

assessed. The authors detail very effectively the requirements and stability of microemulsions and then explain that very little has been done in drug delivery with these systems. From the optimistic description of the basic research undertaken it seems like a ripe research opportunity.

Chapter 7 details liposomal formulations from a more commercial perspective with emphasis on macromolecular drug delivery. An array of materials and methods for the construction of liposomal vehicles having various properties are first described rather extensively. Issues concerning the various routes to delivery are reviewed, touching briefly on trouble-shooting clearance and RES uptake problems. Finally, a short section mentions the specific case of liposomes as macromolecular carriers. Issues in formulation stability and internalization by cells were not addressed to any significant extent. Nevertheless, the chapter gives a very current, well-informed review of a topic that has received much attention in the last decade.

Chapter 8 presents data on the inclusion of nucleic acids into reverse micelles. DNA and RNA of various sizes and types are shown to be solubilized into reverse micelles much smaller than the dimensions of the DNA and RNA themselves. This chapter could have been formatted more effectively in the same style as all other chapters but was instead kept in a classical journal format: Introduction, Experimental, Results, Discussion. It seems to be one of the few mistakes made by the editor. Not only is this format inappropriate for this type of literature review of applied techniques, but reader appeal becomes problematic for anyone unfamiliar with this type of work due to the less-generalized, non-conceptualized style of presentation. Not that this detracts from the quality of the data presented; it simply makes it less comprehensible. Data from spectrometric studies (UV and CD) of the inclusion of biopolymers of DNA and RNA into reverse micelles are given and explained. How this relates to controlled release drug delivery issues is mentioned in a small, speculative section at the end of the chapter.

Chapter 9 returns to polymeric matrices with a well presented review of transdermal delivery systems and models, problems in the development of these systems, and explanations about what can be done to deliver more drugs with this strategy. Less attention is paid to actual materials as is to the design of devices for specific functions, characteristics, and properties, e.g., skin or device rate control and skin permeability enhancement for desired kinetics of delivery. Strategies include diffusion and rate controlling membranes for desired release parameters, examples from current commercial products, and factors to consider in future designs. Modeling analysis include skin depot effects, permeability measurements and predictions, and rate control. This chapter is easy to read and understand and presents most essential and pertinent considerations for transdermal delivery.

David W. Grainger
Institut für Organische Chemie der
Universität Mainz (FRG)

Superconductors: The Breakthrough. By R. M. Hazen, Unwin Hyman Ltd., London, 1988, xxviii, 271 pp., bound, £ 12.95. — ISBN 0-04-440288-0

A review of this book from 1988 is still worthwhile just in case someone has missed it. In writing this book in such a popular style the author is running the risk of having his leg pulled by colleagues, not least for employing such a modest title. However, he should be congratulated most warmly for doing so.

This is the story of the discovery of superconductivity at temperatures above the boiling point of nitrogen, the temperature above which commercial exploitation of the effect becomes a viable proposition.

The Preface, Foreword and the first Prologue all give a historical overview and set the scene, explaining the reason for, and the potential importance of the research in the area up until the first indications of success in January 1986 from Bednorz and Müller at IBM Zürich (who were eventually awarded the Nobel Prize in Physics for their work).

The book is structured in three main sections. The first details the work in the laboratory of Prof. "Paul" Chu in Houston where the complex-metal oxide synthesis work was done and where, by switching ingredient elements from the original Bednorz/Müller recipe ($T_c \sim 30$ K) possibly the first indications of superconductivity above 77 K were seen. One has to say possibly, because, after the initial announcement of the IBM team there were many groups from many nations suddenly devoting their full resources to the problem.

The second section follows the work in which the author was directly involved, that of solving the structures of the two crystalline phases, work carried out at the National Geophysical Lab. in Washington DC in collaboration with Chu. The interactions of the multidisciplinary teams are highlighted and even espionage, betrayal and unethical publishing are hinted at.

The third section describes the intense excitement which was generated by the race to be recognized as the pioneer of high- T_c superconductivity above the all important 77 K which culminated in the New York meeting of the American Physical Society which has become known as the "Woodstock of Physics" where representatives of the various competing groups came together resulting in the most memorable scientific meeting in years.

