

## Preface

Direct C–H functionalization has become one of the most important and emerging topics in organic synthesis. In this regard, Chinese chemists have made significant contributions for promoting the study of such chemistry from different aspects. Encouraged by the considerable progress made in this field by Chinese organic chemists, particularly the young generation of organic chemists in mainland China, it only seems apt to organize a special issue on the recent advances in C–H functionalization with the aim of stimulating in-depth research on the future development of, and potential applications for, this important evolving field. By focusing on the dynamic aspects of C–H activation, 18 papers have been included in this special issue, including two perspectives, two reviews, one feature article, and thirteen research articles.

In the perspectives, Professors Zhang-Jie Shi, Guo-Qiang Lin, and Yongjun Chen have introduced the history of C–H bond activation and functionalization in China and summarized the serious challenges and potential applications of C–H activation. Professor Guosheng Liu *et al.* have also provided intensive perspectives toward the Pd-catalyzed intermolecular allylic C–H functionalization of alkenes.

The direct functionalization of vinylic C–H bonds, as one type of important C–H bonds, has recently attracted significant attention. Jianbo Wang *et al.* have summarized the application of a directing strategy in vinylic C–H functionalization by the use of transition-metal catalysts, which would significantly promote studies in this field. Direct silylation, which has a mechanism completely different from that of C–H functionalization, is another interesting topic in C–H activation. A review on direct silylation reactions of inert C–H bonds by transition-metal catalysis written by Congyang Wang *et al.* would possibly provide strong motivation for conducting future studies in this field. In the feature article, Shangdong Yang *et al.* have addressed the phosphorylation of C–H bonds, with future directions in C–H functionalization directed by phosphine-containing groups.

I would like to acknowledge other contributors for sub-

mitting their important and dynamic research articles. Their studies have covered most of the important aspects of C–H functionalization. Starting from C–H bonds, a different class of reactions has been well documented in the presence or absence of transition-metal catalysts. C–H activation still predominantly occurs via the transition-metal-catalyzed functionalization of C–H bonds irrespective of the presence of directing groups. Both  $sp^2$  and  $sp^3$  C–H bonds can be activated and further functionalized to construct different C–C and C–heteroatom bonds by employing these strategies. The products thus obtained, e.g., functionalized unnatural amino acids and polyarenes, demonstrate potential for applications in drug discovery, biochemistry, and materials chemistry. Among those studies, the use of economical, non-toxic, and earth-abundant transition-metal catalysts exhibits another important trend in this field. Among C–H activation reactions, the direct transformation of aliphatic hydrocarbons is the most challenging goal. In the absence of any transition-metal catalyst, aromatic and benzylic C–H bonds can be oxidized to form ketones and imines under mild conditions respectively, which might provide an important direction in C–H functionalization. One of the important new directions among the submitted studies is the application of photochemistry in C–H functionalization, which paves a new route to simplify transformations and to approach new chemistry. The newly developed PNCP-Ir complexes demonstrate potential in the dehydrogenation of alkanes.

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