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BOOK REVIEWS

Diffusion in polymers
(Plastics Engineering Series/32)
Ed. P. Neogi, Marcel Dekker, Inc. New York, Basel, Hong Kong 1996.

Diffusion plays an important role in polymer processing, modern applications of polymeric materials, in biological, analytical, physico–chemical processes and so on. Up-to-date reviews about diffusion in polymeric systems of different kind are given in the book "Diffusion in Polymers" edited by P. Neogi. In the first chapter, written by J.M.E. MacElroy, an introduction into "*diffusion in homogeneous media*" (including microporous media and amorphous polymers) is given on the basis of thermodynamics and molecular simulations. In the second chapter about "*molecular simulations of sorption and diffusion in amorphous polymers*" written by D.N. Theodorou, the fundamentals and application of the method of molecular simulations is described and discussed on a high level. In chapter 3, the very successful "*free volume theory*" is outlined by J.L. Duda and J.M. Zielinski in the most elaborate form of the Vrentas–Duda theory. Chapter 4 about "*transport phenomena in polymer membranes*", written by P. Neogi, deals with practical applications. The solutions of Fick's laws for different geometries are outlined and discussed including the cases of non-Fickian diffusion. "*Influences of supermolecular structure of polymer solids and its effects on penetrant transport*", a topic important for most applications of polymers in diffusion processes, are described by Sei-Ichi Manabe in chapter 5. In this chapter, the great variety of such structures is concisely and profoundly explained. In contrast to the progress in molecular simulations, here a lack of theoretical understanding still exists, the treatment of the effects is phenomenological up to now. In chapter 6, the "*translational dynamics of macromolecules in melts*" is described by P.F. Green. Due to the reptation and tube model and new experimental techniques, the progress in understanding these diffusion processes was enormous in the last 20 years, and this chapter is one of the most important in this book.

This book gives a broad overview on the fundamentals and the current research on diffusion processes in polymers. Additionally, a lot of references including the most recent literature and many figures makes the book very useful for all scientists and engineers which are interested in diffusion processes in polymers.

G. Fleischer (Leipzig)

Polymer Microscopy, 2nd edition. By L.C. Sawyer, D.T. Grubb, Chapman&Hall, London 1996, xii, 397 pp., hardcover, £85.00, ISBN 0-412-60490-6.

This book provides a practical guide to polymer microscopy and is aimed at both the scientist working in an industrial laboratory and the research student who is looking for the best method of obtaining information about the morphology of a polymer sample. The chapters on polymer applications present typical problems arising in the investigation of plastics and resins which are processed into a wide range of fabricated forms such as fibers, films, membranes, filters, adhesives, emulsions, coatings, and elastomers, as well as liquid crystalline films and fibers. The description of the relevant sample preparations includes polishing, microtomy, staining, etching, and replication, as well as the production of conductive coatings required for both scanning and scanning transmission microscopies, scanning probe methods, and light microscopical observations.

While it is adequate to choose a purely qualitative approach for the above-mentioned chapters, the treatment of imaging theory and the fundamentals of microscopy could be greatly improved by a more quantitative description. Most scientists are capable of understanding Fourier transforms, Patterson functions, convolutions, and contrast transfer functions when properly introduced to the subject and these concepts are crucial for an understanding of any microscopical method. This knowledge is prerequisite for the correct interpretation of electron diffraction patterns as well as images. Furthermore, some theoretical background is necessary in order to be able to choose the best method of solving any specific problem.

The major developments pertaining to new instrumental developments and some applications to polymer research are described. These include confocal and near field microscopies, scanning tunneling microscopy, scanning force microscopy, and new developments in low voltage scanning microscopies and high resolution electron microscopy. There is a very short description of new developments in electron crystallography. This chapter should certainly be handled more extensively in the next edition in view of its importance. For a more fundamental understanding of the physical principles in any of these methods, the reader will have to refer to the specialized literature.

Ingrid Voigt-Martin (Mainz)

Experimental Technique of Physics: Single Molecule Detection
(Eds.: K.O. Greullich, E. Klose, H. Neumann). ISSN 0948-2148, 96,00 DM 1996.

