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sands of scientists and students are eagerly learning to use supercomputers in their research, and there is a growing need for good resource books. By experience, one has learned not to look to the supercomputer manufacturers for such material. Indeed, in such fledgling fields published conference proceedings often are the most helpful references. The present book is exactly of this sort: The International Workshop on the Use of Supercomputers in Theoretical Science took place near Antwerp, Belgium, in the summer of 1984 (how "and Experimental" came into the title of the book is an unexplained mystery).

The book consists of nine contributions, of which seven could be of some interest to scientists who want to learn about techniques for using supercomputers. It appears to me, however, that this book would not be a good choice for today's scientist for several reasons. First, much of the material is out of date. Both the hardware and the software technology available today on supercomputers have been greatly improved in the last three years. As a simple example, the availability of hardware scatter and gather instructions on today's Cray XMP significantly changes one's approach to programming that machine. Similarly, the memories available on the European machines that served this book's authors were quite small by today's standards and forced compromises that are largely irrelevant now.

Second, the articles are decidedly too formal and too oriented toward computer science to be of interest to most practicing physical scientists. This is not meant in any way as a claim that scientists do not need to learn some computer science; in fact, nearly all supercomputer users would profit greatly from fundamental courses in that area. It is my impression, however, that the articles in the present book would be of little help in establishing good programming practices, the area most often neglected by scientists using computers.

Finally, the book makes reference to true parallel processing in only one article, where the discussion centers around a rather obscure French machine (the Marianne supercomputer project) that, as far as I know, has had little if any impact to date on scientific computing.

There are a number of other books that I would recommend for those who want to learn about techniques of using supercomputers. First, *Vectorization of Computer Programs with Applications to Computational Fluid Dynamics* by Wolfgang Gentzsch (Vieweg, Braunschweig, 1984) is a very good

introduction to using vector supercomputers in general (and only the last chapter is specific to computational fluid dynamics). Second, *High Speed Computation*, edited by Janusz S. Kowalik (Springer-Verlag, New York, 1984), and *Parallel Computing '85*, edited by M. Feilmeier, G. Joubert and U. Schendel (Elsevier, New York, 1986), both provide a great wealth of information not only on using vector supercomputers but also on the emerging potentials of other highly parallel architectures.

DENNIS W. DUKE
Supercomputer Computations
Research Institute
Florida State University

Adsorption Processes on Semiconductor and Dielectric Surfaces I

V. F. Kiselev and O. V. Krylov
(Translated from the Russian by A. S. Dobrosavltski)
287 pp. Springer-Verlag, New York, 1985.
\$49.50

This book is a compact review of the area of surface chemistry that is concerned with the study of adsorption and heterogeneous catalysis on semiconductor and oxide surfaces. It is a revision of an earlier monograph published in 1978; originally written in Russian, it has been skillfully translated into English.

The book is strongly focused toward the classical approach to the properties of rather complex surfaces. Thus, it emphasizes techniques such as ir spectroscopy, nmr, esr and isotherm measurements on large-area surfaces, although it also discusses many studies on single crystal surfaces. In a sense, V. F. Kiselev and O. V. Krylov have supplied the reader with everything one might wish to know about the deep historical roots of the field—they provide about 1000 references—but they report very little truly modern surface science.

The book emphasizes substrate surfaces such as Si, Ge, SiO₂, Al₂O₃, graphite and zeolites. It also discusses phenomena such as surface reconstruction, vibrational relaxation of surface species, and the properties of the surface hydroxyl group. Another central theme is the nature of the active adsorption site on these surfaces.

The authors have combined the approaches of surface chemistry and solid-state physics, and the book will therefore appeal to readers from a wide range of backgrounds. I would recommend the book to anyone working in surface chemistry or physics who desires to learn more of the traditional approach to the study of the complex

surfaces of semiconductors and insulators, but I would not recommend it for learning the more modern aspects of the subject.

JOHN T. YATES JR
Surface Science Center
University of Pittsburgh

Surface Crystallography: An Introduction to Low Energy Electron Diffraction

L. J. Clarke
329 pp. Wiley, New York, 1985. \$59.95

The substantial growth of work on surface structure in the last few years and the continuing important contribution of low-energy electron diffraction to that field have made the present a good time for a new text on LEED. This book by Lionel J. Clarke, an experienced user of LEED in the study of surface structure, is a useful and timely text that discusses informatively many features of modern work on LEED, including topics that previous texts do not cover. It should serve well both as an introductory text and as a reference with which active research workers in surface physics can review and amplify their knowledge of particular topics.

Among the notable features of the book is a detailed treatment of the geometry of the surface structure of crystals and its relation to diffraction patterns. The discussion provides practical illustrations of how to deduce the geometry of substrates and overlayers from the observed patterns, including how to deal with incommensurate overlayers or stepped substrates. Modern LEED experimental technique and instrumentation are extensively discussed and well illustrated by numerous figures. The text explains carefully the requirements and advantages of different instruments and offers many critical judgments about the relative merits of various experimental procedures. A valuable chapter on the comparison of theoretical and experimental results places particular emphasis on the now essential reliability factors (r factors); Clark provides explanations and comparisons of several r factors, accompanied by detailed illustrations, critical comments and notes on the refinement of crystal structures. Also noteworthy are a survey of currently used computational approaches and computer programs for LEED intensity calculations and a survey and comparison of LEED with selected other surface analysis techniques, with notes on the special capabilities of each technique.

The least successful part of the book is the attempt to sketch the mathematical development of electron scattering theory. Material as complex as the

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