Westfälische Wilhelms-Universität Münster

# Visible Light-Promoted Activation of Unactivated C($sp^3$)–H Bonds and Their Selective Trifluoromethylthiolation


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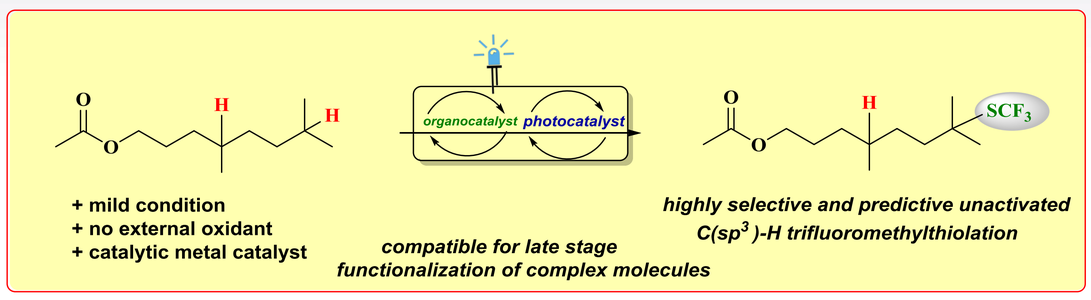
## Introduction

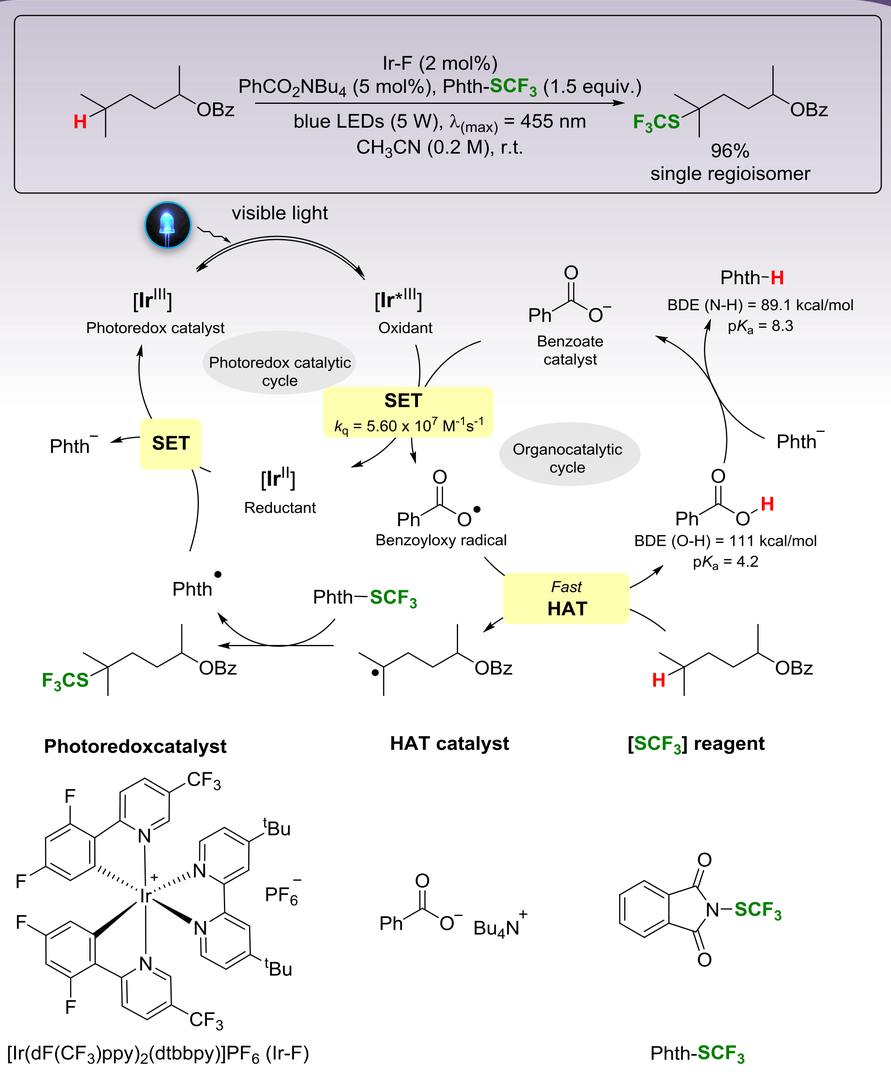
Selective functionalization of ubiquitous C($sp^3$)–H bonds using visible light energy is a highly challenging yet desirable goal in organic synthesis. Developments of such processes rely both on rational design and serendipitous discoveries from innovative tools such as screening technologies. [1]




**Scheme 1**. This work [2]

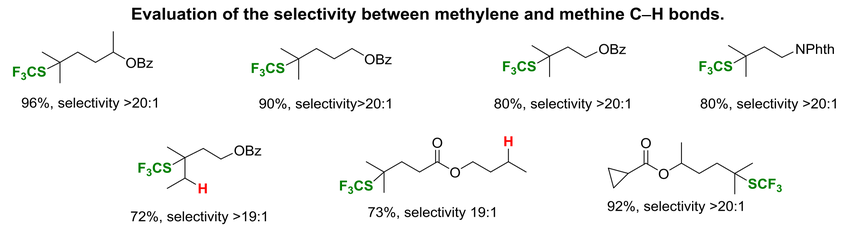
Applying a mechanism based screening strategy, herein, we thus report the photoredox-mediated hydrogen atom transfer catalysis for the selective activation of otherwise unactivated C($sp^3$)–H bonds, followed by its trifluoromethylthiolation, which has high potential as a late stage functionalization tool. The generality of this method is exhibited through incorporation of the trifluoromethylthio group in a large number of C($sp^3$)–H bonds with high selectivity without the need for excess of valuable substrate