Several new developments in various areas of physics, chemistry and even biology have now, for the first time, made single molecule techniques available to a wide spectrum of users. Dramatic progress in fluorescence techniques has made possible single molecule observations in solution. The nano-microscopies and even the microscopic workhorse, light microscopy, now allow single molecule imaging. NMR techniques have reached the level of single molecule sensitivity, surface enhanced Raman spectroscopy is aiming to reach this goal. Even more, the objects of investigations are no longer only simple atoms. The blueprint of life, DNA, has also become the target of single molecule studies. This has been facilitated by the emergence of a further innovative technique, laser microbeam and optical tweezers, which allow the handling of individual molecules solely by light.

A number of contributors to the dawn of this new era of science have gathered recently at the International Workshop "Single Molecule Detection: Basis and Applications in Life Sciences" in Berlin to exchange ideas and to combine efforts specifically to related life sciences. This issue of 'Experimental Technique of Physics' presents reports given at this workshop held on Oct. 4–6, 1995.

F. Kremer (Leipzig)

Polymere–Von Monomeren und Makromolekülen zu Werkstoffen, Eine Einführung H.-G. Elias, Hüthig&Wepf-Verlag Zug, Heidelberg, Oxford (CT) 1996.

The 1971 published textbook "Makromoleküle" from the same author (followed by many new editions, also in English) has been very useful and instructive for many polymer scientists and students in this field. Now, H.-G. Elias has written a new book, intended as "introductory book for learning and studying". This new book resembles in large parts the textbook "Makromoleküle" and treats rather comprehensively the complete polymer science including technological aspects. It starts with a historical review and describes the chemical structures of polymers. In further chapters the synthesis of polymers and the physical structures of fluid and solid polymers are outlined. In most cases the chemical, physico–chemical and physical

experimental methods are shortly explained. Finally, the different classes of polymers up to problems of their recycling are described. Each chapter has its own detailed list of references (monographs and original papers). The book contains many figures and tables of good quality. An advantage of this book is the completeness in which polymer science is treated. It provides on a limited space a large variety of information and knowledge, but this is, however, not only an advantage. Due to the very concise presentation the character of a textbook is lost. New developments in polymer science (e.g. scaling theories, Rouse theory and reptation in polymer dynamics, block copolymers) are nearly neglected.

Altogether, this is a book useful for all the scientists dealing with polymers, but rather as a reference book and to get an overview in a distinct field of polymer science. As a textbook (in its own sense) the approved book "Makromoleküle" of the same author is more recommended.

G. Fleischer (Leipzig)

100 and More Basic NMR Experiments. A Practical Course
S. Braun, H.-O. Kalinowski and S. Berger. VCH Verlagsgesellschaft Weinheim 1996, XII, 418 pages with 260 figures and 5 tables. Softcover, DM 68,00 ISBN 3-527-29091-5.

In this book the authors present NMR from the point of view of practical experiments. The methods described are representative of the most important pulse sequences in modern high-resolution NMR spectroscopy. Every single experiment described has been tested in the laboratory, resulting in a presentation with many practical hints and important details.

Over 100 experiments are featured in twelve chapters well classified according to standard NMR criteria. First, methods of pulse-length calibration for transmitter and decoupler and the established standard tests for the hardware check-up are described in detail. Short comments explain the goal and the physical basis of each experiment. The crucial features of each method are indicated, and the relevant hardware specifications are pointed out. Furthermore, the original literature is being cited, and the pulse sequences are illustrated schematically in diagrams. Of great value are the listings of realistic values of pulse-sequence parameters for each experiment. The processed data are displayed and commented.

In different subsequent chapters the various decoupling techniques, the use of selective pulses and of shift and relaxation agents are illustrated. The modern multi-pulse sequences are discussed in great detail. In 1D NMR these are the methods for determination of relaxation times, polarization-transfer sequences in the context of ^{13}C NMR, as well as signal suppression techniques including double quantum filtering. As much as possible vector diagrams are used for illustration of pulse sequences. Often the evolution of magnetization is described in the widely used product-operator formalism. In 2D NMR the manifold of experiments is addressed following a short introduction. By means of selected examples experimental conditions, parameters, and results of correlation and NOE spectroscopy are discussed. Furthermore, the use of pulsed field gradients is addressed, which facilitates many NMR experiments on modern spectrometers.

