

advances as fast as, for example, the molecular biology of cancer, one may expect this book to be out of date very soon. On the other hand, the assumption that molecular biology will unravel the mysteries of aging as rapidly as it has the mysteries of cancer may be naive. For the time being, this book should give investigators both within and outside the field of basic aging research some interesting systems and molecular hints to think about.

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Ferroelectrics for Optics

Physics and Chemistry of Crystalline Lithium Niobate. A. M. PROKHOROV and YU S. KUZ'MINOV. Hilger, New York, 1990. xx, 377 pp., illus. \$130. Hilger Series on Optics and Optoelectronics. Translated from the Russian by T. M. Pyankova and O. A. Zilbert.

Lithium niobate is a unique material whose varied optoelectronic properties have found use in a wide variety of important applications, including surface acoustic wave devices (widely used in television sets), optical deflectors, tunable optical filters, laser

modulators, Q-switches, and transducers. This material was first synthesized 25 years ago and has been the subject of numerous scientific and engineering studies ever since. It has a complicated crystal structure, which is responsible both for its unusual properties and for many of the difficulties in preparing device-quality single crystals.

The first comprehensive review of the chemistry and physics of lithium niobate was written in 1978 by A. Rauber (in *Current Topics in Materials Science*, vol. 1; North-Holland) and has been an indispensable reference source for workers in the field. It is surprising, considering the continually increasing commercial market for this material, that a more up-to-date review has not been written until now, and this book by Prokhorov and Kuz'minov (both of the U.S.S.R. Academy of Sciences) is very welcome indeed.

A range of topics is covered, including the physical and chemical properties of LiNbO_3 ; methods for making single crystals; defects; domain structure; optical inhomogeneities; and electrical, optical, electro-optical, nonlinear, photoelectric, and photorefractive properties. The subjects covered are treated in great depth for the most part, but the book is not fully comprehensive, as it leaves out the fields of integrat-

ed optics (in which LiNbO_3 is an important substrate material), acousto-optic properties and applications, and related optical materials. This book is filled with interesting facts and information that will be of use to both materials and device researchers. Many of the known property data on LiNbO_3 have been collected here, which makes this a useful reference book.

The translation employs some terminology that is not conventional in English, such as "overcooling" for "undercooling" or "supercooling," and in places the wording is obscure. The authors present a steady stream of facts that often does not lead anywhere. I also found some inconsistencies; for example, in the chapter on crystal growth the authors report that multidomain crystals form if the melt contains impurities, but in the chapter on domains they say that other factors cause domain formation and do not mention the purity issue. Few recent references are included, the authors rely heavily on work from the late '60s and early '70s that many workers would now consider obsolete, and some detailed work on defect structure, for example, is missing. The discussion of crystal growth is based on current Soviet technology, and some of the methods given for improving crystal quality appear to be system-specific and thus may not be generally useful.

In spite of these problems, if you are interested in LiNbO_3 , its applications, or electro-optic or ferroelectric materials in general, this will be a very valuable book to have on your library shelf.

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Books Received

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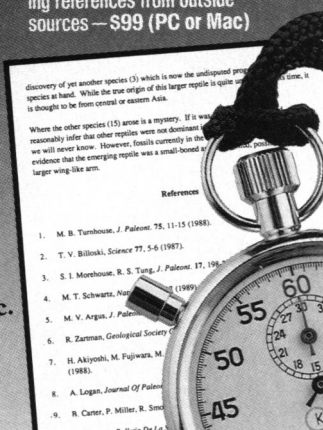
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