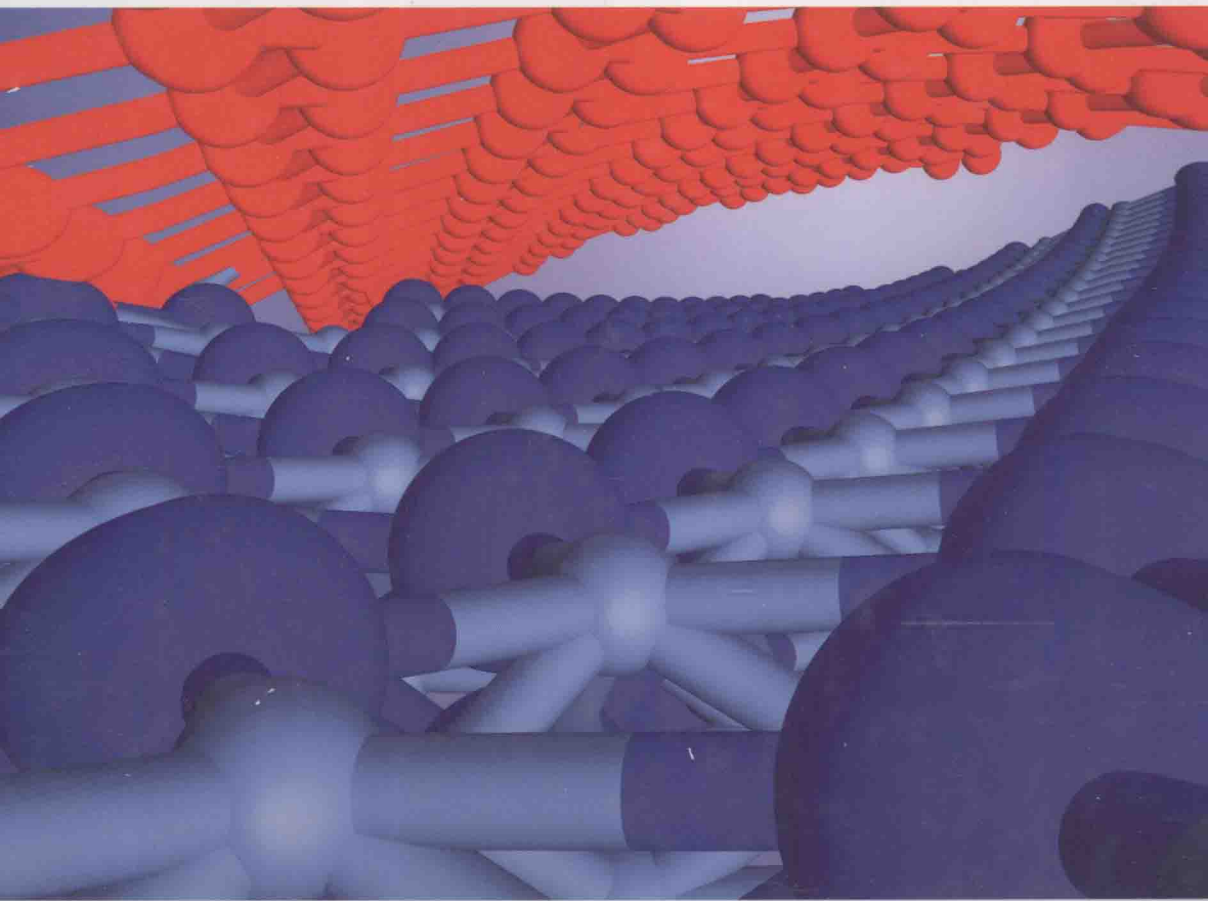


LEONARD J. BRILLSON

SURFACES AND INTERFACES OF ELECTRONIC MATERIALS



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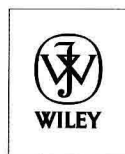
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Surfaces and Interfaces of Electronic Materials



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Preface

This textbook is intended for students as well as professional scientists and engineers interested in the next generation of electronics and, in particular, in the opportunities and challenges introduced by surfaces and interfaces. As electronics technology improves with higher speed, higher sensitivity, higher power, and higher functionality, surfaces and interfaces are becoming more important than ever. To achieve higher performance at the macroscopic level, one requires even more refined control of these junctions at the microscopic and, in fact, the atomic scale. With each advance, new techniques have been developed to measure and alter physical properties with increasing refinement. In turn, these studies have revealed fundamental phenomena that have stimulated designs for new device applications. This synergy between characterization, processing, and design spans several academic disciplines including physics, chemistry, materials science, and electrical engineering.

Several excellent physics-based books are available that provide extensive mathematical analyses focused on specific effects that are also described here. However, the field of electronic surfaces and interfaces encompasses a wide range of chemical and materials science phenomena that impact electronic properties. Rather than follow advanced treatments of specific effects, this book describes at an intermediate level the full range of physical phenomena at surfaces and interfaces, the variety of techniques available to measure them, and the physical issues to be addressed in order to advance electronics to the next level of performance. The author hopes to convey the excitement of this field and the intellectual challenges ahead. He also wishes to thank many of his colleagues for paving the way for this book with their valuable discoveries and insights. Particular thanks are due to Prof. Eli Burstein, who introduced him to the physics of metal–semiconductor interfaces, Dr Charles B. Duke, whose theoretical studies of semiconductor surface structure and tunneling provided a framework on which the experimental program was built, and Prof. Giorgio Margaritondo, who helped launch his soft X-ray photoemission spectroscopy work on interfaces and introduced him to the international world of synchrotron radiation science. Finally, his deepest gratitude goes to his wife, Janice, for her patience, understanding, love, and support during the year in which this book was written.

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