In summary it can be concluded, that this book provides a quick overview of the requirements of different NMR methods, and it supplies substantial and detailed information for actually performing these experiments. It is state of the art with respect to methods and applications, and provides a most welcome help for the working spectroscopists in the routine NMR laboratory.

B. Blümich (Aachen)

Irradiation of Polymers: Fundamentals and Technological Applications
(ACS Symposium Series 620) R.L. Clough, S.W. Shalaby (eds), XIII, 434 pages. American Chemical Society, Washington, D.C., 1996. Hardcover USD 109,95. ISBN 0-8412-3377-2.

This volume of the ACS Symposium Series has been derived from a symposium sponsored by the Division of Polymer Chemistry at the 208th National Meeting of the American Chemical Society held in Washington, D.C., in August 1994.

In 31 chapters of the book, an up-to-date review is given of the fundamental aspects of radiation effects in polymers and of the applications of high-energy radiations in the production of electronic components and biomedical devices.

The first section (6 chapters) presents a brief overview of current understanding of mechanisms of effects occurring in irradiated homochain (e.g., ultrahigh-molecular-weight polyethylene and polybutene-1) and heterochain (e.g., polyhydroxybutyrate) polymers. Sophisticated computational and analytical methods have been used successfully in modeling and monitoring radiation events as evidenced in 4 chapters of the second section. The third section (10 chapters) deals with radiation as an effective means of sterilization in the biomedical, pharmaceutical, and food industries, with the use of radiation in solid-state and thin-film polymerization, preparation of cross-linked pharmaceutically useful gels, development of interpenetrating polymeric systems, fiber-reinforced composites, and improved synthetic rubbers. The fourth section (7 chapters) is dedicated to the problems of stability and stabilization of polymers to ionizing radiation. To underscore the importance of radiation technology in the electronics industry, advances in the use of radiation in lithography are given in the four chapters of the final section of the book.

The present volume addresses and appeals to academic and industrial chemists, engineers, and materials scientists interested in all aspects of radiation effects in polymers.

P. Kratochvíl (Praha)

Microelectronics Technology: Polymers for Advanced Imaging and Packaging
(ACS Symposium Series 614) E. Reichmanis, C.K. Ober, S.A. MacDonald, T. Iwayanagi, T. Nishikubo (eds), XII, 563 pages. American Chemical Society, Washington, D.C., 1995. Hardcover USD 134,95. ISBN 0-8412-3332-2.

The 35 chapters of the present book have been developed from a symposium sponsored by the ACS Division of Polymeric Materials and the Polymers for Microelectronics Division of the Society of Polymer Science, Japan, at the 209th National Meeting of the American Chemical Society held in Anaheim, California, in April 1995.

Polymeric materials have found widespread use in the electronics industry in both the manufacturing processes used to generate modern integrated circuits and as component structures in the completed devices. Radiation sensitivity is the key property required of materials used for imaging the individual elements of an integrated circuit. As the lithographic technologies evolve to allow fabrication of smaller and more compact circuit elements, new resist chemistries and processes are needed.

The first section (15 papers) is devoted to chemically amplified resist materials and processes. In the second section (8 papers), novel chemistries and approaches for sub-0,25 μm imaging are discussed with special attention to 193-nm lithography and silicon-containing resist materials. The last, third section (12 papers) deals with polymer dielectries for microelectronic applications with emphasis on fluoropolymers with low dielectric constants and polyimides.

The volume contains an impressive amount of up-to-date information on novel materials suitable for resist production, and

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can be recommended to researchers in imaging science and technology, polymer materials for microelectronics, and polymer synthesis and characterization.

