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Science & Technology Concentrates

Direct Allylic C–H Alkylation Solved

Jessie Jiang, Contributing Editor

Direct allylic C–H alkylation—coupling a carbon of a nucleophilic molecule to an allyl group (a terminal alkene) of another molecule—is now possible without prefunctionalization by using a \( \text{Pd(II)/bis(sulfoxide)/benzoquinone catalyst system} \), chemists from China and the U.S. report. Zhang-Jie Shi and coworkers of Peking University achieved intermolecular alkylation (shown) using allylarene substrates with dicarbonyl nucleophiles (J. Am. Chem. Soc. 2008, 130, 12901). They also showed that some allylic compounds can form cyclic products through intramolecular reactions. Separately, Andrew J. Young and M. Christina White of the University of Illinois, Urbana-Champaign, carried out intermolecular allylic alkylation reactions using aromatic and heteroaromatic allyl substrates with carbonyl- and sulfonyl-based nucleophiles (J. Am. Chem. Soc., DOI: 10.1021/ja806867p). White's group discovered the \( \text{Pd(II)/bis(sulfoxide)/benzoquinone catalyst system} \) in 2004. Before these two reports, allylic alkylation reactions were normally achieved in two steps through Pd(0)-catalyzed allylic substitution reactions that required installing a functional group at the allylic position. The direct conversion is expected to help streamline the synthesis of small molecules.
DIRECT DIALING Peking University's Shi (second from right in photo above) and coworkers and Illinois' Young (left in middle photo) and White (right) used the same Pd(II) catalyst to independently accomplish direct allylic C–H alkylations.

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  - A new type of porous 3-D organic framework that assumes a belt shape and exhibits luminescence and electrical conductivity
- Modified Plant Beats Aluminum Toxicity
- Genetic loophole could boost plant tolerance to Al^{3+} in acidic soils and increase global food production.

- Direct Allylic C–H Alkylation Solved
  - Coupling a nucleophile to an allylic compound in a single step is expected to help streamline small-molecule syntheses.
- Restructuring In Core-Shell Particles
  - Structural changes taking place in bimetallic nanoparticles under different reaction conditions sets the stage for fine-tuning catalysts.
- Fluorescent Bulbs Trade Off Energy Savings For Mercury
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