authors, is to begin with preparation techniques followed by a description of atomic structures. Given the importance of these two aspects of amorphous solids, this plan makes good sense. An individual researcher is unlikely to possess the same degree of familiarity with a plethora of techniques now available for the formation of amorphous materials in bulk and thin film configurations or be equally knowledgeable about different experimentally determined or computer-modeled atomic structures. The rapid evolution of the subject is reflected in the absence in these volumes of the connection between amorphous structures and the recently discovered icosahedral phase.

Subsequent chapters in Elliott's volume are devoted to phonons, electrons and defects; they probe at some length important concepts such as localization and the valence alteration pair model. Zallen treats vibrations and defects lightly, but instead includes random walks and fractional dimensionality, which lead into the chapter on percolation. Both volumes include a detailed description of disorder-induced localization, the metal–insulator transition and the mobility edge. A number of applications are mentioned and particular attention is paid to the physics of electrostatic copying and solar cells based on hydrogenated amorphous silicon.

These are excellently written volumes—overlapping in parts and complementary in others. While Elliott's monograph is likely to serve as a reference work, Zallen's could be an introductory textbook. Both deserve to be in the library of all students of disorder. The study of disorder has also refined the concept of order: It is not confined to spatial configuration but includes time and has far-reaching ramifications in many areas—among them biology. We are familiar with the idea that coherence can result from collectivity; it is becoming evident that so can chaos. But then, chaos is just one harmony too many.

Thermometry

James F. Schooley
245 pp. CRC, Boca Raton, Fla., 1986.
ISBN 0-8493-5833-7. $108.00

To cite the importance of temperature measurement throughout science and engineering is to state the obvious. However, the literature associated with the field has not always kept pace with developments. It is, therefore, noteworthy that in the past five years there have been several publications that do much to redress the situation.

The proceedings of the Sixth Temperature Symposium were published in 1982 as Volume 5 of *Temperature, Its Measurement and Control in Science and Industry* (available from the American Institute of Physics). Like the preceding volumes in the series, this highly useful work is a collection of state-of-the-art journal-quality papers. As is usually the case for such a compendium, the book was not designed for classroom use and its coverage of the field, while extensive, is neither historically nor technically complete.

In 1983, Terence Quinn's *Temperature* made its appearance and was subsequently reviewed (favorably) by this reviewer (*Rev. Sci. Instrum.* **56**, 334, 1985). Now James Schooley has contributed further to our understanding of a complex subject with his *Thermometry*. Both authors recognized the need for a comprehensive, up-to-date, unified, and self-consistent treatment of the subject. Both were able to draw on their professional training and careers as metrologists influential on the international level—and the advice of their colleagues: The collection of names acknowledged in the prefaces of the respective books reads like a "Who's Who in Temperature." The result has been a pair of books that provide a superior treatment of this conceptually most difficult of the SI base quantities.

Thermometrists at all levels of proficiency and involvement will discover that the two books complement each other handsomely—possibly leading to a desire to own both. Schooley's book is slanted more to the needs of students and has some material on thermometry below 0.5 K (the approximate lower limit in Quinn's book). Quinn's book has about a third more text, most of which is devoted to the practical methods of thermometry (called "modern thermometry" by Schooley). Of course, there is much subject matter overlap, but the differing approaches of the two authors to the same material often promoted a more complete and deeper understanding.

Both authors are to be complimented for the quality—and quantity!—of their references. This is particularly important in such a broad and diverse field where the interested reader can be given expert guidance to the voluminous source material that is so readily accessible in archival journals and symposia proceedings. This avenue is especially valuable in cases where the coverage is light: Schooley devotes only sixty pages to practical thermometry but furnishes 250 references.

A forlorn query to the publisher about the high cost of Schooley's book

elicited the response that there is a 50% discount in quantities of five or more intended for classroom use.

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Optical Bistability: Controlling Light by Light

Hyatt M. Gibbs

471 pp. Academic, New York, 1985.
ISBN 0-12-281940-3 $54.50 hardcover;
ISBN 0-12-281941-1 $34.95 paper

An optical system is said to be bistable if it has two output states for the same optical input. Although no optical bistability is required for optical computing, which is one of the main thrusts for developing this phenomenon, it serves as a focal point for quite a large number of associated fields, and derives its importance from that fact. The diversity of the field is illustrated by noting that the research in optical bistability involves physics, engineering and materials science. From the physics aspect, one studies the contribution from excitons, biexcitons and plasma to band renormalization, band filling, screening of the Coulomb interaction and phase-space filling, and how these affect the nonlinear processes in semiconductors, multiple-quantum-well structures and semiconductor-doped glasses. The development of fast characterization techniques, using pump and probe beams, have proved to be powerful tools for studying the time evolution of the various nonlinear processes.

The engineering of the optically bistable devices involves the design of nonlinear etalons or waveguides; these can be either active or passive, intrinsic or hybrid, and they can rely for optical feedback on mirrors, gratings or a nonlinear absorption mechanism. Issues asssociated with the performance of bistable devices include figures of merit that deal with the minimum energy required to switch on a device, transient and transverse effects and chaos.

Materials science is involved in the various techniques used for the fabrication of the bistable devices, such as molecular-beam epitaxy, photolithography and plasma etching.

The book attempts to cover most of these topics in the chronological order of their development, supplementing the discussions with practically all the relevant references of who did what and when. As the author states, "it is a research book intended for new entrants and active workers in the field of optical bistability." The book consists of a preface, 7 chapters, 9 appendices,