P. Kratochvíl (Praha)

Polymer Durability: Degradation, Stabilization, and Lifetime Prediction
(Advances in Chemistry Series 249) R.L. Clough, N.C. Billingham, K.T. Gillen (eds), XIV, 712 pages. American Chemical Society, Washington, D.C., 1996. Hardcover USD 139,95. ISBN 0-8412-3134-6.

The 39 chapters of this volume have been developed from a symposium sponsored by the Division of Polymer Chemistry at the 206th National Meeting of the American Chemical Society, held in Chicago, Illinois, in August 1993.

Due to the ever-widening applications of polymers, there is a growing emphasis on their durability and reliability. The wide usage of polymeric materials has also been creating serious environmental problems. Thus the science of polymer degradation, stabilization, and lifetime prediction has become a discipline of prime importance. The present book provides an overview of the state of the art in this area. All chapters were written by internationally recognized experts from all over the world.

The first section on degradation (17 chapters) discusses fundamentals of the molecular mechanisms by which polymers undergo aging and deterioration, particularly by UV light, as in outdoor exposure, or by thermal exposure. A variety of important analytical techniques used for studying degradation is described, with special emphasis on the very sensitive technique of chemiluminescence. The second section on stabilization (16 chapters) covers major types of additives used for polymer stabilization during processing, long-term application at elevated or room temperature, and UV exposure. The final third section on lifetime prediction (6 chapters) discusses progress in developing methods for predicting the aging rate of a material in a particular application.

This volume is an extremely useful source of up-to-date information on the difficult and still unsolved problem of polymer stability for polymer chemists, chemical engineers, materials scientists, and industrial manufacturers.

P. Kratochvíl (Praha)

Hydrophilic Polymers: Performance with Environmental Acceptance
(Advances in Chemistry Series 248) J.E. Glass (ed.), XIII, 516 pages. American Chemical Society, Washington, D.C., 1996. Hardcover USD 114,95. ISBN 0-8412-3133-8.

This volume reviews the recent developments in the fields of surfactant-modified, water-soluble polymers in aqueous solutions, the use of water-soluble polymers in biodegradable and biological systems, and the search for new hydrogels and new non-associative water soluble polymers. The book comprises 25 chapters written by experts mostly from Northern America.

The first section (2 chapters) on hydrogels deals with polyphosphazenes and amphiphilic poly(ethylene oxide) star polymers. The second section, consisting of 6 chapters, is devoted to biocompatible and biodegradable polymers based on poly(ethylene oxide), polymeric carboxylic acids, poly(aspartic acid), and cellulose derivatives. The largest third section (16 chapters) treats associating polymers; in addition to the discussion of general concepts of polymer association in aqueous media, it deals specifically with hydrophobe-modified acrylamide polymers, hydrophobe-modified ethoxylated urethane polymers, hydrophobe-modified alkali-swellable polymers, and hydrophobe-modified hydroxyethyl cellulose thickeners. A single paper on the synthesis of amine functional homopolymers with N-ethenylformamide forms the last, fourth section.

From the point of view of methodic approach, rheology techniques predominate, followed by scattering techniques, spectroscopy, fluorescence measurements, NMR and others.

Specialists in the following areas will find the present volume very valuable: polymer chemists and engineers interested in personal care products, coatings, and detergents, as well as experts in petroleum recovery and water treatment.

P. Kratochvíl (Praha)

Chromatographic Characterization of Polymers: Hyphenated and Multidimensional Techniques
(Advances in Chemistry Series 247) T. Provder, H.G. Barth, M.W. Urban (eds), XIV, 294 pages. American Chemical Society, Washington, D.C., 1995. Hardcover USD 124,95. ISBN 0-8412-3132-X.

The present volume comprises 20 contributions by internationally recognised experts in the field of polymer analysis and characterisation. Modern separation techniques are discussed in which separation according to various parameters and application of several detectors, each sensitive to a specific physical quantity, enable the user to obtain detailed information on complex systems, such as polymer blends or copolymers, which are non-uniform in both molecular weight and chemical composition. High degree of sophistication of equipment and software for evaluation of data make it possible to obtain important characteristics of the material analysed in a short time with a minimum amount of the sample. The most difficult part of the task is search for appropriate experimental conditions. Once these are found, routine application of the procedure is easy.

