diffusion unlike beam-like implantation, PIII offers the unique advantage of normal incidence from all sides and uniform penetration irrespective of size, shape and contour of the target. The evolution of microstructure is of interest as PIII often produces metastable phases and enhances surface dependent properties of interest.

The present investigation is aimed at studying some aspects of surface modification of some commercial grads of steel and Ti by PIII of nitrogen. The studies include PIII under different conditions, detailed characterization of the surface microstructure and composition, assessment of hardness and wear, corrosion resistance and finally correlation of structure-property-parameter. The thesis is presented in five chapters. Chapter1 presents introduction to the subject matter and chapter 2 provides a comprehensive summary of the current status of understanding in the evolution of PIII technology. Chapter 3

summarizes the experimental part of the work, Chapter 4 presents the

experimental results of this investigation and their analyses. Finally, Chapter 5 summarizes the major outcome of the present work.