ter 20, *J. H. Raymer, S. D. Cooper,* and *E. D. Pellizzari* compare the retention properties of four polyimide-based materials and a well-established polyphenylene oxide stationary phase by means of a deuterated tracer pulse technique.

The last two chapters are combined in a "Special Applications" section. *P. H. Neill* and *R. E. Winans* (chapter 21) report on the use of IGC to determine the alterations that coals and oxidized coals undergo when heated to 450 °C. Interpretation of the observed effects is made on the basis of results obtained by pyrolysis, plastometry, and microdilatometry. The final chapter of the volume (by *S. G. Gilbert*) deals with the determination of water sorption isotherms of starch materials.

A general drawback of multi-authored books also applies to this volume: although the contributions are well written, some information can be found in almost every chapter whereas other useful information may have been omitted. Unfortunately, the work which has been done by the editorial staff cannot be recognized by the reader of the book since he does not know anything about the original versions of the contributions. Nevertheless, contributions to a book should be "harmonized" to a certain extent. Thus, symbols should be used consistently throughout the volume. In this book, however, almost every author uses his own special symbols (e.g., five different symbols are used for the hold-up or dead time). Another example: Figure 3 of chapter 14 appears again in a much better version two chapters later; the latter version alone would have been sufficient. Finally, the last chapter is only of minor quality compared to the other chapters; in fact, it looks like a manuscript for an oral presentation, the figures are not explained in the text, and "the product tcKt" turns out to be a product of the factors "tc" and "Kt"!

Only a few errors have been observed (e.g., sub- and superscripts are missing with the symbols and units of Table 1 in chapter 13, and the heading of the last column of Table I in chapter 14 should read "γ_s^P" instead of "γ_s^D"). The subject index is of sufficient length (but, as an example, the entry "absorption" is missing). The reference lists of the individual chapters cover the literature until the beginning of 1988, thus providing the reader with information also on recent work.

In all, the book contains a wealth of highly interesting information, and it will be of value for specialists in the field as well as for the interested newcomer.

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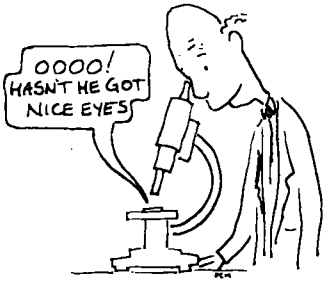
Transmission Electron Microscopy. By *L. Reimer.* Springer Series in Optical Sciences, Springer-Verlag, Second Edition, 1989, xiii, 547 pp., paperback, DM 128.–ISBN 3-540-50499-0

In 1906 *J. J. Thomson* was awarded the Nobel Prize for demonstrating that the electron was a particle. Thirty-one years later his son, *G. P. Thomson,* was awarded the Nobel Prize for demonstrating that the electron was a wave. In 1986 *Ernst Ruska* was awarded the Nobel Prize (long overdue) for utilizing both the particle and wave properties of electrons in designing the first electron microscope in 1931.

Electron microscopes are amongst the most widely used and the most important scientific instruments. They are essential equipment for biologists, chemists, geologists, materials scientists, physicists and others. There are many books on the subject, but this book by *Reimer* is, quite simply, the best. This second edition is a revision of his earlier book on Transmission Electron Microscopy (TEM), first published in 1984. In the last five years the field of TEM has expanded enormously and this revision very thoroughly updates and extends growth areas such as electron holography, lattice imaging with atomic resolution, electron energy-loss spectroscopy, etc.

The scope of the book covers both TEM and analytical electron microscopy. Even subjects like reflection electron microscopy from surfaces are discussed. Contents include the types of electron microscopes available, particle optics and electron lenses, wave optics, imaging, scanning transmission electron microscopy (STEM), electron-specimen interactions, contrast theory, high resolution electron microscopy (HREM) and analytical electron microscopy.



The main thrust of the book is to explain as clearly as possible the basic physical principles underlying transmission electron microscopy in all its various forms. In this Professor *Reimer* succeeds admirably. Although the book adopts a theoretical approach it is also full of useful practical advice. For example on p. 458 we are advised that 'Vacuum leaks can never be cured by heavy greasing but only by carefully polishing the sealing surfaces. Viton rings should be used in preference to rubber. All surfaces should be washed with methyl alcohol, which evaporates completely in air. Finger-marks should be avoided by wearing gloves'. This quotation also illustrates the easy-to-read crisp sentences that the author adopts.

The value of this book lies in its breadth, depth and accuracy. I have indicated its breadth above, but the book also digs deep into the fundamentals of the subject: for example there is a particularly clear exposition of the dynamical theory of electron diffraction, and of applications ranging from the critical voltage effect to the imaging of surface steps.