The first section of the book, consisting of four papers, is devoted to general reflections on the potential, present state-of-the-art and future of the hyphenated techniques. Nine communications, forming the second section, deal with size-exclusion chromatography and field-flow fractionation measurements using, in addition to conventional concentration detectors, molecular-weight and molecular-size sensitive detectors, viz., light-scattering and viscosity detectors. Jackson and Barth discuss concerns regarding the practice of multiple-detector size-exclusion chromatography and point out that the additional information is obtained at the expense of an increase in the complexity of the instrumentation and data handling; many users seem to be forgetting about this factor. In the third section, including seven contributions, the application of the multidetector and multidimensional techniques to the analysis of compositional heterogeneity in copolymers and polymer blends is demonstrated.

The volume is an up-to-date review of a most topical field of polymer analysis and characterization. It is a very useful source of information for specialists working in this area and also a stimulating reading for generally interested polymer scientists.

P. Kratochvíl (Praha)

Cluster of Atoms and Molecules II, edited by Hellmut Haberland, Springer Verlag, Berlin, Heidelberg, New York, 1994, ISBN 3-540-56958-8, 414 pages, 174 figures and 15 tables. Price DM 130,-.

The second part of the two-volume treatment on clusters of atoms and molecules presents two main topics of cluster science. After a short introduction the second chapter contains 9 articles about solvation, chemistry and charging of free clusters. Chapter 3 deals mainly with clusters in contact with a macroscopic medium or if they are embedded into a solid, a liquid or a gas. The articles are well written, illustrated and easy to understand, also for non-specialists. They contain many references and treat latest results. Each article is written by an expert in the field. The book is recommended for those, who look for a deeper understanding of the two discussed aspects of cluster science.

A. Huwe (Leipzig)

Crystallography of Supramolecular Compounds
Georges Tsoucaris, Jerry L. Atwood, Janusz Lipkowski (Eds.) NATO ASI Series C: Mathematical and Physical Sciences – Vol. 480, Kluwer Academic Publishers, Dordrecht, Boston and London 1996, ISBN 0-7923-4051-5, 520 pages, hardcover, Dfl. 375.-; US$ 240.00; UK£ 169.-.

This book contains the proceedings of the NATO Advanced Study Institute on Crystallography of Supramolecular Compounds in Erice, Italy (1–11 June 1995). In its interdisciplinary character (including crystallographers, chemists and physicists) it is devoted to the development of general structural models for a large spectrum of compounds, such as ionophores, cryptates. fullerenes. calixarenes, cyclodextrines, cyclotriveratrylenes, pillar type compounds, zeolites, hydrates, solvates and others.
A major objective is molecular recognition based on preorganization of molecular receptors leading to a large range of devices including switches and sensors. Despite the breadth of the disciplines involved in this proceedings and the variety in the nature and size of the systems – from atoms to single 5000 molecular weight molecules and to high supramolecular polymers such a helicates – the importance at the non-covalent interactions with a precise restricting geometry has been emphasized. Their analysis has been enhanced by combining the crystallographic results with information from different methodologies, including Molecular Dynamics, Thermodynamics, NMR, various other spectroscopies and atomic force microscopy. In a synopsis J.M. Lehn summarizes: "Supramolecular sciences as the science of organized matter paves the way from condensed matter to organized matter. The generation and control of order in fluids also leads to the inception of collective behaviour and represents a step up the ladder of complexity, a basic goal of supramolecular research".

