

work (and to be absolutely fair also that chosen by Parkin and Poller); which one is taken as a recommended text is clearly a matter of personal choice.

Powell's book contains thirteen chapters. The first chapter is concerned with general concepts and is followed by three on main group (typical) elements (in *ca.* 130 pages total), seven on transition elements (*ca.* 330 pages total), one on clusters (*ca.* 20 pages) and the last on lanthanides and actinides (5 pages). The main-group chapters are on (i) methods of formation of metal-carbon bonds, (ii) organometallic compounds of the first three groups and (iii) organometallic compounds of Groups IV and V. The approach adopted for transition metal derivatives is essentially based on the electron number of the principal ligand in the complexes and so chapters deal, for example, with alkyl, alkylidene, alkene and alkyne complexes; allyl and diene complexes; five electron ligands; and arenes. Throughout the book, emphasis is placed on structures, bonding, preparation and reactions. Examples of the uses of organometallic compounds in organic synthesis is limited to the more simpler products.

The author also wished to bring out the importance of organometallic chemistry to industry. Throughout the book are various mentions of industrial processes/chemicals. One chapter is also devoted to the mechanisms of homogenous transition metal processes.

At the end of the chapters are key references and a limited number of problems taken (with permission) from various British University examination papers. As an extra, the answers are available in a booklet from the Publishers.

All in all, this is a very useful addition to the available texts and is reasonably priced.

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Transformation or Organometallics into Common and Exotic Materials: Design and Activation

R M Laine

Martinus Nijhof, Dordrecht, Boston, Lancaster, 1988
306 pp. Price \$96.00 (US); £53 (UK); 175.00 Dfl
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This book contains the proceedings of a NATO Advanced Research Workshop held in September 1986. It is concerned with the design, synthesis and selective conversion of organometallic (or metal organic) precursors to high purity, high strength or temperature-stable materials. The book clearly intends to help establish the scientific principles required for successful applied research in the materials chemistry area. The book contains reviews from most of the participants at the workshop and it is divided into four parts. The first, entitled Framework Sciences, is an attempt to

outline the background for the other (more applied) papers. It includes papers on metal clusters, organometallic polymers, gas phase pyrolysis of organometallics and the microstructures of hard metals. Clearly, a background chapter is needed in a work of this nature, but I found the coverage to be somewhat uneven, ranging from quite in-depth discussions to rather more sketchy outlines. For background studies in this area, other sources will give a broader and more comprehensive treatment.

The work becomes much more useful in the three chapters covering (respectively) preceramic polymers, chemical vapour deposition and sol-gel processing and overall make the book a valuable contribution to the field. In these chapters, the book addresses itself directly and practically towards an assessment of the potential use of chemical synthesis as means of preparing materials for advanced technology applications.

The section on materials for electronics is mainly concerned with chemical vapour deposition of conductors, semi-conducting materials, or insulating films. This section describes chemical vapour deposition of Fe-Co organometallic clusters (Czekaj-Korn and Geoffroy), metal-silicons (Aylett), boron-nitride (Schleich, Lai and Lam), Group III-V species (Haigh; Maury) and Ruthenocene (Ezzaouia and Gorochoy). The chapter by Aylett is particularly useful in that it does what its title claims, tells us 'how to make metal silicide thin films from molecular silicon metal compounds — and how not to'. It is done succinctly and briefly but references are provided.

The chapters on preceramic polymers look at various aspects of materials chemistry for the preparation of bulk non-oxide ceramics. Most work in this areas has been in the (SiC)_n and the (SiN)_n area. The chapter by Wynne discusses boron nitride precursors; Noltes considers various organosilicons as precursors to (SiC)_n for electronic and ceramic applications; Harrod's chapter looks at metallocenes of Ti and Zr as catalysts for the coupling of organosilanes. Bacque, Pillot, Birot and Dunogues discuss the preparation of new polycarbosilane model polymers. Finally in this section Seyferth discusses silicon containing ceramics generally and then describes the preparation of a novel polysilazane, its conversion to ceramic products and their use in improving polysilanes.

The final section is concerned with sol-gel processing. This is concerned with structural control of materials to improve performance in ceramics, glass and composites, essentially by increasing the regularity of molecular order in the polymeric materials, i.e. structural improvement at the microstructural level (>10,000 Å). Ulrich terms this as ultrastructural processing and defines it as molecular manipulation and control of uniquely homogeneous structures. The system and concepts are illustrated with references to mullite (3Al₂O₃·2SiO₂), a high temperature structural material. Work with alkoxides is then described in a chapter by Dislich, with transition metal oxides by Livage, thin film work by Brinker and the preparation of finely dispersed powders from organometallics by Matijevic and Gheradi.

The work as a whole represents a most useful collection of information in this rapidly growing field, although some

of the chapters treat their topic areas somewhat sketchily. However, the fact that so much is contained within a single cover, together with its use as a source of reference, makes the book important as part of the information collection for laboratories in the area. At this price, it will be bought by those laboratories, less so by groups having a less central interest in the area. However, its use as a source of reference should not be underestimated and I strongly recommend its acquisition.

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