

clusters (Rosenberg and Laine) to metal cluster catalysts dispersed on solid supports. There is plenty here for those of us involved in either catalysis or clusters, or both.

As is always the case in volumes of this sort, there is some overlap and a range of styles but the information is there for those involved in both research and teaching. Much, of course, is highly speculative, and there's nothing wrong with that! There are no serious omissions and there is the odd bonus. Certainly, the chapter devoted to catalysis by colloids (Lewis) is very welcome.

Overall, a good, useful book which will be of benefit to both researchers and teachers.

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Metallized Plastic—Fundamentals and Applications

K. L. Mittal (ed.)

Marcel Dekker, New York, 1998

xiv + 372 pages. US\$175

ISBN 0-8247-9925-9

The word 'fundamentals' in the subtitle of this book hints at accessibility to the beginner. But some disappointment may be forgiven when it becomes apparent that there is no lucid introduction to a set of unifying principles, and no stepwise revelation of the implications of those principles; in fact the contents are recently updated versions of 28 papers, delivered to a symposium in 1993, involving about 84 contributors. The plain fact is that very few symposia are dedicated to covering the fundamentals of any subject at all, and few collections of papers presented at conferences are anywhere near as accessible to the beginner as single-author books.

So I conclude that this book is not for beginners. It is actually for those already active in metallized plastics. There must be many industrial scientists engaged in this field. It is part of a much wider trend to the greater use of various different materials in juxtaposition. No longer do we simply have metals competing with plastics, we combine them to achieve more than either one could achieve by itself. Other examples of combining materials are metal-matrix fibre composites, plastics filled with minerals or silver-coated glass microspheres, aluminium/resin laminates, and syntactic foams.

The papers are well written and authoritative and have been grouped in three categories. The first deals with metallization techniques, such as vapour-phase metallization of plastics, selective metallization of optically variable devices, and the solid-phase dispersion of ultrafine metal particles, which have different properties from those of bulk metals, into a polymer by thermal relaxation. One interesting paper discusses the diffusion of noble metals and other metals at high temperatures into polyimide film. Any attempt to accelerate the

process rapidly results in a traffic jam, but low deposition rates enable many single atoms to diffuse into the bulk resin. Their progress can be mapped using radiotracer techniques.

Another paper describes the introduction of silver atoms into aramid fibres and films by exposing the aramid to solutions which are later chemically reduced to silver. This procedure is followed by electroless plating.

The other two sections are slightly shorter than the first. One deals with interfacial interactions and the other with the modification of plastics surfaces. The 'interfacial' papers tend to deal with fundamental aspects, but there is also one on the computer simulation of dielectric relaxation at metal-insulator interfaces. The final (modification) section discusses practical topics such as the adhesion of metals to fluorocarbon polymers, the surface modification of polymers by plasma and ion bombardment, and fracture mechanisms of thin metallized plastics. This last paper focuses on the measurement of the fracture energy between a thin metal film and a polyimide substrate. A non-linear approach was used because linear elastic fracture methods give an inequality in the energy balance concepts.

This book can certainly be recommended to industrial libraries where companies are active in the field of metallized plastics, and some postgraduate scientists in universities will undoubtedly find one or two topics relevant to their work, but the general reader may prefer a different format.

Each paper has a few references. The page layout is uniform and pleasing. As is customary with research papers, there are many graphs and other figures. There is a reasonable index.

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Handbook of HPLC

E. Katz, R. Eksteen, P. Schoenmakers and N. Miller (eds)

Marcel Dekker, New York, 1998

xi + 1008 pages. US\$225

ISBN 0-8247-9444-3

There are many books available on HPLC, mainly in the form of specialized texts covering either theory or specific application areas. This book, however, provides a comprehensive overview of HPLC fundamentals, techniques, instrumentation and applications in one volume. The book is split into four sections to reflect the above areas, each section comprising a number of chapters by contributing authors. Each of the 29 chapters tends to be complementary and there is very little overlap for a book of this size. The chapters also contain extensive reference lists and a good number of useful tables, and figures.

