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Book Review

***Solid State Organometallic Chemistry. Methods and Applications*, Edited by M. Gielen, R. Willem and B. Wrackmeyer, Wiley Interscience, Chichester, 1999, pp. xviii + 529. ISBN 0-471-97920-1; GB £165.00**

With solid state chemistry undergoing a renaissance period, this is a timely addition to the many volumes that discuss organometallic chemistry in solution, and it is, in part, aiming to review techniques and areas that may be useful and of interest to the general organometallic chemist.

The first two chapters, dealing with X-ray crystallographic methods, make an invaluable introduction. Edward Tiekink points out in a refreshing manner that while the result of a crystallographic study may not be perfect in the eyes of a true crystallographer, it may well be of great satisfaction to the bench chemist. This chapter thus aims to help the 'chemical crystallographer'. While presuming some prior knowledge, pertinent points about single crystal and powder diffractometry are highlighted, as well as useful tools such as the Cambridge Structural Database. Chapter two, by Larry Favello, is complementary to the first and provides a good balance by explaining to the non-crystallographically trained user crystallographic problems such as data deficiency in a case study manner.

The theme of crystallography is continued in Chapter three which outlines the now burgeoning field of supramolecular organometallic chemistry, or molecular crystal engineering, an area which Dario Braga has made his own. Nicely succinct, the authors review hydrogen bonding in intermolecular C–H agostic compounds, ion pairs, and reactive intermediates and successfully link these to areas such as alkene polymerisation, while remembering that these interactions are limited to the solid state.

In Chapter four by Yuri Slovokhotov, an attempt is made to give an appraisal of the very specialised area of X-ray absorption fine structure spectroscopy (XAFS). While not immediately successful and perhaps overlong, useful insights into the problems of determining the 3D structure of partially ordered or amorphous condensed phases, solution or heterogeneous samples are revealed.

Chapter five, by Nikolas Fröhlich and Gernot Frenking, gives the 'experimental chemist' a heavyweight view of theoretical models derived from ab initio calculations. With theoretical techniques such as DFT becoming increasingly popular in the organometallic field, this is a timely, if demanding, reference chapter, linking well solid state structures with calculation.

In Chapters six and seven, the focus of the book moves away from 'crystallographic' techniques towards solid state NMR and Mössbauer spectroscopy. Melinda Duer presents a thorough appreciation of solid-state NMR spectroscopy in an organometallic framework, providing both theoretical and descriptive discussion on eliciting the electronic and molecular structures of organometallic materials. The review of Mössbauer spectroscopy by Jack Silver is vast and fits uneasily into the style of the book as a whole, being very detailed and less for the general overview of the technique and its applicability to the solid-state organometallic area and more for reference.

The final three chapters look at specific areas in which an appreciation of the techniques described earlier in the book is a useful, if not an essential, component. Chapter eight, by Wolfram Uhlig, is an excellent review of organosilicon polymers derived from silyl triflate intermediates. However, given that little or none of the techniques described in the previous chapters are utilised in the characterisation of these materials, this contribution appears very much out of place. Polymer-supported catalysts, a field that is becoming increasingly important in industrially viable catalytic processes, are reviewed in the final two chapters. Bernard Delmond and Gilles Dumartin describe the use of polymer-supported tin catalysts as systems that can circumvent the problems surrounding the toxicity and potential environmental impact of solution-based tin reagents. While primarily dealing with the synthesis and reactivity of these materials, characterisation by ^{117}Sn CP-MAS-NMR spectroscopy is illustrated. Finally, James Cameron highlights the last 2 years of research in the study of polymer-supported metal complexes, incorporating such diverse areas as metal–ion and gas separation technology, polymer electrolyte systems and

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electrode surfaces, and the development of new catalytic systems.

The wide array of techniques expertly described, plus the highlighting of a few areas of increasingly important applications, should make this book a useful addition to the bookshelf of the organometallic chemist.

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