## Mechanistic Aspect

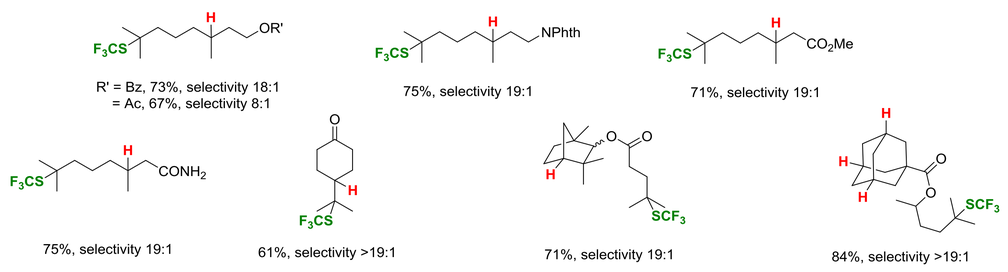



## Scope of the reaction

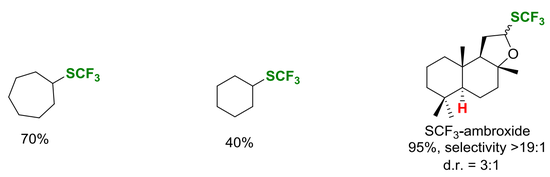
**Evaluation of the selectivity between methylene and methine C–H bonds.**



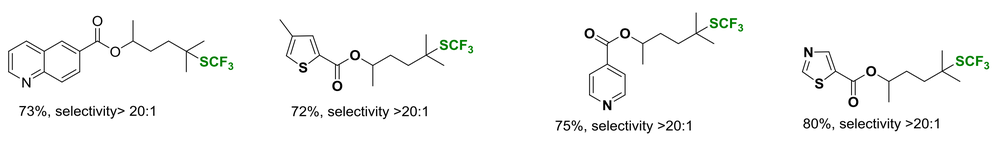

**Evaluation of the selectivity between methine C-H bonds on multiple methine C–H bond containing substrates.**



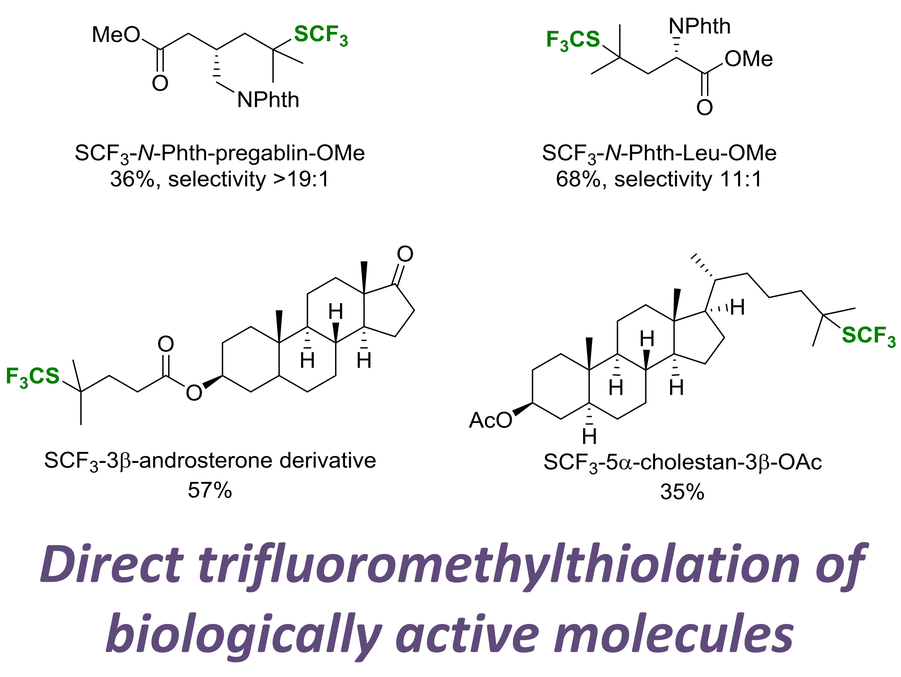

**Evaluation of the reactivity of methylene C–H bond containing substrates.**




**Evaluation of the reactivity of substrates containing heterocyclic core.**




## Application




***Direct trifluoromethylthiolation of biologically active molecules***


***Summary*** Visible light promoted photoredox catalysis has recently been emerged as a tool to accomplish various otherwise synthetically challenging transformations and herein we have thus reported its first use in the direct catalytic activation ofotherwise unactivated C($sp^3$)–H bonds followed by its trifluoromethylthiolation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References:

1. Hopkinson, M. N.; Gómez-Suárez, A.; Teders, M.; Sahoo, B.; Glorius, F. *Angew. Chem. Int. Ed.* **2016**, *55*, 4361.
2. Mukherjee, S.; Maji, B.; Tlahuext-Aca, A.; Glorius, F. *J. Am. Chem. Soc.*, **2016**, *138* ,*50*, 16200