In addition to the material you might expect to find in a book of this nature, it also contains a number of surprises. At first glance a chapter on capillary electrophoresis may seem out of place in a book on HPLC since traditionally electrophoretic techniques have been considered to utilize a different separation principle from chromatographic techniques. However, the recent advent of capillary electrophoresis has blurred the boundaries between these two areas with, for example, the technique of micellar electrokinetic capillary chromatography, exploiting simultaneously both electromigration and chromatographic sorption to achieve separation. This short chapter explains the basic principles of CE and gives a succinct account of the most important modes of CE used at present.

Another area covered in more detail than in many other books on HPLC is the description of ion-exchange sorption processes in modern HPLC techniques. This area is covered in three chapters, so there is potential for repetition. However, although some overlap is bound to occur, each author has focused on different aspects of ion separation and application to give a very comprehensive review of this field of analysis.

Overall I found this book well structured and well presented. It is certainly eminently suitable as a textbook for undergraduate students although the price may well mean it becomes a popular library text. It is, however, also suitable for a wide range of HPLC practitioners—from new users who want a better understanding of the technique through to the old hands' who want to catch up on the latest innovations, or perhaps want an insight into other areas of application. While reviewing the book I tried to think of something that may have been omitted, but I failed. True, some specialist areas such as metal speciation studies are not covered in great detail, but they are included and reference is made to more specialist texts. Thus, despite its cost (and weight!), I can thoroughly recommend this book to any user or potential user of HPLC.

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Anthropogenic Compounds, Part H. Organosilicon Materials

G. Chandra (ed.)

The Handbook of Environmental Chemistry, Volume 3

Springer-Verlag, Heidelberg, 1997

xvii + 324 pages. £76. DM198

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Organosilicon materials are prime examples of anthropogenic or synthetic compounds, unknown in nature. A conservative estimate, based on current world sales of about 600 000 metric tons, suggests that more than

15 million metric tons of polymethylsiloxanes and related compounds have been released into the environment in one form or another in the last 50 years. The environmental fate of silicones is therefore a matter of high public interest. In an oxidizing environment the ultimate fate of silicones is conversion to carbon dioxide, water and silica. How, and whether, that occurs and what happens in the intermediate stages is the subject of active research, particularly by the silicone manufacturers themselves.

This recent volume in the *Handbook of Environmental Chemistry* series, edited by Grish Chandra of the Dow Corning Corporation, aims to give access to a single volume dedicated to commercial organosilicon materials: their structure, properties, manufacturing, environmental fate/effects, and the legislation that governs their use'. These aims are impossibly ambitious, but the book does bring together for the first time much of this information.

There are 12 multiauthor chapters that cover roughly three general themes. The first four chapters and the final one concern introductory and general topics, including the entry and predicted fate of silicones in the environment, their extraction and detection in trace quantities, ecotoxicity testing and a review of relevant physical properties. The next four chapters describe studies on individual classes of silicones. Three chapters describe the regulatory frameworks in the United States, Europe and Japan.

The book seems to demonstrate that whereas there are many issues around the environmental fate of silicones it is not (yet?) a problem'. It is a stimulating and sometimes frustrating read, but one that I do recommend to anyone with an interest in silicon or environmental chemistry. Individually, each of the chapters is well written and informative and the book is well produced. Like any multiauthor volume, there are problems in overlap and structure. It is very difficult to combine the twin aims of coherence in content and allowing authors to express a personal and individual perspective. The result in this volume is that there is more repetition of basic information about silicones and their structures and properties than was necessary.

The book does reveal clearly that the environmental analysis of silicones is very much a developing subject where there are not yet universally accepted methods of analysis. Chapter 2, by J. C. Carpenter and R. Gerhards, is an excellent critical description of the methods and techniques that are being used and some that are being developed. The problems of detecting and analysing minute quantities of materials are well understood in analytical environmental chemistry but the additional problems with silicones of high molecular weight and structural diversity add a further layer of complexity.

Modern approaches to environmental chemistry require a sophisticated understanding of physical properties and particularly the quantification of these properties. The chapter by S. M. Mazzoni, S. Roy and S. Grigoras summarizes comprehensive data for sili-