J. P. Carbotte from McMaster University in Hamilton, Canada, and his colleague *F. Marsiglio* from the University of California at San Diego, USA, summarize boson exchange mechanisms and combined phonon-exciton mechanisms. A strong coupling approach to high-T_c superconductivity is considered by *J. Rammer* from the University of Bayreuth, FRG. Experimental studies allowing the assessment of the role of phonons in high-T_c superconductivity are included as well as a discussion of non-phonon and combined non-phonon and phonon mechanisms. *K. Machida* from Kyoto University considers electronically driven instabilities in a number of materials such as heavy Fermion superconductors, Cu-free cubic oxides, and the superconducting cuprates. *G. J. Hyland* from the University of Warwick, UK, looks at ground states of the parent compounds which are Mott-insulators and discusses the role of non-stoichiometry and altered valences in high-T_c superconductivity. Superconducting properties resulting from a short coherence length are discussed by *Y. Iye* from the University of Tokyo, Japan. He discusses fluctuations of diamagnetism and conductivity within the Ginzburg-Landau framework. Flux creep phenomena are discussed in the second part of the article.

Chemical aspects of the preparation of high-T_c superconductors are reviewed by *R. M. Iyer* and *J. V. Yakhmi* from Bhabba Atomic Research Center in Bombay, India. They discuss solid state and solution methods for the preparation of bulk superconductors. The oxygen stoichiometry of $YBa_2Cu_3O_{7-x}$ and processing for high critical current densities are reviewed as well as problems in synthesizing Bi and Tl superconductors. The following chapter by *A. V. Narlikar* et al. from National Physical Laboratory in New Delhi, India, is a comprehensive overview of substitution studies. Numerous tables and graphs summarize data and results of substitutions of the relevant lattice sites in $La_{2-x}Ba_xCuO_4$ and $YBa_2Cu_3O_{7-x}$ superconductors. A short section on substitutions in the Bi and Tl superconductors and an extensive bibliography with 144 entries concludes this review.

Sound velocity and measurements of the elastic constants are reviewed by *R. Srinivasan* from the Indian Institute of Technology. After a discussion of sound velocity data, he considers the possibility of structural change near 230 K; a number of measurements seem to point in that direction, e.g. sound velocity measurements, mechanical loss factors, specific heat, etc. Valence and conduction band XPS studies of high-T_c superconductors are summarized by *B. P. Padalia* and *P. K. Mehta* from the Indian Institute of Technology. The role of twins in $YBa_2Cu_3O_{7-x}$ is discussed at length by *C. J. Jou* and *J. Washburn* from the Lawrence Berkeley Laboratory, USA. Their proposed qualitative model for the formation of twins in $YBa_2Cu_3O_{7-x}$ is consistent with numerous experimental observations such as imperfect Meissner effect, remanent magnetization, etc.

Two chapters discuss thin film superconductors. *K. Wasa* and his colleagues from Matsushita Electric Industrial Co. Ltd. in Moriguchi, Japan, review basic thin film processing. After a short introduction listing the various deposition methods, the remainder of the article discusses deposition of a variety of high-T_c superconductors using RF-sputtering. *O. Meyer* from the Kernforschungszentrum in Karlsruhe, FRG, reviews the modification of thin films by ion beam irradiation and its effect on transport properties and electronic structure. The article closes with the discussion of application of ion beam modification techniques. Finally, the design, preparation, and characteristics of a superconducting three terminal device are discussed by *T. Kobay* and *U. Kabasawa* from Osaka University. Their "superconducting current switching transistor" shows a modest current modulation gain of 5 to 7. The authors close with a tentative interpretation of the current modulation mechanism on the basis of non-equilibrium superconductivity.

The volume certainly offers a wide range of topics and caters to a broad cross-section of scientists and engineers, just as the editor promised in the preface. Although the volume is somewhat heavily biased towards the theory side this will not be the case in future volumes as a glance into the list of planned articles reveals. The subject index in the back of the volume is a welcome supplement which enables the reader to cross-reference specific topics with other articles in the volume. On the negative side, some of the figures are of poor quality due either to the design of the responsible author or to the reproduction. It would improve this series if the editor would insist on higher quality supplied figures; a similar comment applies to the type styles, some of which are not suitable for camera-ready publications. Overall this first volume of the series is a good beginning and one can look forward to the forthcoming volumes.

Herbert Jaeger
Max-Planck-Institut für Metallforschung
Heisenbergstrasse 5, 7000 Stuttgart 80 (FRG)

Chambers Science and Technology Dictionary. Edited by P. Walker, W & R Chambers/CUP, Cambridge 1989. xvi 1008 pp., hard cover, £ 30 – ISBN 1-85296-150-3

Professor *Peter Walker*, a former Professor of natural history at the University of Edinburgh, Scotland, and a distinguished collection of collaborators from fields as disparate as acoustics and zoology have combined to produce a reference work of the highest quality which covers many areas of materials science as well as, amongst 100 other areas, biology, geology, and printing.

