LCPs, in which the liquid crystalline building blocks are incorporated into the polymeric backbone, and side-chain LCPs, in which the liquid crystalline building blocks are attached to the main chain via a flexible spacer. The latter class is the one of interest for electro-optical applications, because the mesogenic (liquid crystal forming) side chains can be reoriented relatively easily by electric fields. Main-chain LCPs, historically the older of the two subgroups, have so far found application mainly in high-strength materials.

Athene Margaret Donald and Alan H. Windle have both made substantial contributions to main-chain LCPs. Theirs is the first book to cover both classes of LCPs. It also appears to be the first textbook to cover the entire field and is thus a most welcome addition to the literature. It addresses chemical, physical and materials science aspects of LCPs. Before this book, there were only review articles and the excellent collection of articles in *Side Chain Liquid Crystal Polymers* (Blackie, Glasgow, UK) edited by C. B. McArdle.

The major chapters of *Liquid Crystalline Polymers* cover stability of LCPs, molecular theories of LCP systems, local order and classification of the liquid crystalline phases, elastic deformations and defects, field and flow induced effects, and various applications. After giving a brief history of the field, the authors provide a remarkable section on terminology and concepts, which introduces in alphabetic order a large number of terms needed for discussing LCPs. This is a very useful chapter given that the book's audience ranges from synthetic chemists to electrical engineers.

While the book is undoubtedly a very useful one, there are a few elements that could be modified in a second edition. Reading the various chapters, I got the impression that the stronger familiarity of the authors with main-chain LCPs is reflected in the material they present, through strong emphasis of main-chain systems. Except for references to their own work, the latest reference given was from 1989. It is also not clear to me why the macroscopic dynamic equations for low-molecular-weight nematic materials are useful in a polymeric context, because the dynamic glass transition takes place at rather low frequencies in LCPs. There are also quite a few lingual infelicities that should be rectified. For example, the text on the cover ends with the confusing term "small molecule liquid crystalline polymers," and later we find "the hotter the molecule the shorter its persistence length."

In this 300-page book the authors give an overview of a large field and cover many of the important features of LCPs. The book can serve as an introduction for readers coming from a wide range of backgrounds. I strongly recommend it to all beginners in LCPs and to colleagues who want to get an overview of aspects outside their domain of expertise.

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Physics of the Earth

Frank Stacey
Brookfield P., Kenmore, Australia, 1992. 513 pp. $74.00 hc ISBN 0-646-09091-7

This third edition of Frank Stacey's textbook provides a valuable survey of planetary-scale geophysical topics. The work is targeted at advanced undergraduate and graduate students interested in applying physics to phenomena in the Earth, such as its gross structure, radioactivity, rotation, gravitation, elastic waves, thermal engine and magnetic field. Geophysics is undergoing rapid theoretical, observational and technological advances, fueled by exciting developments during the last decade such as global seismic imaging of the deep interior, geomagnetic mapping of the flow regime in the core and new space-based methods for determining instantaneous motions of the surface plates. Stacey's book provides an introduction to many of the fundamental physical phenomena underlying these exciting new capabilities, and it stands out as a valuable quantitative guide to geophysics.

From the teaching perspective, a textbook such as C. Mary R. Fowler's *The Solid Earth: An Introduction to Global Geophysics* (Cambridge U. P., New York, 1990), is better illustrated and more accessible to students in undergraduate geophysics classes, but as was true 15 years ago when I took my first introductory class in geophysics, *Physics of the Earth* (then in its second edition) provides an excellent complementary text for the quantitatively oriented student.

