by ionic and π-bond interactions mainly in organometallic compounds of elements of Groups 1–3, e.g. in oligomeric organoalkali-metal derivatives and cyclopentadienyl compounds. Again this is a good introduction to the area but the extent of the literature means that much of the detail has had to be left out.

The authors have performed the valuable service of encouraging chemists to look at interactions between as well as within molecules. However, much of the 'self-assembly' discussed here is that of crystallization. There is little about self-assembly in solution, little about applications, and little sense of the way in which organometallic compounds might be synthesized to give sites specifically designed for recognition of particular molecules. These are topics for the future research which this book is likely to stimulate.

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Grignard Reagents—New Developments

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In 1900 the landmark paper by Victor Grignard, 'Sur quelques nouvelles combinaisons organométalliques du magnésium et leur application à des synthèses d'alcools et d'hydrocarbures' was published.[1] 'At the close of its first century, the Grignard reagent has achieved maturity but exhibits no signs of senescence'—so writes Herman Richey in his Preface. Indeed, on the evidence of this and other books, there are even signs of rejuvenation.

Grignard Reagents—New Developments is a collection of 12 detailed reviews of selected aspects of organomagnesium chemistry, in which important developments have taken place towards the end of the 20th century. Some of them review the new light that has been shed on old topics. For example, Holm and Crossland discuss the mechanism of reactions of Grignard reagents with carbonyl compounds and show that, in contrast to the simplistic picture presented in undergraduate textbooks, of nucleophilic attack by carbanionic carbon at the carbonyl carbon, in many cases an important reaction pathway involves initial electron transfer. Other chapters in this category are on nucleophilic displacements at carbon by Grignard reagents (Hill), and stereoselective additions of Grignard reagents to aldehydes (Gawley; a review of the general principles, but with the examples drawn from the specialized area of the author's own work, i.e. reactions of α-amino Grignard reagents). A heavyweight contribution in this category is by Garst and Ungváry, who present a comprehensive account of their side of the long-running argument concerning the mechanisms of Grignard reagent formation. Will this be the knock-out, or will Walborsky and others return for another round?

Several chapters are reviews of new topics, or topics which have shown major new developments: hydromagnesiation of alkenes and alkynes (Sato and Urabe), stereoselective addition of Grignard reagents to alkenes (Hoveyda, Heron and Adams), applications of magnesium anthracene in forming Grignard reagents (Raston), structures of organomagnesium compounds as revealed by X-ray studies (Bickelhaupt), X-ray absorption spectroscopy and large-angle X-ray scattering of Grignard compounds (Ertel and Bertagnolli; this chapter includes an account of the principles and practice of EXAFS and LAXS, which provide a good introduction to these techniques), di- and poly-functional organomagnesium compounds (Bickelhaupt), and the uninformatively titled 'Unusual Organomagnesium Compounds' (Smirnov, Tjurina and Beletskaya). This last chapter is an account of the authors' work on the intriguing, though still ill-defined, substances obtained by co-deposition of magnesium vapour and organic compounds, and formulated by them as RMg_nX or RMg_nH.

At first sight the remaining chapter, entitled 'Grignard Reagents—Industrial Applications and Strategy', by Busch and de Antonis, appears out of place, though it could be argued that the large-scale industrial use of Grignard reagents is a fairly recent development. I have some criticism of this chapter. Some of the statements made are questionable: for example, the reaction of a Grignard reagent with a ketone does not give 'a complex of the product alcohol with the residual magnesium salts', and to describe the role of ethereal solvents as 'stabilizing the Grignard reagent' begs some questions. It should also have been noted that carbon dioxide, as well as water, should not be used on burning magnesium. Nevertheless, most readers of this book are likely to be from academic institutions, and this chapter will provide such readers with a salutary insight into the challenge faced by those needing to scale up laboratory syntheses for industrial use.

In 1954, just over half-way through the Grignard reagent's first century, Kharasch and Reinmuth's monumental *Grignard Reactions of Nonmetallic Substances* was published. It has been clear to authors of recent books (including myself) that the subject was now so large that they could not hope to emulate Kharasch and Reinmuth's achievement. In editing this book, Herman Richey has opted to cover selected topics in depth, and the result will be invaluable to those working in the chosen areas. The book as a whole should also find a place in libraries, though its price will put it beyond the reach of most individuals.

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