

now be extended to alloys. The extension is decidedly nontrivial. On one hand he shows how an idealized picture may be developed from Ziman's NFE theory of how an alloy *ought* to behave. On middle ground are some problems that have been "resolved" only by recourse to rather crude models, such as those that attack the problems of the equilibrium volume, and the energy and entropy of mixing. And at the other extreme, which is approached when there is a large difference in the valence or the electronegativity of the alloy constituents, almost everything may go wrong: Linear screening and perturbation theory may break down, and some electronic states may become localized; the NFE model may have to be completely abandoned in favor of a tight-binding model that incorporates the notion of chemical bonds, or even of compound formation, in the melt.

The second part of the chapter considers in a systematic fashion a variety of experimental data: diffraction experiments; thermodynamic and surface properties; diffusion, viscosity and electromigration; magnetic susceptibility, nuclear magnetic resonance, and Hall effect; and resistivity, thermoelectric and optical properties. This part of chapter 6 is especially admirable and fascinating: first, the degree to which each type of result may be explained by the NFE rigid-sphere model or some extension thereof is considered, and then the remaining anomalies, wherever they appear, are discussed in relation to "compound formation."

It is as though Faber, having steered an admirable course through the well charted NFE and a few other theoretical seas (and having added significantly to the reliability and clarity of those charts), now finds himself irresistibly drawn toward the murkier regions of less randomly arranged liquids. He does discuss as examples the Tl-Te and Mg-Bi liquid systems, and observes that the anomalies are so severe in these cases that they must be regarded as liquid semiconductors. And with the comment that he is now poaching on territory already covered by N. F. Mott and E. A. Davis [*Electronic Processes in Non-crystalline Materials*, (Clarendon, Oxford, 1971)], Faber ends his journey.

Inevitably, there were a few shortcomings in this first edition: some typographical errors, unclear sentences, unreferenced citations (e.g., Percus-Yevick dense-fluid theory) and obscure references (the ones by B. W. Mott).

But as it stands, this book deserves to be in many libraries. I believe it will have a major impact on the field of liquid metals, leading to substantial

clarification and stimulating further interest in the subject. Faber has worked long and hard on the book and deserves much praise for the high-quality product that has emerged. This volume should remain a valuable and thought-provoking contribution to the field of liquid metals for at least as long as, and probably much longer than, it took the author to write it.

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Fiber Optics

M. P. Lisitsa, L. I. Berezhinskii,
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272 pp. Israel Program for
Scientific Translation,
New York, 1972

This book is intended to cover the state-of-the-art in the field of fiber optics as of the year 1968 and is an English translation of the original Russian publication entitled *Volokonnaya Optika*. In the preface the authors state that "... Despite these growing uses of fiber optics, no book has been published so far in the world literature ..." and they go on to state "Being the first monograph in the world literature on the subject ..." The authors seem to have missed a 1967 book with the same title that I wrote, which has subsequently been translated into Russian.

Approximately 20% of the book is devoted to general and elementary theory of optics: laws of photometry, image formation, basic electromagnetic theory, reflection and refraction at dielectric interfaces and optical thin-film theory.

The second chapter deals with the geometrical optical theory of ray propagation in large diameter (compared to the wavelength of light) cylindrical and conical fibers. The light-transmission efficiency and angular-flux distribution is calculated using meridional and skew rays.

The next chapter describes the theory and experiments on mode propagation through optical waveguides. Solutions of the dielectric waveguide equations are developed for near cut-off and far from cut-off conditions, and the field configuration in the waveguide is calculated for various lower-order modes. The discussion of mode launching, mode identification, waveguide mode coupling and evanescent wave propagation is sketchy.

The next two chapters deal with factors affecting image quality through

fiber optics (including methods for its assessment) and simple techniques of optical fiber fabrication and quality control.

Chapters 6-8 are devoted to an extensive discussion of various applications of fiber optics in optical, electron-optical and other systems. Particular emphasis is given to fiber-optics configurations for use as field flatteners, photorefractometer, couplers for multistage image intensifiers and medical (endoscopic) applications with or without the use of lasers. The discussion of some designs for scanning and control systems incorporating fiber optics is particularly lucid and imaginative. Other applications in high-speed photography, scintillation chambers and contactless potentiometers are included.

This book is one of a number of translations from Russian literature undertaken by Israel Programs for Scientific Translations. The quality of translation, typesetting, illustrations and binding is excellent. Unfortunately, however, in a fast-moving field such as fiber optics, the material can become out of date in a few years' time, and this book is the first to fall victim of obsolescence. In the year 1968 this book would have served its purpose, but the field has advanced and expanded a great deal during this period. However, this book is of considerable value as an introductory treatise on the subject.

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Thermodynamics

Frank C. Andrews

288 pp. Wiley,
New York, 1971. \$9.95

This book by Frank C. Andrews is intended to serve as a first treatment of thermodynamics following courses in introductory physics, chemistry and calculus. It is sufficiently brief that it can be covered in one semester, or even in one quarter.

Part I is a 100-page survey of the principles of thermodynamics, covering briefly such topics as systems, work, heat, the First and Second Laws of Thermodynamics, thermal equilibrium, entropy, thermodynamic potentials and temperature. This part contains fewer than 50 problems, in line with the author's expressed intent of deviating from the usual pedagogy of thermodynamics. Instead of using a number of problems to illustrate each basic principle or definition as it is presented, the plan of Andrews is to streamline the study of thermodynam-