F. Kremer (Leipzig)

Vibrational Spectroscopy of Molecules and Macromolecules on Surfaces, by M.W. Urban, 384 pages, 118 figures and 94 tables, John Wiley & Sons New York 1996, hardcover, ISBN 0-471-52815-3. The aim of this book is to bridge the gap between basic principles of vibrational spectroscopy and the practical aspects of it with focus on structure-property relations on surfaces and interfaces. It provides a brief introduction into the basic principles of vibrational spectroscopy, especially Infra-red and Raman spectroscopy, a detailed presentation of advanced experimental techniques for the investigation of surfaces connected with a broad variety of systems investigated to derive the structure-property relations. The range of systems discussed covers small molecules on surfaces, adsorption on metal oxides and zeolites, inorganic macromolecules, polymeric surfaces and interfaces as well as organic surfactants like amphiphilic monolayers. The chapters provide detailed information's about band assignments, structural identifications and structure property relations. This makes this book a useful reference source for all dealing with surface vibrational spectroscopy.

This valuable book is ideal for those who wish to get a brief background in surface vibrational spectroscopy and the large variety of systems, which can be investigated by this powerful technique, as well as for those who seek a further grounding in this subject.

N. Klöpper (Leipzig)

Nonlinear optical materials, edited by Shashi P. Karna and Alan T, ACS symposium series 628, American Chemical Society, Washington DC 1996, 249 pages and more than fifty figures, hardcover, ISBN 0-8412-3401-9.

Nonlinear optical materials covers the lectures given at the 208th National Meeting of the American Chemical Society, Washington DC, August 21–25, 1994.

The book provides a broad collection of theoretical articles on the behavior of materials for second order nonlinear optics, most of which derive from recently completed computational modeling focusing on topics of current interest.

The chapters are grouped together by general technique(s) used for the modeling and their applications. After an introduction by N. Bloembergen, one of the founders of the field, and the overview chapter, the next three chapters (2–4) focus on the ab initio time-dependent Hartree-Fock and post-Hartree Fock techniques and their application for the calculation of molecular nonlinear optical materials. Then chapters 5–7 discuss the Hartree-Fock-based semi-empirical techniques and their applications to modeling the second- and third-order organic nonlinear optical materials. Chapters 8 and 9 focus on the development of density-functional techniques and their application to predict molecular nonlinear optical coefficients. Chapter 10 discusses a time-dependent perturbation theory for determining nonlinear optical properties of polymers. Chapters 11 and 12, also devoted to the nonlinear optical properties of polymers, discuss model Hamiltonian methods and their applications. The book concludes with an experimental chapter devoted to one of the most recent applications of nonlinear optical materials – the resonant nonlinear optical phenomenon, which presents a major challenge to theoretical modeling.

This valuable book is ideal for those who wish to get a brief background in theoretical nonlinear optics as well as for those who seek a further grounding in the subject.

Th. Fischer (Leipzig)

Polymers for second order nonlinear optics, edited by Geoffrey A. Lindsay and Kenneth D. Singer, ACS symposium series 601, American Chemical Society, Washington DC 1995, 545 pages and more than hundred figures, hardcover, ISBN 0-8412-3263-6.

Polymers for second order nonlinear optics covers the lectures given at the 208th National Meeting of the American Chemical Society, Washington DC, August 21–25, 1994.

The book provides a broad collection of articles on the behavior of polymers for second order nonlinear optics, most of which derive from recently completed investigations focusing on topics of current interest. The major themes include chromophores, their design, synthesis and optical measurements, the synthesis and characterization of nonlinear optic polymers, chromophore alignment, longterm thermal, photo, and oxidative stability and thin film devices.

This book can provide a sound introduction for those new to the field but will have its greatest impact as a convenient way for experienced investigators to broaden their understanding of the behavior of nonlinear optic materials.

This valuable book is ideal for those who wish to get a brief background in nonlinear optics as well as for those who seek a further grounding in the subject.

Th. Fischer (Leipzig)

Pattern Formation in Liquid Crystals
A. Buka and L. Kramer, Eds., In: Partially Ordered Systems L. Lam, D. Langevin, Eds., Springer-Verlag, New York Berlin Heidelberg 1996, ISBN 0387-94604-7, 339 pages, hardcover, DM 110.-.

The investigation of pattern formation processes in nonlinear non-equilibrium systems has attracted great interest in physics as well as chemistry and related sciences during recent years. Liquid crystals are characterized by material properties which make them favourable for the study of such phenomena.