With the rate of development of science and technology ever increasing, it is not only the educated layman who becomes baffled, but one professional may have trouble understanding terms used by another in a neighboring field.

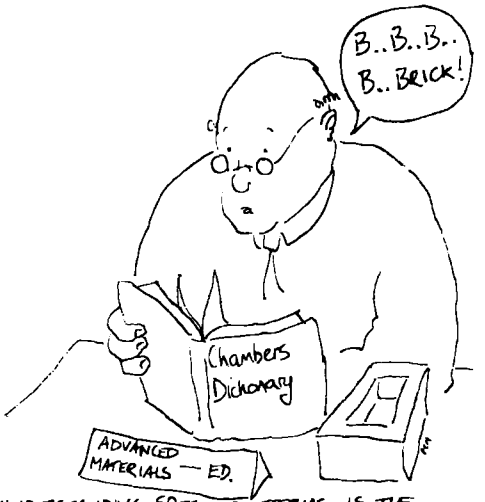
define your terms,
you will permit me again to say
or we shall never understand one another
— Voltaire

This book, to quote from the Preface, "will help a physician to understand a term in molecular biology, the layman to comprehend a medical term and both to talk to their builder in an informed manner."

Extending this philosophy to physicists, chemists, metallurgists, ceramists and engineers, which the dictionary does, is certainly a worthwhile task and one that is supported wholeheartedly in the Editorial Office of ADVANCED MATERIALS.

Chambers' technical dictionaries have a history of almost 50 years. The Technical Dictionary (1940), was supplemented substantially in 1958 and further revisions were made in 1971 and 1974. It seems a particular truism that changes in science and technology in the intervening years appear to have been as great as in the whole of earlier history.

The book, it is claimed, is not intended to replace the expert's own specialist dictionaries but should supplement them, giving the user a source of information which is multidisciplinary in character. To quote from the Preface once again "understanding specialist terms is the first step in applying intelligent controls" and the quality and composition of this work will take the reader a long way towards that goal.



"UNDERSTANDING SPECIALIST TERMS IS THE FIRST STEP IN APPLYING INTELLIGENT CONTROLS"

The main body of the dictionary, some 983 pages, starts with *a* and ends with *zymo-*, and the words in between are, unsurprisingly, arranged in alphabetical order. Joking apart, the coverage of the dictionary is satisfactory, the descriptions concise but clear, in many cases making interesting reading.

The book also contains a Greek alphabet (always useful) and appendices which contain information ranging from ISO paper sizes, through chemical formulae and nomenclature, information on the chemical elements and the classification of the animal and plant kingdoms, to a table mapping geological time and another describing and listing SI units and conversion factors.

All in all, the dictionary is well thought out, produced in high quality and is a valuable reference work which can be recommended without reservation to laymen and specialists alike.

Students of all ages, in all fields of materials technology will find it a valuable companion.

Knowledge is of two kinds. We know a subject ourselves or we know where we can find information upon it
—Samuel Johnson

Chambers are to be congratulated.

Peter Gregory
Advanced Materials
P.O. Box 101161, D-6940 Weinheim (FRG)

Electronics Reliability and Measurement Technology—Non-Destructive Evaluation. Edited by *Joseph S. Heyman,* Noyes Publications, 1988, xii, 188 pp., bound, $ 39.–. ISBN 0-8155-1171-X

The title of the book is misleading. The reader expecting to find a description of the main nondestructive methods for reliability evaluations of electronics will be disappointed. The book consists of a collection of papers presented at a workshop held in June 1986 at NASA Langley Research Center and sponsored by NASA, the U.S. Air Force, the National Security Industrial Association, and the Aerospace Industry Association.

The first paper "Measurement Science and Manufacturing Science Research" gives an overview of the activities at some U.S. universities, sponsored by the Semiconductor Research Corporation.

The paper "Nondestructive SEM for Surface and Subsurface Wafer Imaging" describes the use of a scanning electron microscope as a tool for both failure analysis as well as device characterization. The main emphasis is on capacitive coupling voltage contrast and on nondestructive subsurface imaging of semiconductors.

The paper "Surface Inspection – Research and Development" gives a brief overview of the industrial approach to semiconductor and magnetic disc surface inspection methods and the paper "Sensors Developed for In-Process Thermal Sensing and Imaging" describes a silicon thermophile array for fabrication process control.

The paper "Wafer Level Reliability for High-Performance VLSI Design" deals with the problem that the lifetimes of devices using new technologies are far shorter than older ones and are coming close to system lifetime. In order to monitor reliability on the wafer level, the paper proposes to introduce test structures on the wafer which allow the evaluation of certain failure modes, such as electromigration of mobile ions within a short time.

Some further papers deal with

- microfocus X-ray imaging for solder quality and structure inspection