

A New Avenue for Single-Electron Chemistry of Aromatic N-oxides in Synthesis and Catalysis

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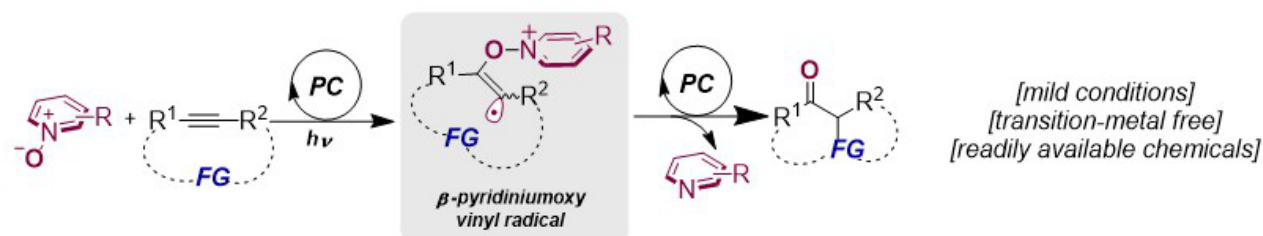
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There is a critical and continuous need to develop new synthetic strategies and catalysis, that could utilize readily available chemicals to achieve selective transformations and synthesis of architecturally complex and orthogonally functionalized molecules under mild conditions. The successful development of such methods will undoubtedly provide positive effects on reducing the complexity, labor and expense associated with the discovery and development of new therapeutics and on our ability to produce the next generation of medicines. Aromatic *N*-oxides and the derivatives, readily accessible and versatile reagents, have long been recognized as electro-pair donors. However, unconventional single-electron transfer chemistry of aromatic *N*-oxides and its applications in synthesis and catalysis are severely underdeveloped, although it holds great promise to access new chemical space and address synthetically relevant challenges that could not be achieved by two-electron transfer chemistry.

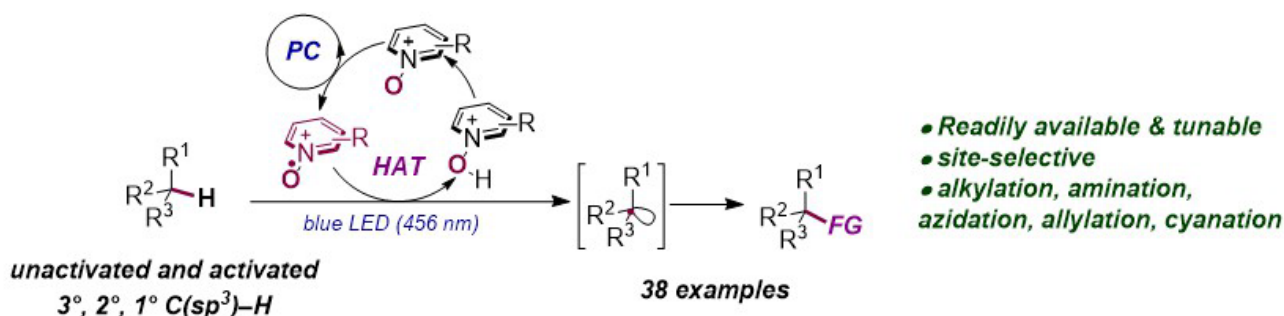
The Deng group focus on the investigations of the single-electron transfer process of aromatic *N*-oxides for development of novel and practical synthetic methods and hydrogen-atom transfer catalysis. Our group recently develop a novel photocatalytic strategy for the generation of reactive and controllable b-oxypyridinium radical through mild visible-light photoredox catalyzed single-electron oxidation of an alkyne/pyridine *N*-oxide system. We reported an acridinium photoredox catalyzed *ortho*-alkylation reaction of pyridine *N*-oxide with arylalkynes or ynamides. By applying this strategy, we have also developed the first photoinduced oxidative cyclopropanation of ene-ynamides, via b-oxypyridinium vinyl radical cascades. Furthermore, our group disclosed that, in conjunction with an acridinium photoredox catalyst, readily available and tunable pyridine *N*-oxides could serve as effective hydrogen atom transfer (HAT) catalysts for site-selective C-H functionalization of a broad range of substrates, including unactivated alkanes.

a) Development of β -pyridiniumoxy vinyl radical mediated synthetic methodology



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b) Aromatic *N*-oxide based HAT catalyst for regio- and stereo-selective C-H functionalization



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