In addition to standard patterns as Rayleigh-Benard convection or Taylor vortices which are already found in isotropic materials one observes a vast variety of pattern formation phenomena which are unique to liquid crystalline mesophases and directly related to the anisotropic and nonlinear dynamic properties of these substances.

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The book does not claim to provide a monograph of the broad field of pattern formation in liquid crystals. Due to the relatively specialized selection of topics it is also not recommended as an introductory reading into the subject. Instead, it provides a valuable collection of relevant modern aspects and trends for readers directly engaged in the field of pattern formation.

Along with a comprehensive treatment of electroconvection in nematic liquid crystals, other phenomena like flow instabilities, viscous fingering, thermal convection and mesophase growth are subjects of the individual chapters. A general introduction which also comprises a short presentation of additional pattern formation phenomena in liquid crystals precedes the text. A special chapter is devoted to the description of the relevant hydrodynamic and electrohydrodynamic equations. Special emphasis is laid upon the carefully arranged introduction to models and methods of the theoretical description of the pattern formation mechanisms.

The individual chapters have been contributed by 10 different authors, which guarantees a high expertise of the authors in the respective topic. On the other hand, this leads to a certain lack of interrelation and coherence between different parts of the book. Some chapters use SI-units in their presentation while the same relations and quantities are treated in cgs in other chapters, sometimes different symbols have been used to express identical quantities.

In the figures, less attention has been given to an illustration of the patterns described, which might be expected from the title of the book. Instead, in the more theoretically oriented book the reader finds a careful selection of properly presented and visualized experimental and theoretical data and a well balanced collection of abstract mathematical treatment and clear verbalized description. In conclusion, the book provides a recommendable reading for an audience which is engaged in the field of pattern formation or structure and dynamics of liquid crystals.

R. Stannarius (Leipzig)

Spectroscopy of Polymers, by J.L. Koenig, 328 pages, 283 figures and 32 tables, American Chemical Society 1996, paperback, ISBN 0-8412-1924-9. This book is directed to those who have basic knowledge of polymer chemistry and some familiarity with vibrational and resonance spectroscopic methods. It covers two powerful spectroscopic methods for investigating the structure-property relationship of polymers, vibrational spectroscopy, i.e. Infra-red and Raman spectroscopy, and NMR-techniques. Being not an elementary textbook, it intends to give sufficient knowledge of the spectroscopic techniques to enable the reader to decide which spectroscopic method (FT-IR, Time resolved FT-IR, Raman spectroscopy, High Resolution NMR of solutions and solids and NMR Imaging) delivers what information about polymers. After a brief theoretical introduction to polymer science the theoretical background of the spectroscopic methods is described with the focus on polymeric systems. Detailed experimental descriptions make this book a reference manual for spectroscopic problems on polymers.

This valuable book is ideal for those who wish to get a brief background in vibrational spectroscopy and NMR on polymers.

N. Klöpper (Leipzig)

IR-Spektroskopie: eine Einführung
H Günzler, H.M. Heise
vch Verlag Weinheim
ISBN 3-527-28759-0 (paperback)
397 pages, German, DM 68,00.

The book claims to be an introduction to IR-spectroscopy, and actually it is one. There is hardly any other book which offers the German-speaking student such an easy entrance to the world of IR-spectroscopy. This is mainly achieved by the very compact but nevertheless relatively easy-to-read dealing of the emergence of an IR-spectrum in chapter 1 & 2. After less than 40 pages, the reader has already acquired a large part of the theoretical background of IR-spectroscopy.

The following three chapters about the spectrometer, preparation of the substances and special sample techniques are very easy to follow since they just describe different technical devices and methods without discussing the theoretical questions behind them e.g. about D*, the light-throughput or the FFT-algorithm. The techniques presented herein are hardly to be assimilated straightaway by the reader with all the described details. But nevertheless one keeps in mind a good overview about the technical problems that emerge in IR-spectroscopy and their solution. However, those who can practically work with an IR-spectrometer for their scientific work, will benefit from this part of the book to a very high degree. They will find quick and clear answers to the large number of different questions arising in spectroscopy. For a deeper insight into the specific topics there is a sufficient number of references to the literature.

