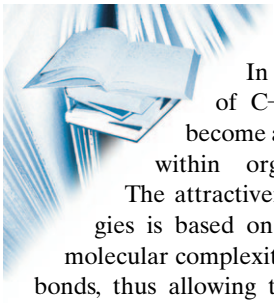

C–H Activation

In recent years the subject of C–H bond activation has become a rapidly developing field within organometallic chemistry. The attractiveness of such methodologies is based on the ability to build up molecular complexity from rather inert C–H bonds, thus allowing the use of elegant bond disconnection strategies for assembling valuable organic structures. Although specialized reviews have recently appeared, the exponential growth of C–H activation demands a book with a more up-to-date, comprehensive, and well-balanced coverage. The current book meets this challenge, covering the most recent advances; indeed, it can be considered as the successor to *Handbook of C–H Transformations: Applications in Organic Synthesis*, edited by Gerald Dyker (Wiley-VCH, 2005).

C–H Activation is a collection of 12 independent chapters, written by renowned authors. Each chapter includes references to earlier reviews, books, and landmark discoveries. The topics are illustrated with descriptions of the most recent advances in this emerging field, including references up to 2009. However, the book could have been improved by a general and detailed introduction to the subject at the beginning, thus avoiding repetition of the introductory material in the individual chapters. Nevertheless, the book is well organized and is clearly written, although there are some differences in style as a consequence of multiple authors. The descriptions of future perspectives, applications in the area of natural products, and, in some cases, experimental procedures at the end of the chapters will be very valuable to readers, particularly students. There is no doubt that the book will serve as a key reference source in the area of C–H bond functionalization.

Although at first sight the book might appear to be a simple compilation of results and tables, this is not the case; indeed, the chapters include insightful discussions and in-depth descriptions of the key principles, thus making the book an enjoyable experience. The first seven chapters are primarily focused on Pd-catalyzed C–H bond activation, with topics ranging from the Catellani reaction, heterocycle arylation, palladium migration, and allylic C–H oxidation to the double activation of C–H bonds. In particular, the chapters on the arylation of heterocycles, written by Fagnou and Gaunt, are truly excellent and of high quality, providing detailed mechanistic explanations and illustrating the critical role of the catalyst and additives for promoting regiochemical control. The dichotomy of Pd- and Cu-catalyzed C–H arylations is nicely described by Daugulis in Chapter 3; however, one might have wished to have more specific details or additional mechanistic explanations. Lautens and Larock discuss the potential of the Catellani reaction and that of palladium migration methods for promoting remote activation of C–H bonds, including fine details and excellent comprehensive reviews of the literature. The chapters by You and Liu on the functionalization of allylic C–H bonds and on arene–arene coupling reactions are quite remarkable, beautifully illustrating how these methodologies hold promise for future advances in the field. The following two chapters of the book are focused on Ru- and Rh-catalyzed C–H activations, methodologies that have proven to be competitive and, in some instances, complementary to those using Pd salts as catalysts. In Chapter 10, Li provides an overview of the functionalization of C–H bonds adjacent to nitrogen or oxygen atoms by cross-dehydrogenative couplings. Davies and Du Bois complete this collection with two pleasing and well-balanced chapters on the use of metal carbenoids and of metal nitrenes, which are unique tools for building up molecular complexity, including the development of regio- and stereoselective transformations.

Some topics are covered in more than one chapter. An example is the contribution by Fagnou in *Science* in 2007, which is treated in Chapters 4 and 6; similarly, the Pd-catalyzed functionalization of allylic C–H bonds is discussed in Chapters 7 and 10. Other topics, for example the impact of the iridium-catalyzed C–H activation, particularly in alkane dehydrogenation, are not described.

Also, a chapter devoted specifically to stereoselective functionalization of C–H bonds when not employing metal carbenoids would have been an excellent addition because of the increasing importance of such methods. The most regrettable omissions, though, are the lack of more inorganic aspects and of a comprehensive description of computational methods, which have played a critical role for explaining the elementary steps in the catalytic cycles of C–H activation processes; only a few mentions of ab initio or DFT studies have found their way into the book.

I strongly recommend the book *C–H Activation*, as it certainly stimulates new concepts and ideas in one of the most vibrant, intellectually rewarding, and promising avenues of research within organic and organometallic chemistry. It is an essential reference source for the practitioners in the field for many years to come, and it should have a privileged spot on many bookshelves.

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