

Visible light-driven iminyl radical-mediated C-C single bond cleavage/radical addition cascade of oxime esters

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Nitrogen-centered radicals (NCRs) have become the focus of intense research efforts over the past few decades given their versatile reactivity in C-N bond forming reactions and great potential in the synthesis of nitrogen-containing compounds. Employing the redox properties of photocatalysts, a variety of NCR species could be formed in a controlled way under very mild conditions, thus enabling easy construction of various C-N bonds. Despite these significant advances, the exploration of photogenerated NCRs in activation/cleavage of the inert C-C single bonds is still underdeveloped. Iminyl radicals are one of the most important classes of NCRs and can be easily formed from readily available and stable oxime derivatives via thermolysis, UV irradiation, transition metal catalysis, or using oxidant. Because of their favorable kinetics and synthetic potential of the imino group in products, such radical class has been extensively explored in N-heterocycle synthesis and hydrogen atom abstraction. Hence, we developed a room temperature, visible light-driven N-centered iminyl radical-mediated and redox-neutral C-C single bond cleavage/radical addition cascade reaction of oxime esters and unsaturated systems. This mild, general and redox-neutral protocol enables constructing various C(sp³)-C(sp²) and C(sp³)-C(sp³) bonds, thus providing an efficient approach to a wide range of diversely functionalized cyano-containing alkenes, ketones, carbocycles and heterocycles.

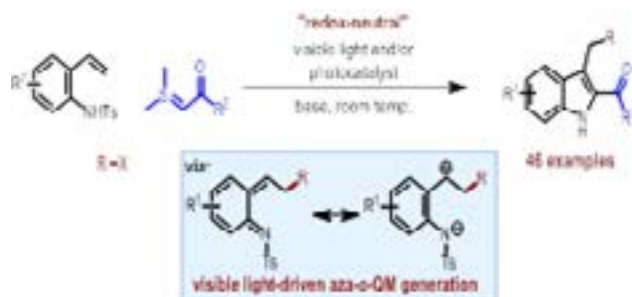


Figure: NCR-mediated C-C single bond cleavage/radical addition cascade.

Recent Publications

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2. For selected reviews on visible light photocatalysis, see: a) Prier, C. K. Rankic, D. A. MacMillan, D. W. C. *Chem. Rev.* 2013, 113, 5322-5363; b) Schultz, D. M. Yoon, T. P. *Science* 2014, 343, 985-994; c) Romero, N. A. Nicewicz, D. A. *Chem. Rev.* 2016, 116, 10075-10166; d) Reiser, O. *Acc. Chem. Res.* 2016, 49, 1990-1996.
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Biography

Xiao-Ye Yu received her BS from Taiyuan Normal University in 2013. She then began her PhD studies under the supervision of Professors Jia-Rong Chen, Alper Harward and Wen-Jing Xiao at Central China Normal University. Her research interests are Nitrogen Radical Chemistry.

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