Concerning accuracy, there are many books on TEM which contain fundamental errors in understanding. This book, on the other hand, is reliable and accurate and reflects the scholarship one expects from Professor *Reimer*.

The book is for research students, post-doctoral scientists, lecturers and professors. It is good for teaching purposes and for reference. If you are an electron microscopist this book is the best: you should have it on your book shelves: I cannot recommend it too strongly.

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Methods of Surface Analysis. Edited by *J. M. Walls*. Cambridge University Press, Cambridge 1989. x, 342 pages, bound, $ 80.–ISBN 0-521-30564-0

At present, surface analysis and related methods represent one of the fastest progressing technological fields. Therefore there is an increasing demand for appropriate books, introducing the newcomer to the principles of these methods and their range of applications.

The above mentioned book is a compendium of articles from experts who cover one method or one field of interest each. The book contains 9 chapters dealing with the 6 most common methods of surface analysis (AES, XPS, SSIMS, DSIMS, ISS, RBS) and 3 more general topics which aim at supplying the reader with the essential basic knowledge. This selection out of the large number of different surface analysis techniques is wise and concentrates on those methods with a broad range of applications. Three more methods are briefly dealt with: Sputtered Neutral Mass Spectrometry (SNMS), Laser Microprobe Analysis (LIMA) and Atom Probe Microanalysis.

The book is composed well, contains instructive drawings and images, but mainly deals with VG products, almost neglecting all other products, instrument manufactures and construction principles. There is, for example, in the chapter "State-of-the-art XPS" only a short remark about small spot ESCA and no reference to the SSL instrument and the new Uppsala machine, the XPS "jumbo" ESCA-300. Also the world's finest scanning SIMS instrument, built by Levi-Setti in Chicago, is not mentioned at all. The spatial resolution in Scanning Auger Microanalysis is about 350 Å with commercially available instruments (e.g. PHI-660) and not 2000 Å as stated in Chapter 1.

The more practically oriented analyst, who has to struggle with the tricky every-day samples, would like to find some more examples of typical applications in the many fields in which surface analytical instruments are used today. In addition, the sections on data processing and curve fitting are very brief and confined to a list of possible computer routines. More information would have been helpful.

If there are many authors, who contribute to a book, it is obviously always difficult to make it up in such a way, that everything fits together, that each writer uses the same formulas and expressions and that unnecessary repetition is avoided. The reviewer is of the opinion that these problems have been solved satisfactory.

Generally only few literature references are given, in some cases even too few, and they are often not mentioned in the text.

The book can be recommended without reservations for all VG instrument users and those being non-specialists, who are looking for an introduction into those surface analytical methods which are frequently used today, and who want to get information quickly on the appropriate technique to choose for a special applicational purpose.

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Nuclear Magnetic Resonance, Vol. 18, Edited by *G. A. Webb*. Royal Society of Chemistry, Cambridge 1989. LVI, 511 pp., bound, $ 232.-, ISBN 0-85186-412-0.

The number of applications of nuclear magnetic resonance (NMR) spectroscopy is growing rapidly and NMR is increasingly used also in non-traditional areas of application like the investigation of solid and macromolecular materials. To a considerable degree its increasing popularity is a result of the continuing development of innovative methods and measurement procedures for instance in solid state and two-dimensional NMR. A comprehensive literature review about current NMR activities can be of value not only for the specialist but also for those interested in the applicational potential of the method.

The book reviews the NMR literature published between June 1987 (1986 in some cases) and May 1988. The 13 chapters cover different subjects, which are reviewed by specialists. The individual chapters are preceeded by a compilation of citations of 588 books and reviews. For this list, a subdivision into type of publication (books, regular review series, reviews in periodicals, etc.) has been chosen and not a classification according to subjects. Considering that there are references to reviews in each chapter on individual subjects the list seems redundant.

Chapter 1 (*C. J. Jameson*) covers the theory and physics of chemical shielding tensor values. Known as chemical shift in isotropic liquids, these values are essential for quantitative structural and dynamic solid state NMR. Chapter 2 (*M. J. Foster*) deals with the applications of nuclear shielding. Apart from ^{1}H and ^{13}C, chemical shift studies of nuclei such as ^{6}Li, ^{9}Be, $^{14,15}N$, ^{17}O, ^{19}F, etc. are reported. Spin-spin couplings are treated in Chapters 3 (theory: *J. Ostershede*) and 4 (applications: *J. C. Lindon* and *J. M. Williams*). Like the chemical shift values, the coupling constants give important information on molecular conformation. Different liquid state NMR techniques for their measurement as well as coupling between particular nuclei other than ^{1}H and ^{13}C