

Book review

A. TOGNI and T. HAYASHI, eds.

Ferrocenes, Homogeneous Catalysis – Organic Synthesis – Materials Science
VCH, Weinheim, 1995, 540 pp., hard-cover, DM 248.00

“Homogeneous Catalysis”, “Organic Synthesis” and “Materials Science” are the three main parts of this useful compilation of ferrocene-based chemistry encompassing progress from about 1986 to mid 1994. It sets out to cover the areas of research where ferrocene is perceived to play a key role based on its particular physical and chemical properties. Each of these consists of a collection of reviews by prominent authorities in their respective fields and aims to provide new perspectives for further development in these areas.

Overall, this aim has been achieved in a mostly very readable and clear fashion. The graphics are predominantly straightforward black-on-white line drawings and represent a refreshing break from high-resolution 3D colour images, the use of which is not always warranted. Reading the book from cover to cover, however, one could not fail to notice a certain degree of repetition, especially in the introductory remarks of some reviews. It would have been more useful to write one condensed introduction for each of the main parts. This said though, it has to be pointed out that the individual contributions are in themselves precise and informative.

From a catalytic chemist's point of view, the first part on homogeneous catalysis is clearly the most useful. Essentially it deals with diphenylphosphinoferrocene (dppf) derivatives. The review by Gan and Hor gives an authoritative account of some of the basic aspects of dppf co-ordination chemistry, synthesis and catalysis. This is followed by Hayashi's review on a specific part of catalysis – asymmetric/enantiomeric synthesis employing chiral dppf derivatives. The subsequent review by Butsugan, Araki and Watanabe focuses on catalytic enantioselective dialkylzinc additions, again involving dppf derivatives. These three reviews, giving an instructive and up-to-date compilation of established dppf catalysed reactions, would present the main interest for the catalytic chemist. The high enantioselectivity displayed by these dppf catalysts (in combination with their chiral stability induced by the ferrocenyl unit) shows them to be an exciting class of compound – the full potential of which has not yet been realised regarding their industrial (e.g. pharmaceutical) uses. Therefore, from this viewpoint alone *Ferrocenes* is a timely contribution and should serve to raise awareness in the general catalysis community of the potential which may be unlocked by further exploration of dppf-chemistry.

The second part, “Organic Synthesis – Selected Aspects” is an interesting follow

on for the reader whose appetite has been whetted for ferrocene-based catalyses/syntheses. The aspects presented are: chiral ferrocenes (essentially excluding the exhaustively treated dppfs), ferrocenes containing heteroelements, ferrocene containing macrogels and cryptands and finally a review relating electrochemistry of redox-active ligands to structural aspects. This particular combination of topics may look a little eclectic at first, but does provide an informative and structured insight to the fascinating chemistry of ferrocene derivatives. The initial presentation of general methods for the preparation and resolution of chiral ferrocenes by Wagner and Herrmann is followed by discussions of ferrocene derivatives with progressively more involved ligand substituents, touching on interesting synthetic and redox-aspects of macrocyclic/cryptand chemistry and even on host-guest interactions.

Part three by Togni deals with materials science and discusses ferrocene-containing organometallic polymers, charge-transfer complexes and liquid crystals. It describes different strategies for the polymerisation of ferrocenes which provides one principle way of heterogenising homogeneous catalysts. The remaining two sections are of equally high standard, although they would probably only be of indirect interest to the catalysis community.

There is merit in the approach of linking different areas of research (e.g. chiral catalysis and liquid crystals) and consequently this book illustrates very well the versatility of the ferrocene unit. However, a more traditional approach with each of the three sections appearing as part of a larger compilation on its respective topic would have been equally valid. On balance, the combination of homogeneous catalysis and organic synthesis worked well and seemed appropriate; the inclusion of the third section on materials science, although interesting and well written, did not seem imperative. In summary, here is a selection of research areas involving ferrocene covered with a high degree of proficiency and elegance. The book is focused and concise and would be most useful for interested readers of the journal.

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