Perhaps the most distinguishing aspect of Stacey's book is its thorough development of physical insight for dynamical processes in the Earth based on considerations of the energy budget. Basic principles of energy conservation and thermodynamics are applied to developing a mantle convection scenario. A vision of a whole-mantle convection system driven largely by cooling and subduction of surface lithospheric plates overlying a thin low-viscosity asthenospheric layer and by intermittent upwelling of thermal plumes from a chemical and thermal boundary layer at the core–mantle interface is advocated on the basis of energetics. Complications such as chemical heterogeneity in the mantle are dealt with only qualitatively in the book, but relevant issues are discussed. Many controversial aspects of this scenario—such as whether plumes actually rise from the base of the mantle and how deep the sinking lithosphere actually descends into the mantle—are major topics of current research in the geophysics community. But Stacey chooses to advocate a particular model rather than present a comprehensive accounting of all the different perspectives. While the reader is alerted to this choice in the preface, it does pose a challenge to the teacher of providing alternate perspectives on his or her own, perhaps by appealing to texts that advocate very different visions of how the Earth system works, such as Don L. Anderson's *Theory of the Earth* (Blackwell, Boston, 1989). For example, the origin of the Moon, now widely postulated to be the result of a major impact, late in the Earth's accretion process, by a Mars-sized planetesimal is viewed by Stacey as requiring no special event or process. This assertion, however, fails to account rigorously for the angular momentum and other well-recognized complexities of the combined Earth–Moon system. Nonetheless, much is gained by carefully following the interwoven arguments that Stacey uses to build his Earth model.

Physics of the Earth is replete with basic derivations, tabulations of geophysical information and valuable problem sets. The reference list is surprisingly limited, and so one will need to seek more extensive bibliographies in other texts, such as those mentioned above. The applications of thermodynamics interspersed throughout the text reflect one of Stacey's main areas of research, and greatly augment the text. It is likely that specialists in different areas will be critical of the book's presentation of their own discipline; for example, I found the development of seismological topics, my specialty, rather lacking. But the overall balance of the work makes it a valuable survey that provokes thought, even for specialists in the field.

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NEW BOOKS

Acoustics

Acoustics of American English Speech: A Dynamic Approach. J. P. Olive, A. Greenwood, J. Coleman. Springer-Verlag, New York, 1993. 396 pp. $59.00 *hc* ISBN 0-387-97984-0.

Processing of Complex Sounds by the Auditory System. Proc. Mtg., London, December 1991. R. P. Carlyon, C. J. Darwin, I. J. Russell, eds. Oxford U. P., New York, 1992. 136 pp. $49.95 *hc* ISBN 0-19-852272-X.

Resonance Acoustic Spectroscopy. *Springer Series on Wave Phenomena.* N. D. Veksler. Springer-Verlag, New York, 1993. 282 pp. $89.00 *hc* ISBN 0-387-55638-9.

Astronomy and Astrophysics

Back to the Galaxy. *AIP Conference Proceedings 278.* Proc. Conf., College Park, Md., October 1992. S. S. Holt, F. Verter, eds. AIP, New York, 1993. 659 pp. $145.00 *hc* ISBN 1-56396-227-6.

The Center, Bulge, and Disk of the Milky Way. L. Blitz, ed. Kluwer, New York, 1993. 167 pp. $59.00 *hc* ISBN 0-7923-1913-3.

The Realm of Interacting Binary Stars. J. Sahade, G. E. McCluskey Jr, Y. Kondo, eds. Kluwer, New York, 1993. 451 pp. $140.00 *hc* ISBN 0-7923-1675-4.

Atomic and Molecular Physics

Optical Properties of Excited States in Solids. *NATO ASI Series B 301.* Proc. Sch., Erice, Italy, June 1991. B. Di Bartolo, ed. Plenum, New York, 1993. 733 pp. $149.50 *hc* ISBN 0-306-44316-3.

Biophysics and Medical Physics

Biological Physics. *Key Papers in Physics* E. V. Mielczarek, E. Greenbaum, R. S. Knox, eds. AIP, New York, 1993. 421 pp. $58.00 *hc* ISBN 0-88318-855-4.

Biomechanics: Mechanical Properties of Living Tissues. Second edition. Y. C. Fung. Springer-Verlag, New York, 1993. 568 pp. $49.50 *hc* ISBN 0-387-97947-6.

Biophysical Labeling Methods in Molecular Biology. G. I. Likhtenshtein. Cambridge U.P., New York, 1993. 305 pp. $54.95 *hc* ISBN 0-521-43132-8.

Genetic Engineering: Principles and Methods 15. J. K. Setlow, ed. Plenum, New York, 1993. 247 pp. $149.50 *hc* ISBN 0-306-44526-3.

Princeton Lectures on Biophysics. Proc. Lectures, Princeton, N.J., June 1991. W. Bialek, ed. World Scientific, River Edge, N.J., 1992. 401 pp. $86.00 *hc* ISBN 981-02-1325-5.

Radiation Protection in Medicine. *Proceedings 14.* Proc. Mtg., Arlington, Vir-