Introduction

Microindentation hardness testing and its associated methodology continue to be used widely in materials evaluation. The subject matter in this book, however, goes beyond the mere obtaining and interpreting of microindentation hardness numbers. It deals with the use of indentation methods in the study of intrinsic deformation properties, residual stress states, thin-film adhesion, and fracture properties in a variety of materials.

The last such collection of contributions to the general field of microindentation hardness testing in the United States was published more than a decade ago.[1] Since then, a considerable body of work has improved our understanding of indentation behavior as it relates to fundamental material properties and has extended the range of applications to engineering practice. The symposium from which the content of this book derives was organized as a joint venture between the International Metallographic Society, the American Society for Metals, and ASTM. It was held on 15 and 16 July 1984, in Philadelphia, PA, in conjunction with the 17th annual International Metallographic Society technical meeting. Contributors and attendees at the symposium represented eleven countries in addition to the United States, and their technical interaction provided a forum for discussion of microindentation research and technology.

This volume is organized into three sections dealing with fundamentals, testing techniques, and engineering uses of microindentation-based methods for metals, ceramics, and polymers. The reader will find that the classification of papers into the three sections is somewhat arbitrary. Nevertheless, as one proceeds through the book one will note something of a progression from scientific principles to practical applications.

The papers in the section on fundamentals question some of the traditional theories of indentation behavior and examine how these theories relate to intrinsic material properties. This section covers metals, ceramics, and polymers. There is an emphasis in many of these papers on a relatively new approach to quantifying microindentation behavior through the use of the load-displacement response of materials. The section on techniques addresses such topics as hardness scale interconversions, measurement methods, errors, standardization, and time and size effects. The third section, on applications, contains six papers which exemplify some of the many engineer-

[1] *The Science of Hardness Testing and Its Research Applications*, American Society for Metals, Metals Park, OH, 1973.

ing uses of microindentation techniques. Two of these papers deal with sliding wear and abrasion damage assessment, one with the mounting and microindentation testing of small particles, and three with various aspects of coatings testing.

The editors would like to express their sincere gratitude to the contributors and reviewers of this volume for their cooperation and efforts. The International Metallographic Society and the U.S. Office of Naval Research provided travel support for some of the symposium contributors from outside of the United States. Chris Bagnall and James McCall of the International Metallographic Society are also acknowledged for their help with many of the necessary details required to organize the symposium facilities and funding.

Peter J. Blau
Brian R. Lawn

National Bureau of Standards, Gaithersburg, MD, 20899; symposium cochairmen and editors.