emplified by the purple dinuclear copper site of cytochrome c oxidase and nitrous oxide reductase, and the trinuclear sites of ascorbate oxidase and the internal electron transfer pathways are also discussed. This contribution ends with a description of the structure of the first vanadium containing enzyme to be solved, a chloroperoxidase for which the geometry of the catalytic V centre is revealed. The wider chemistry and biochemistry of the fairly recent addition of V to the realm of biologically relevant metals are to be found in vol. 89.

A critical evaluation of the available structural data (mostly provided by EPR and X-ray absorption spectroscopy) to assess possible models for the mixed valence Mn-containing centre in the oxygen-evolving complex responsible for green plant photosynthesis is given by Penner-Hahn. The structural and redox properties of synthetic FeS clusters are discussed by Capozzi et al. before they consider parameters important in fine-tuning redox potentials by the protein environment. This is achieved by comparison of the crystal structures of the FeS proteins (which exhibit a wide range of midpoint potentials) with NMR and other spectroscopic data, to define electron distribution within the cluster. Nickel/iron hydrogenases have shown some very surprising results from IR and EPR spectroscopies, together with crystallographic studies. Frey describes the model for the *D. gigas* enzyme where the three FeS centres (two 4Fe–4S and one 3Fe–4S) are aligned and separated by ≈ 12 Å. The Ni centre is bimetallic containing one Ni and one Fe atom separated by 2.8 Å with one CO and two CN ligands to the Fe atom.

I highly recommend this series of very readable and stimulating reviews. They provide a valuable resource for chemists and biochemists interested in (or wishing to find out more about) the roles played by metals in biological processes. The wide range of topics covered, and organisation of the series gives added value to many of the individual contributions, should result in effective cross-discipline intellectual stimulation. The series is well produced and cross-referenced within the articles. Particularly important, abbreviations and acronyms are defined and accessible (except for the single letter code used for amino acids), a surprising omission given the catholic nature of the projected readership, and the abundance of amino acid sequence comparisons and protein structures using this notation. A small quibble for a useful series covering a wide field of information.

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Metal Catalyzed Cross-Coupling Reactions, F. Diederich and P.J. Stang (eds.), Wiley–VCH, Chichester, 1998, pp. 571 + xxi, £ 85, ISBN 3-527-29421-X

As the editors point out in their forward, methodology for the formation of carbon–carbon bonds between sp^2 and sp centres has advanced dramatically over the last 25 years. In the most widely used version of the genre, an organometallic nucleophile is coupled with an aryl, alkenyl, alkynyl, propargyl, benzyl or allyl halide in the presence of a complex of nickel, palladium or copper. This volume, however, will take the reader far beyond these prototypes.

The first chapter, by Negishi and Liu, reviews palladium and nickel catalyzed couplings of organometallics of zinc, magnesium, aluminium and zirconium. The authors make some useful generalisations about the relative reactivities of various systems. They describe classic examples, recent work with tosylates, complex natural product syntheses, enantioselective versions of the reaction, and tandem processes. The chapter concludes with a section detailing representative experimental procedures—as does each of the other chapters. The examples are well-chosen and concisely described, but I wonder if a conscientious experimentalist would really use this rather than go back to read the original paper.

Next Suzuki describes coupling reactions of organoboron compounds with organic halides, these being almost invariably catalyzed by palladium complexes. The synthesis of useful organoboron compounds is discussed in some detail, and carbonylation and reactions with triflates more briefly. The Heck reaction is reviewed by Bräse and de Meijere, with a comprehensive and thorough discussion of all the many variants of conditions, substitution patterns, leaving groups and additives which have found favour over the last 25 years. Cascade reactions, multiple couplings and enantioselective processes are all well discussed. Although all the chapters are well-referenced, this one is particularly thorough.

The volume is dedicated to the late John Stille, and Mitchell reviews the Stille coupling of organotin compounds. This is a thorough chapter with most of the references to 1990s work. Sonogashira describes the somewhat less common cross-couplings involving sp-carbon atoms. Almost all of these involve an alkenyl or aryl halide. Link and Overman discuss the use of the Heck reaction in natural product chemistry, focusing especially on ring synthesis and tandem processes. In Ch. 7, Marek and Normant review carbometallation reactions of alkynes, allenes, enynes and alkenes, with particular emphasis on intramolecular processes. Bäckvall is an excellent choice to review 1,4-additions to dienes, catalyzed by palladium complexes, a field in which he is a world leader. Knochel describes reactions of organozinc reagents and Hiyama considers organosilicon compounds. The final chapter, by Tsuji and Mandai discusses palladium-catalyzed reactions of propargylic compounds.