An erroneously spelt erroneous, along with a few other minor defects are counteracted by pictures of the important participants and by lines such as "A good X-ray peak has a silhouette that soars like a futuristic skyscraper; our peaks looked more like melting igloos" which emphasize humorously the sort of problems and disappointments which were overcome on the way to success while bringing a smile to the lips of the more knowing.

The book is written with a humor which can be appreciated both by the scientist and the more general public and a good effort is made to explain enough of basic physics and chemistry to capture the attention of the non specialist, to

involve him in the excitement of discovery and to keep him reading to the end.



Anyone with an ounce of the scientist romantic in him will love a story which rivals *Star Wars* for fantasy and *Gone With The Wind* for romance. It is the sort of book which brings science to the attention of the general public and gives it a good name.

Peter Gregory
Advanced Materials
Weinheim (FRG)

Side Chain Liquid Crystal Polymers. Edited by C. B. McArdle. Blackie and Son Ltd., London 1989. 448 pp., bound, £ 75. – ISBN 0-216-92503-7 (USA: 0-412-01761-X)

This book presents an overview of thermotropic side chain liquid crystalline polymers, one of the rapidly growing innovative fields in liquid crystalline materials research. The book is made up of clearly structured contributions from acknowledged experts in the field. Within 14 chapters, theoretical concepts, structural and synthetic aspects, characterization methods and properties, and a discussion of potential applications are covered. Since the book is exclusively dedicated to thermotropic side chain liquid crystalline polymers it is certainly more than an extension to the existing reviews.

In an introductory chapter the editor McArdle summarizes the scope and potential for thermotropic side chain liquid crystalline polymers, focusing on applications based on electro-thermo-optical effects. The second chapter on the physical principles of the polymers is written by M. Warner and the syntheses and different structural principles of liquid crystalline polymers containing mesogenic side groups are

covered by Percec and Pugh. The authors not only describe the 'classical' side chain systems, but also novel types of structural modifications. The following chapter by Gray deals in detail with the synthesis and properties of side chain liquid crystal polysiloxanes. The placing of liquid crystalline polysiloxanes into a separate chapter is questionable, as it overlaps and repeats some parts of the previous chapter. Le Barny and Dubois describe the scope and potential of chiral smectic C liquid crystal side chain polymers, which are currently under extensive investigation because of their potential applications. The following three chapters 6–8 summarize the characterization of side chain liquid crystalline polymers. The chapter by Noel covers, with well chosen examples, macroscopic structural characterization, by DSC, optical microscopy, miscibility studies and X-ray methods. The chapters on dielectric relaxation spectroscopy (Haws, Clark and Attard) and on NMR methods used to study molecular order and motions (Böffel and Spiess) treat the theoretical background and give experimental results. The contribution on cholesteric side chain polymers (Shibaev and Freidzon) discusses especially their optical properties and demonstrates features of cholesteric materials. Side chain liquid crystalline elastomers are described by Gleim and Finkelmann. The properties of side chain liquid crystalline polymers in an electric and a magnetic field are summarized by Haase. Chapters 12 and 13 are concerned with two potential applications of side chain liquid crystalline polymers; as optically nonlinear media (Möhlmann and van der Vorst) and as materials for optical data storage (McArdle). Both contributions also cover theoretical aspects and compare side chain liquid crystalline materials with low molar mass liquid crystals and inorganic materials. The last chapter by Janini, Laub, Purnell and Tyagi treats theoretical aspects as well as experimental results concerning the use of side chain liquid crystalline polysiloxanes as the stationary phase in gas-liquid chromatography.

The book demonstrates the interactions which are necessary in such an interdisciplinary research area. All chapters are distinctly structured and well written. Figures, formulas and tables are uniform and clearly incorporated within the text. The more general introductions into each specific topic and the extensive up to date (1988) literature references are very valuable. However, the organization of the chapters is not entirely convincing. In addition, more specific cross references to other chapters would be helpful. Nevertheless, the book is highly recommended to academic and industrial researchers in the field of liquid crystals and is also of general interest to physicists and chemists working in linear and nonlinear optics, optoelectronics and molecular electronics.

Hans-Werner Schmidt
Fachbereich Physikalische Chemie – Polymere
der Philipps-Universität Marburg (FRG)