Preface

Surface coatings are useful to change the surface properties according to the requirement for optical activity and sensor application, energy saving application-solar coating, absorber, reflector, emitter; mechanical and tribological phenomena, cutting and forming tools, information storage application, protective, environment resistant, decorative, micro-electronic device etc. Surface coatings modified by ions or lasers are also of great advantage in the forthcoming industrial technology. In this compilation, attempt has been made to select a few applications and describe it in detail for material selection, technique of deposition, characterization and evaluation. It is not possible to cover all the applications of surface coatings.

In the first three chapters of the book, super hard coatings of advanced materials for wear, abrasion and erosion in cutting and forming tool application developed by different techniques have been described along with their evaluation of wear resistance and finished surface of work material. It is followed by the exciting development in the field of synthetic diamond film and coatings. In the next chapter, gas deposition describes the unique technique of nano-particle deposition at almost sonic speed for electronic components with no environmental pollution. Then after in two chapters, two important commercial applications of surface coatings in solar application and functional decorative coatings by ion plating have been discussed in detail. Coatings to reduce plasma contamination and power loss in fusion reactors have been elaborately described in the next chapter. In the last two chapters role of cluster ion beam and lasers in surface modification, thin film formation, surface smoothening, cleaning has been covered showing the usefulness of this technology in commercial viable applications.

Utmost care has been observed to present the material in the above chapters as current as possible but with the rapid development in the field and unlimited scope of the subject makes the exposition sometimes difficult. However it is expected that the above presentation will be informative to the reader.

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About the Editor

Rajendra P. Agarwala graduated from Agra University, India and got his M. Sc. in Physical Chemistry in 1950 and then went to Imperial College of Science and Technology, London and secured Ph. D (Lond. Univ.) in Applied Physical Chemistry and D.I.C. in 1953. He returned to India in 1954 and joined National Chemical Laboratory, Poona. In 1955, he was appointed in Atomic Energy Establishment, Trombay (now known as Bhabha Atomic Research Centre) and worked on Defect and Diffusion in Metals and Alloys, Radiation Damage in Metals and Alloys, Metallurgical Coatings and Thin Films in various positions.

He worked in the Metallurgy Dept. of Massachusetts Institute of Technology USA as a visiting scientist and was invited to be Visiting Professor in Material Science, Tohoku University, Sendai; Visiting Professor in Solid State Physics, Australian National University, Canberra and as National Visiting Professor of Material Science by Government of Japan. He was the first Research Grantee of International Atomic Energy Agency, Vienna and Wakefield Scholar at London.

He has a handsome number of publications in International journals and has enjoyed high positions in National Professional Societies. He has been on the International Advisory Committee of International Conferences and Advisory Board of Defect and Diffusion Forum and Solid State Phenomena (International Journals). He was member of Thin Film Division of International Union of Vacuum Science, Techniques and Applications (IUVSTA). He is the editor of 'Diffusion Processes in Nuclear Materials' published by Elsevier Science Publishers B. V., Amsterdam.

He is married to Mrs. Prabha Agarwala, M. A., a leading professional Sitar player in Indian classical music and has a son, Dr. Sanjay Agarwala, M.S., M.Ch. (Liverpool) (Gold medallist) who is one of the leading surgeons in orthopaedic and microsurgery in the country.