The editors have assembled here an impressive cast of authors, beyond doubt all experts in the topics they review. The choices of the chapter titles derive in many cases from their authors' expertise—they are definitely not systematic, with some based on substrate type, some on reaction type and some on organometallic nucleophile type. There is, however, not too much overlap but unfortunately one very conspicuous hole—palladium-catalyzed couplings to allyl derivatives. A few are discussed in Negishi's opening chapter, but given the level of activity in this area, I would have expected a more extended and systematic review.

Overall the book is well produced with clear legible diagrams, and each chapter is very thoroughly referenced. It is unfortunate that each chapter has its own glossary of acronyms—and these vary from one chapter to another. The index is adequate, if not particularly comprehensive. Readers will find value for money in this volume; the information density is high, the authors distinguished, and the coverage timely. At £85 this will not find its way on to many individual bookshelves, but it is a useful library purchase.

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Organofluorine Chemistry: Fluorinated Alkenes and Reactive Intermediates, *Topics in Current Chemistry*, *Volume 192*, R.D. Chambers (Ed.), Springer-Verlag, Berlin-Heidelberg, New York, 1997, pp. 244 + x, UK £84.00, ISBN 3-540-63171-2

Organofluorine Chemistry: Techniques and Synthons, *Topics in Current Chemistry*, *Volume 193*, R.D. Chambers (Ed.), Springer-Verlag, Berlin-Heidelberg, New York, 1997, pp. 252 + x, UK £84.00, ISBN 3-540-63170-4

These companion volumes, dedicated by Professor Chambers to Nobel laureate George Olah on the occasion of his 70th birthday, are recent additions to a well known series designed to provide 'critical reviews of the present position and future trends in modern chemical research'. The sheer breadth and depth of organofluorine chemistry nowadays precludes the possibility of achieving this objective in just two standard volumes of 'Topics', hence the coverage needed to be appropriately selective. This has been achieved nicely and without serious overlap with recent major books on organofluorine chemistry or with a 'fluorine thematic' issue of *Chemical Reviews*. A fair proportion of the areas reviewed reflect the front-line editor's own long-standing research interests, as expected. Volume 192 contains four reviews, viz. Nucleophilic Reactions of Fluorinated Alkenes (R.D. Chambers and J.F.S. Vaughan), Reactions of Electrophiles with Polyfluorinated Olefins (U.A. Petrov and V.V. Bardin), Fluorinated Free Radicals (W.R. Dolbier) and Telomerisation Reactions of Fluorinated Alkenes (B. Améduri and B. Boutevin) and Volume 193 contains five: Elemental Fluorine in Organic Chemistry (J. Hutchinson and G. Sandford), Fluorinated Organometallic Compounds (D.J. Burton and L. Lu.), Enzymatically Controlled Reactions of Organofluorine Compounds (T. Kitazume and T. Yamazaki), Building Block Approaches to Aliphatic Organofluorine Compounds (J.M. Percy, UK) and Electrofluorination of Organic Compounds (F.G. Drakesmith). No doubt organometallic chemists will make a beeline for Volume 193 and the Burton/Lu review of fluorinated organometallic reagents; however, there is also much to occupy their attention in Percy's discourse in the same volume on fluoro-organic building blocks. Volume 192 is less immediately useful to organometallic chemists in general.

Burton and Lu, focusing on work reported during the past 10 years, describe in agreeable style methods of synthesis and applications of perfluoroalkyl, fluoroalkenyl, perfluoroaryl, carboalkoxydifluoromethylene, dialkoxyphosphinyldifluoromethyl, α,α-difluoroallyl and α,α-difluoropropargyl derivatives of 'workhorse' metals such as lithium, magnesium, zinc, copper and tin. Percy's superbly crafted review dealing with general and significant developments in the area of building block chemistry of so called lightly-fluorinated aliphatic compounds (i.e. the molecules contain up to three F substituents) is replete with information on the use of metal-based aids for the synthesis of fluorinated target molecules. For me, his review is the high spot of this two-volume collection of reviews and deserves to be consulted widely in general organic synthesis circles, as does the review by Kitazume and Yamazaki on the biotransformations of lightly-fluorinated organic compounds.

Drakesmith's timely and authoritative review of electrofluorination methodologies in Volume 193 contains a thoughtful section on the still-uncertain mechanism of the conversion of hydrocarbon substrates to perfluorinated entities via electrolysis in anhydrous hydrogen fluoride using nickel anodes (the famous Simons Process that was discovered almost 60 years ago). This ought to attract at least passing attention from organometallic chemists. The brief section on C–F bond-making via fluorodemetallation of organic deriva-