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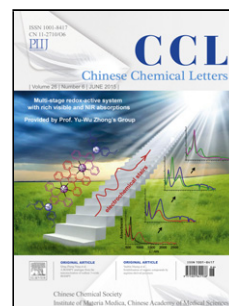
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Review

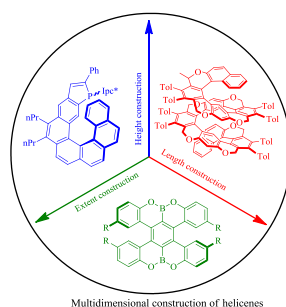
## Recent progress on multidimensional construction of helicenes

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Graphical abstract



Helicenes with unique  $\pi$ -conjugated helical structure and excellent chiroptical properties have received more and more attention. In this review, the idea of multidimensional construction of helicenes and their derivatives was proposed, and the related recent progress was summarized comprehensively.

**ABSTRACT**

Helicenes have attracted more and more attention in the field of photoelectric materials and asymmetric catalysis for their unique  $\pi$ -conjugated screw-shaped structures and excellent chiroptical properties. However, further study and application of helicenes are based on novel idea, delicate design, and efficient synthetic methods. Recent development of helicenes has witness various smart designs and approaches. In order to obtain a systematical and vivid introduction of latest development of helicenes, the idea of multidimensional construction is proposed in this review, which concludes the construction of multi-dimensions from length, extent, and height. We hope that this idea could be helpful to forecast the trend of helicene chemistry and provide the design inspiration of novel helicenes.

**Keywords:** Helicene Multidimensional construction  $\pi$ -Conjugated systems Chirality Catalyst

**1. Introduction**

Helicenes, which formed by ortho-annulated aromatic or heteroaromatic rings, have attracted increasing interest not only because of their structural curiosity and beauty but also for the unique properties caused by their helically extended chiral  $\pi$ -systems [1]. Above all, the synthesis of helicenes has always been fundamental but essential for their further study and application [2]. Consequently, feasible and efficient synthetic methods have been explored and developed in the past few decades to construct new kinds of helicenes with special structures and properties. However, in the road to the palace of novel and functional helicenes, efforts and progress could never be too much for the development of new synthetic methods. Therefore, recent progress about the preparation of helicenes is presented herein to provide necessary guidelines and potential opportunities for their further development.

In order to introduce the recent development of helicenes vividly and systematically, we propose the idea of multidimensional construction to summarize the recent synthesis of helicenes as well as forecast its trend of development. However, we focus on the viewpoint of construction and ignore the concrete distinction of carbo- or hetero- helicenes here. Just as the name implies, multidimensional construction contains preparations in different dimensions including three parts: length, extent, and height, which has

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