In the 6th chapter, the reader is guided to the generally difficult qualitative interpretation of an IR-spectrum. This chapter mainly presents the spectra of more than 40 different classes of substances, explains their characteristical features and compares them with each other. To plough through this chapter needs of course a lot of patience, but tackling with at least some of these spectra is essential for those readers who want to become a professional IR-spectroscopist one day. The three last chapters which are dealing with quantitative analysis, with NIR, FIR, related methods and with spectra-libraries again follow the principle: many interesting things, presented a compact and clear manner.

The authors make use of a large number of spectra and of some very simple but therefore very clear drawings. They left out the exercises and solutions one still can find in the former edition of Günzler/Böck. This really is a great pity. A physicist will miss any comment on the interesting and upcoming field of time- and frequency-resolved IR-spectroscopy.

The IR-book of Günzler and Heise will surely not be the only book a beginner in IR-spectroscopy needs, but probably it will be the one that he uses most frequently.

H. Skupin (Leipzig)

Recent Advances and New Horizons in Zeolite Science and Technology.
H. Chon, S.I. Woo, S.-E. Park (eds.)
Studies in Surface Science and Catalysis, Vol. 102, Elsevier Science, Amsterdam 1996, ISBN 0-444-82499-5, 462 pages, hardback, Dfl. 425; US$ 265.75.

This book was conceived as a handbook for the preconference summer school of the 11th International Zeolite Conference (11th IZC) held in 1996 at Taejon, Korea. While during the summer schools of the 8th and 9th International Zeolite Conferences mainly newcomers were introduced into the various topics of zeolite science and technology, the concept of the 11th IZC preconference summer school and hence of the present book was changed following a tendency which could be observed already at the 10th IZC summer school in Wildbad Kreuth, Germany: Instead of presenting introductory courses, the lectures were addressed to those who have already actively worked on zeolite science and technology. Therefore, in accordance with the title of the book, the contributions are intended to give a review and analysis of important new findings during the last decade on synthesis, characterization and application of zeolites as well as a prediction of new directions of research and development.

The book contains 12 chapters written by scientists from USA, Canada, The Netherlands, Australia, Norway and South Africa. The fact that no scientists from Japan and other countries which are well-known for their important role in the field of zeolite

research are included is not necessarily a disadvantage. Three chapters deal with the characterization of zeolites (R.F. Howe: EPR-, IR-, Raman-, UV/Vis-, X-ray-absorption-, and Mass spectroscopy; M. Stöcker: Solid-State NMR; S. Kaliaguine: XPS), three with synthesis, characterization and application of special porous materials (A. Sayari: M41S and related materials; S.L. Suib: Ferrierites, octahedral molecular sieves and layered materials; S. Lee and D. Venkataraman: Organic zeolites?), two with catalysis (C.T. O'Connor et al: Petrochemicals; S. Feast and J.A. Lercher: Fine chemicals), two with adsorbed species (K. Seff: General aspects; T. Bein: Conducting nanostructures in zeolites), one with computational approaches in zeolite structural chemistry (J.M. Newsam) and one with zeolite-based membranes (M.J. den Exter et al.).

In fact, this book comprises nearly all modern directions of zeolite research. In general the contents of the contributions are of high level. The representation however, should have been improved before publication. For instance, on page 97 it is claimed by the author of this chapter that NMR and XPS will be discussed elsewhere in this book, viz. in chapters 4B and 4C, respectively. However, his own chapter is no. 4 and 4B and 4C do not exist at all. In the legends to the nearly 30 figures of chapter 5 the reader does not find references of the original papers. Instead, it is carefully added to each legend "Reproduced by permission of... (the respective publisher)". Since this seems to become a general tendency, editors and authors of scientific papers should pay more attention in future to the reasonable demand that in the legends to figures besides the explaining text either the original paper or the scientists must be mentioned who have put forward our knowledge about nature through this work. Legends in scientific papers should not be misused as a means of public relations.

H. Pfeifer (Leipzig)