

## Book Review

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### Metal-catalyzed cross-coupling reactions

Wiley-VCH, 2004, 2nd edition,  
2 volumes, 916 pp; Price £230.  
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The vast and important area of metal-catalysed cross-coupling reactions touches upon many branches of organic synthesis, and the second edition of this monograph is a timely update of the 1998 first edition, which was edited by François Diederich and Peter Stang. Practitioners of this vital and rapidly changing field, as well as those engaged more generally in synthetic organic chemistry, will welcome this comprehensive and up-to-date overview of metal-catalysed cross-coupling reactions. The format and approach that made the first edition such an excellent source of reference has been retained for the second edition: international experts have contributed chapters on the various aspects of cross-coupling reactions, exploring areas from mechanistic studies to the scope of the coupling reactions. One of the most welcome features of the first edition, the inclusion of detailed experimental procedures at the end of each chapter, has been retained for the second edition. Coupled with thorough referencing to the primary literature, this encourages chemists to consider using a cross-coupling reaction in their synthesis. The cross-coupling reactions discussed in the first edition are still present, i.e. Suzuki, Stille, Heck, Sonogashira and Negishi couplings, along with the cross-coupling of organosilicon

and organozinc reagents, carbometallations, palladium-catalysed 1,4-addition to dienes and palladium-catalysed propargylic couplings. In these updated chapters, this reviewer counted 1257 post-1998 references out of a total of 2993, demonstrating that these chapters have been considerably updated since the first edition. Many of these chapters also contain comprehensive and well-referenced tables of results based on catalyst–ligand systems and substrates. Of special note in this regard is the chapter on the Heck reaction, which lists in table form the many ligands, additives and leaving groups that may be used in the reaction. There is also a tabulated list of natural products that have been synthesised using the Heck reaction. In addition to these well-established areas of metal-catalysed cross-coupling reactions, other areas have now grown to the extent that they receive dedicated chapters: the reactions of  $\pi$ -allyl metal species, cross-coupling of organomagnesium reagents, palladium-catalysed aminations and directed *ortho*-metallation (DoM) are all covered in this new edition. Furthermore, a new chapter is also dedicated to mechanistic aspects of cross-coupling reactions. The chapter on palladium-catalysed amination is especially welcome, since this area has grown rapidly in the last 5 years, and is of great interest to both academic and industrial synthetic chemists. Moreover, despite the power of this methodology, many chemists are dissuaded from employing it because of the often bewildering array of reaction conditions available, involving variations on catalysts, ligand, solvent and base. The authors go into detail on

each of these parameters, before considering the various classes of amine that have so far been coupled to aryl systems, thus providing an overview of the scope of the reaction. This chapter will most certainly be of great help to those who are considering using this methodology, but who are unsure of which reaction conditions to choose. The new chapter on the tandem strategy of DoM/cross-coupling is comprehensive and well written. Again, like many cross-coupling reactions, choice of reaction conditions is critical here, and once again the authors go into great detail with regard to matching of substrate types with catalyst–ligand–solvent–base. One criticism of this monograph is that it does not cover metal-catalysed enolate arylation, a process that has rapidly developed into a powerful new methodology for C–C bond formation. Nonetheless, the two volumes that make up this second edition are thoroughly referenced, consistently well written, clear and free from errors. The text is accompanied by many tables, and the reactions that are discussed are highlighted in well-drawn schemes. This is an absolutely essential reference work and it is highly recommended for anyone engaged in the field of organic synthesis.

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