warheads of 100 kilotons each).

The book contains a number of chapters on various technical approaches for monitoring that go beyond the START treaty. During the ratification proceedings, senators on both sides of the issue will remind the Executive Branch that START will not destroy warheads, but merely move them from launchers to other places. The calculations by these authors show some promising approaches for monitoring the dismantling of warheads, as well as submarine-launched cruise missiles and air-launched cruise missiles; the constraining of warheads on multiple independently targetable re-entry vehicles; and a cutoff of the production of fissile materials. These technical approaches can be complemented with data exchanges that can be verified by on-site and challenge inspections.

Beyond these technical considerations, the FAS–CSS research has signaled broader, more procedural results. Of course, the measurement in July 1989 of neutrons and gamma rays from the Soviet cruise missile on the SLAVA in the Baltic Sea could have been masked with shielding, but the SLAVA experiment showed a greater truth: the willingness of the Soviets to allow very intrusive inspections. This kind of "cooperative measure," coupled with data exchanges that give the number and location of cruise missiles, could greatly enhance the ability to "trust but verify" the agreed number of cruise missiles in a START II treaty.

The US and Soviet Union are often constrained from looking very far from the status quo on arms control issues. It would be wise for the two countries to examine the results of the FAS–CSS group when they consider their bargaining positions for a START II treaty.

DAVID W. HAFEMEISTER
California Polytechnic State University

Organic Superconductors

T. Ishiguro and K. Yamaji
Springer-Verlag, New York, 1990. 288 pp. $59.50 hc
ISBN 0-387-51321-3

The discoveries of the ceramic superconductors—with transition temperatures above 100 K—have overshadowed in large measure another remarkable series of discoveries: the discovery of superconductors synthesized from nonmetallic, organic compounds. These organic compounds have superconducting transition temperatures in the teens, but the rate at which new compounds with higher transition temperatures and remarkable electrical and magnetic properties are being discovered, documented and understood makes this field one of ever-growing importance to the condensed matter physicist.

Takehiko Ishiguro and Kunihiko Yamaji, who have been active contributors in this area for over a decade, have put together a remarkable monograph on the organic superconductors. It goes far to capture the essence of the field, what these materials are and why they behave the way they do. The authors have succeeded in building a coherent picture of the many competing factors that determine the physical properties of the organic superconductors, and the book gives a balanced and well-reasoned account of the wide range of experimental data now available.

It is not easy to compare this monograph with others on superconductors, for few require so large a breadth of understanding of diverse topics as do the organic superconductors. But it is reminiscent in some sense of Nevill F. Mott and H. Jones's monograph, *The Theory and the Properties of Metals and Alloys* (Clarendon, Oxford, England, 1936), published at a time when quantum mechanics had just been applied to the theory of metals, and the individuality of different metals was beginning to be appreciated. Ishiguro and Yamaji's book is analogous: It applies the methods of condensed matter physics to all organic superconductors and extracts an understanding of the individuality of each. Like Mott and Jones's book, it describes a field in transition, with new results, new phenomena and new materials being reported in quick succession. This timeliness of course has its advantages and disadvantages. It captures the excitement of the field but at the same time dates the book.

The topics covered range from descriptions of the organic state, the structural constraints on these molecules, their band structure and the magnitudes of overlap integrals to the subtleties of the Green's function treatment of conducting systems in high magnetic fields. These and many more concepts are introduced and discussed in some depth. Fortunately, this is done in a comparatively simple manner that uses an intuitive, physical approach understandable to recent college graduates and intermediate graduate students.

The book gives a concise, physical description of the various phenomena observed in one- and two-dimensional conductors—the Peierls transition, charge-density waves, spin-density waves, open and closed Fermi surfaces and more. These brief but precise vignettes are well done, and the book gives the best descriptive comparison I have seen of the different classes of organic superconductors as well as a well-reasoned, fair and balanced analysis of the interpretation of the behavior of each.

The level at which the different theoretical sections are presented varies from elementary—for band models and superconductivity—to advanced—for the use of finite-temperature Green's functions to describe the field-induced spin-density waves. Not everyone is going to be comfortable with the varying levels of presentation, but in all cases the steps of the authors' arguments are well explained.

While there is a great deal that is covered in the text, there is also a great deal that is not. There is no discussion of methods of chemical synthesis, crystal growth, electrocrystallization, solid-state polymerization or any of the details of experimental methods used to determine the physical properties of these materials. The authors recognize this limitation and clearly state that they are not experts in these areas and therefore have omitted them. That is fair enough.

What is more surprising perhaps is the omission of any major discussion of the properties of polyacetylene, the polydiacetylenes, the Krogmann salts and $(SN)_x$. While these are either not superconducting or, in many cases, not in the strict sense organic, they have all been part of the family of compounds that have been the focus of similar studies and have many common links to the organic superconductors.

The book contains some spelling errors that could have been caught by an alert editor, some typographic errors and some mislabeled figures, but on the whole the book is well assembled, well illustrated and has several hundred references and a comprehensive subject index. It is a welcome and timely contribution in a rapidly growing area of condensed matter physics.

WILLIAM A. LITTLE
Stanford University

Semiconductor Material and Device Characterization

Dieter K. Schroder
Wiley, New York, 1990. 599 pp. $59.95 hc ISBN 0-471-51104-8

In the early 1950s, physicists first became familiar with terms such as hole and electron concentration, Hall mobility, drift mobility and minority-carrier lifetime in connection with measurements on semiconductors. Such measurements were necessary to understand and explain both the bulk properties of germanium and silicon and the behavior of devices fabricated from those materials. In the intervening 40 years we have witnessed the birth of the semiconductor industry, which developed a variety of new materials, exploited bandgap engineering and two-dimensional structures and produced incredible numbers of discrete devices and integrated circuits.

Not surprisingly, there has been a concomitant need for a greater and more widely based knowledge of material and device properties. Details of the ever more sophisticated methods and instruments associated with that goal have been documented in source papers, review papers, conference proceedings, a few now out-of-print books and several chapters appearing in various textbooks and handbooks.

Dieter Schroder recognized the need for a single comprehensive source for this information. His book unites a broad range of electrical, optical, physical and chemical techniques, while providing a guide for the uninitiated. For example, in discussing lifetime-measuring techniques, the author writes that the "topic would appear to be straightforward since the concept of electron and hole lifetimes in semiconductors is, in principle, quite simple. However, in practice, there are often as many lifetime values for a given device as there are measurement techniques—[in reality] 'lifetime' is quite a complex concept."

In addition to carrier lifetime, chapters in the book cover resistivity; carrier and doping concentration; contact resistance and Schottky barrier height; series resistance, channel length and threshold voltage; mobility; oxide and interface trapped charge; deep-level impurities; optical characterization; and chemical and physical characterization. Each of the chapters is logically constructed and complete, and all include useful appendixes.

Despite the author's diligent coverage of the field, he has omitted one important measurement technique. Acoustoelectric interactions in general and surface acoustic wave techniques in particular have been described in many publications. Fortunately, a recent article provides an excellent overview of the subject (M. Tabib-Azar, M. Abedin, M. Abbate, P.