

# Preface

There are various engineering applications where surface has to perform a job different from the bulk of a component. On many occasions, just by altering 1–2 % of the total thickness of the components, the properties enhance their performance considerably. In the last several decades, the importance of surface engineering has grown substantially. The list of applications, where manipulation of surface properties is required, is unlimited, especially in the field of automobile, petrochemical, food processing, nuclear, etc. Surface alloying is a class of the surface engineering family, where the surface of the base materials is intentionally alloyed to a thickness of tens of microns. For example, carburizing, nitriding, chromizing, boronizing, etc., are popular methods of surface alloying. These processes involve change in the surface chemistry of the component and modifications in the microstructure and properties. Sometimes, it is advantageous to combine two different surface alloying methods to compensate for the disadvantages offered by one of the methods. The topic of surface alloying is interdisciplinary in nature and various science and engineering streams can work together for its further advancement in science and technology. This book is about the scientific aspects of a focused topic of surface alloying of metals. It is aimed at undergraduate and postgraduate students to develop understanding about the fundamentals and focused topics in the relevant field of surface alloying. This book is just an initiation in this direction and possibly useful to researchers of the R&D institutions and universities, engineers in automobile industries and students who work on this subject for the first time.

The book consists of seven chapters. [Chapter 1](#) (by S.S. Hosmani) deals with the basics of surface alloying. This chapter has attempted to cover the essential concepts of surface alloying along with some of the interesting results in this research area. The relevant concepts are explained by using simple text and schematic diagrams. [Chapter 2](#) (by S.S. Hosmani) attempts to review some of the interesting results associated with nitrided binary iron-based alloys (Fe–Cr and Fe–V alloys). In [Chap. 3](#) (by S.S. Hosmani), the effects of different operating parameters of plasma-nitriding, gas-nitriding, and nitro-carburising of 4330 V steel (NiCrMoV low alloy high strength steel) are discussed. Surface alloying of materials by plasma nitriding using glow discharge plasma has become an important environmentally benign surface modification process to obtain improved hardness, wear resistance, and corrosion resistance. The surface alloying of

austenitic stainless steels and Cr-plated austenitic stainless steel by plasma nitriding is described in [Chap. 4](#) (by P. Kuppusami). [Chapter 5](#) (by S.S. Hosmani) is about the role of carburizing, chromizing, and duplex surface treatment on microstructure and hardness of mild steel. [Chapter 6](#) (by R.K. Goyal) attempts to introduce readers to various characterization techniques, which would be useful in the study of surface treated materials. Finally, [Chap. 7](#) (by S.S. Hosmani and P. Kuppusami) gives the conclusions and possible research scope in the field of surface modification.

While preparing this book, we were indebted to several individuals. We are very thankful to them. Many thanks to Springer-India team that provided constant administrative support for the completion of this book.

Santosh S. Hosmani  
P. Kuppusami  
Rajendra Kumar Goyal

An Introduction to Surface Alloying of Metals

Hosmani, S.; Kuppusami, P.; Goyal, R.K.

2014, XI, 133 p. 70 illus., Softcover

ISBN: 978-81-322-1888-3