Switchable Divergent Synthesis of Fluorinated Molecules Using Photoredox Catalysis

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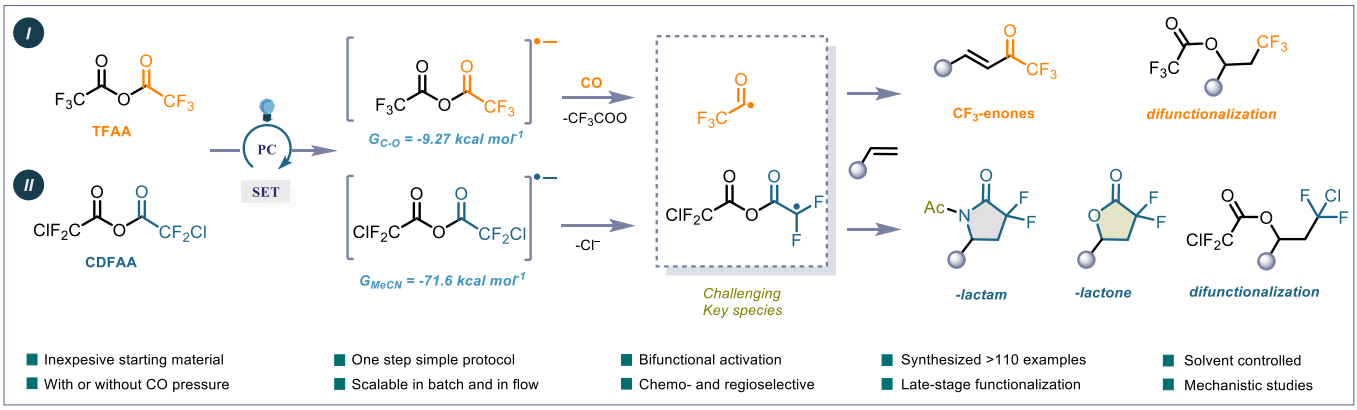
The introduction of fluorine atoms into molecules significantly alters their chemical, physical, and biological properties. Therefore, it is a very attractive method to elaborate innovative materials, agrochemicals, and pharmaceuticals.[1]

Recent progress in the design of redox active reagents, capable to transfer nucleophilic, ambiphilic, and electrophilic type of fluorinated radicals significantly broadened the field of fluorine chemistry.[2] Yet, the synthetic complexity to access such scaffolds is often associated with multi-step processes and hinders the practicability of utilising these reagents for the synthesis of vital molecules.



In this presentation, I will discuss some of the latest works from my group on the strategies of using structurally simple, inexpensive, and readily available fluorinated acetic anhydrides and carboxylic acids as redox active reagents to access various fluoroalkyl radicals. The reactivity of these species can be further adjusted using the principal of switchable divergent synthesis in photocatalysis, allowing to synthesize a wide range of fluorinated molecules.[3-5]

[1] (a) Purser S.; Moore, P. R.; Swallow, S.; Gouverneur, V. *Chem. Soc. Rev.* **2007**, *37*, 320-330; (b) Berger, R.; Resnati, G.; Metrangolo, P.; Wever, E.; Hilliger, J. *Chem. Soc. Rev.* **2011**, *40*, 3496.

[2] A. J. Fernandes, R. Giri. K. N. Houk, D. Katayev, *Angew. Chem. Int. Ed.* **2024**, e202318377.

[3] K. Zhang, D. Rombach, N. Y. Nötel, G. Jeschke, D. Katayev, *Angew. Chem. Int. Ed.* **2021**, *60*, 22487

[4] R. Giri, I. Mosiagin, I. Franzoni, N. Y. Nötel, S. Patra, D. Katayev, *Angew. Chem. Int. Ed.* **2022**, *61*, e2022091.

[5] R. Giri, E. Zhilin, D. Katayev, *Chem. Sci.* **2024**, in press.