

HANDBOOK OF PHYSICAL VAPOR DEPOSITION (PVD) PROCESSING

Film Formation, Adhesion, Surface Preparation and Contamination Control

by

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Dedication

**To my wife
Vivienne**

Without Vivienne's constant support, encouragement, and editorial assistance, this book would not exist. Her wide spectrum of contacts within the vacuum equipment and PVD technology industries has made the accumulation of information in some sections of this book possible.

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Preface

The motivation for writing this book was that there was no single source of information which covers all aspects of Physical Vapor Deposition (PVD) processing in a comprehensive manner. The properties of thin films deposited by PVD processes depend on a number of factors (see Sec. 1.2.2), and each must be considered when developing a reproducible process and obtaining a high product throughput and yield from the production line.

This book covers all aspects of PVD process technology from characterizing and preparing the substrate material, through the deposition process and film characterization, to post deposition processing. The emphasis of the book is on the aspects of the process flow that are critical to reproducible deposition of films that have the desired properties.

The book covers both neglected subjects, such as film adhesion, substrate surface characterization, and the external processing environment, and widely discussed subjects, such as vacuum technology, film properties and the fundamentals of individual deposition processes. In this book, the author relates these subjects to the practical issues that arise in PVD processing, such as contamination control and substrate property effects on film growth, which are often not discussed or even mentioned in the literature. By bringing these subjects together in one book, the author has made it possible for the reader to better understand the interrelationships between various aspects of the processing and the resulting film properties. The author draws upon his long experience in developing PVD processes, teaching short courses on PVD processing, to not only present the basics but

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