

**Science of Synthesis, Stereoselective Synthesis 3: Stereoselective Pericyclic Reactions, Cross Coupling, C–H and C–X Activation**; edited by P. Andrew Evans, Georg Thieme Verlag: Stuttgart, 2011, hardcover, 1166 pp., €2590, ISBN: 978-3-13-154131-4; softcover, 1066 pp., €249, ISBN: 978-3-13-165181-5

Stereoselective synthesis is now the modern daily life of every synthetic chemist. The impact of stereoselective synthesis has gone way beyond the boundary of organic chemistry, even chemistry. As a scientist in this exciting field, I appreciated the opportunity to review the *Stereoselective Synthesis* volume of *Science of Synthesis*. It has been an enjoyable experience reading this volume on pericyclic reactions, cross coupling, C–H and C–X activation. The book is structurally well-organized and scientifically well-presented.

Reading this volume reminds me of the early masterpiece work, *Comprehensive Asymmetric Catalysis*, edited by Jacobsen, Yamamoto, and Pfaltz. The three volumes of *Comprehensive Asymmetric Catalysis* were published in 2000, more than a decade ago. Given the fast pace of the asymmetric catalysis field, the current *Stereoselective Synthesis* volumes of *Science of Synthesis* focusing on asymmetric catalysis are very timely.

The first two chapters, by Yu and Ishihara respectively, nicely introduce the development of the stereoselective [m+n] cycloaddition reactions, and summarize excellent procedures for construction of four-, five-, six-, seven- and nine-membered rings in asymmetric manners. The following two chapters are devoted to the topic of carbocyclization reactions, in which Shibata details the enantioselective Pauson–Khand reaction and other [m+n+1] reactions, and Malacria et al. comprehensively review the [m+n+2] cyclizations. Toste et al., in their chapter, contribute an excellent summary of the recent development of asymmetric cycloisomerization reactions as well as their synthetic application. Trauner et al. provide an elegant overview of electrocyclic reactions and their utility in several important total syntheses. Other important processes related to pericyclic rearrangement included ene reactions, sigmatropic rearrangements, isomerization to form a stereogenic center and allylic rearrangements, which were beautifully illustrated by Terada, Hiersemann, and Peters et al., respectively. In their chapters, recent achievements of the asymmetric versions in this area have been fully updated, and various attractive synthetic utilities are also covered. Crawley summarizes the metal-catalyzed allylic substitution reactions by classifying them into enantioselective, dynamic kinetic resolution, and stereospecific processes. Other important topics of this volume include the stereoselective construction of C–C bonds through cross-coupling reactions. Shibasaki et al. elegantly describe the asymmetric Mizoroki–Heck reactions, and Hiyama et al. contribute an excellent review of cross-coupling reactions. Two chapters are devoted to the asymmetric C–H activation processes, in which Andrus beautifully illustrates the allylic and benzylic oxidation, and Davies et al. nicely highlight the C–C bond formation by C–H activation process.  $\alpha$ -Functionization of carbonyl compounds, particularly in a stereoselec-

tive manner, represents another powerful tool in the realm of synthetic chemistry. Stoltz et al. contribute their well-written chapter to the enantioselective functionization of enolates, and MacMillan et al. nicely describe the direct  $\alpha$ -functionization of carbonyl compounds without the involvement of enolates. The Baeyer–Villiger reaction, another important transformation of carbonyl compounds, is nicely presented by Levinger, who details this useful reaction into both chemical and enzymatic approaches. Enantioselective ring opening of epoxides, aziridines, and cyclic anhydrides was accounted by Johnson, and Oriyama details the asymmetric acylation of alcohols and amines. Both of these elegantly reviewed topics represent useful protocols for affording enantioenriched alcohols as well as amines. Gouverneur et al. review the asymmetric fluorination processes, which are of great interest to agricultural, medicinal, and material chemistry. Stereoselective fluorination and fluoroalkylation were introduced separately in this chapter. Carpentier and Kirillov nicely summarize the stereoselective polymerization. Lattanzi devotes the last beautiful chapter to the stereoselective oxidation of sulfides as well as disulfides.

Each chapter of this volume was written by well-known chemists who are leading experts in the field. Rather in a unique style, most of the chapters were not written to be comprehensive; instead, most of the authors tend to be highly selective by choosing the most significant results from the field. The experimental procedures extracted from the most significant references are highly useful for the readers, avoiding the search for the original paper, and represent a nice feature of the *Science of Synthesis* book series.

The volume contains a number of important transformations in asymmetric synthesis, as you can read from the subtitle, and some of them are not really associated with each other. One would have a feeling that the whole book is rather the assembly of several transformations and not well integrated together. I guess this situation is difficult to be avoided given the wide spread of stereoselective reaction. Including different aspects in a single book did not jeopardize this *Stereoselective Synthesis 3* to be one of my favorite collections.

Overall, I strongly recommend *Stereoselective Synthesis 3: Stereoselective Pericyclic Reactions, Cross Coupling, C–H and C–X Activation*, as it is very timely, informative, and comprehensive. It certainly stimulates new ideas and concepts in asymmetric catalysis, one of the most attractive, fruitful, and promising research areas in organic chemistry. This book will be a practical guidebook and an essential reference source for researchers and the practitioners in the field for many years to come, and organic and medicinal scientists definitely should have one on their bookshelves.

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