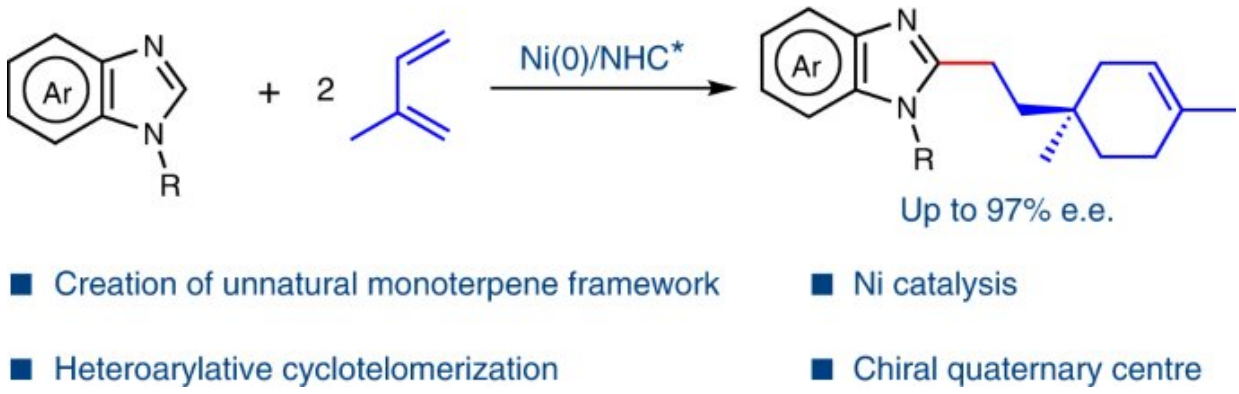
# Scientists realize nickel-catalyzed asymmetric heteroarylative cyclotelomerization of isoprene

August 23 2022, by Li Yuan




Graphical abstract. Credit: *Nature Catalysis* (2022). DOI: 10.1038/s41929-022-00825-z

Isoprene is used as a precursor to produce terpenes and terpenoids. However, the direct catalytic conversion of isoprene to terpenoids is challenging.

Recently, a research team led by Prof. Chen Qing'an from the Dalian Institute of Chemical Physics (DICP) of the Chinese Academy of Sciences (CAS) realized nickel-catalyzed asymmetric heteroarylative cyclotelomerization of isoprene to access a series of unnatural chiral monoterpenoids bearing a quaternary carbon stereocenter.

This study was published in *Nature Catalysis* on August 18.

Terpenoids exist in almost all living organisms and function physiologically. In nature, terpenoids are biosynthesized under enzymatic catalysis, and are often further oxidized and rearranged to generate other monoterpenoids. However, creating an additional monoterpene skeleton by an artificial catalytic system is still challenging.

"In this work, we have developed a more efficient and simple catalytic system to realize the diversity construction of terpenoids," said Prof. Chen.

The researchers created an unnatural monoterpene skeleton that performed the cascade isoprene dimerization/C-H functionalization, leading to the heteroarylative telomerization of isoprene. They used nickel catalysis to tackle the challenges in simultaneous control of the chemo-, regio- and enantioselectivity.

By studying the preliminary mechanism, they found that this reaction proceeded through an enantioselective dimerization of isoprene and sequent C-H alkylation of heterocycles pathway.

"Our study not only provided an efficient enantioselective transformation of bulk chemical isoprene, but also helped to create another unnatural monoterpene framework with different biological activities," said Prof. Chen.

**More information:** Gong Zhang et al, Nickel-catalysed asymmetric heteroarylative cyclotelomerization of isoprene, *Nature Catalysis* (2022). DOI: 10.1038/s41929-022-00825-z

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