[Preface]

doi: 10.3866/PKU.WHXB201903057

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C—H Activation

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Published online: April 11, 2019.

Conventional syntheses of organic chemicals rely mostly on reactions between various reactive functional groups and reagents. Mechanistically, they are dominated by the involvement of highly reactive intermediates such as carbocations, carbanions, radicals and carbenes. Due to the high dissociation energy and low acidity of common C—H bonds, they are generally considered “unreactive” in the classical chemistry and regarded as by-standers. Thus, C—H bonds were not factored in designing synthetic routes for chemical products. As a result, in order to convert a C—H bond into a useful product, one often had to transform the C—H bond into a more reactive bond first.

However, C—H bonds are among the most common bonds in naturally abundant chemical feedstocks such as natural gas, petroleum and biomass as well as in various biologically important molecules. The traditional requirement of firstly converting such C—H bonds into reactive functional groups beforehand increases overall synthetic steps and lowers synthetic efficiency. It also increases waste generations from reactions and purifications of these intermediate structures, besides rapidly depletion of resources. Thus, with the recent increasing environmental concerns and sustainability awareness, there has been great interest in developing more efficient and more direct chemical transformations. Thus directly using one C—H bond

as an equivalent of a functional group or using two different C—H bonds as two different functional groups (such as in the Cross-Dehydrogenative-Coupling reactions) have been developed rapidly recently. Such reactions bypass the needs of synthesizing one or both reacting partners and can greatly shorten a chemical synthesis, thus moving towards more sustainable and greener chemical productions. In spite of the enormous successes in the field of C—H functionalizations, there are still many challenges on the subject. To overcome these challenges requires better theoretical and mechanistic understandings of these reactions.

Over the last decades, with its rapid economic and industrial development, China has become a major player in the field of C—H activation and functionalization. Great achievements and innovations have been made by these researchers, ranging from direct natural gas conversion into high valued products to the synthesis of complex molecules for biological and medical applications. This special issue represents a small collection of various examples in these achievements. I am confident that these papers will inspire more exciting researches in this field.

Finally, I want to express my sincere gratitude to the authors, referees and the Editorial Office for making this special issue successful.