Sustainable Process Engineering
Micro Flow Chemistry & Synthetic Methodology

TU/e EINDHOVEN UNIVERSITY OF TECHNOLOGY

Continuous-flow synthesis of trifluoromethoxylated building blocks

Alexander Nyuchev & Timothy Noël

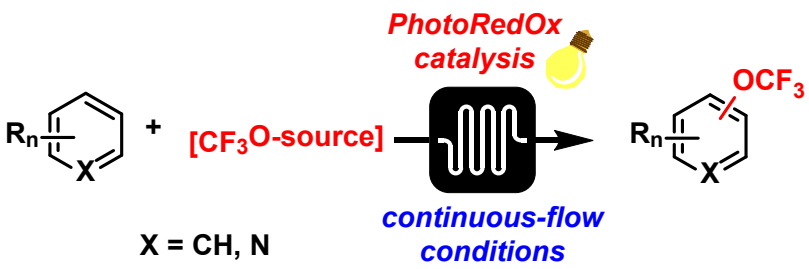
Introduction

Trifluoromethoxy group (CF_3O-) has a unique physicochemical and biological characteristics, namely CF_3O-group has very high electronegativity, excellent lipophilicity and only orthogonal disposition relative to aryl ring. Because of this conformation, compounds with CF_3O-group have additional binding affinity in an active site of a biological target (enzyme, protein, *etc.*). That's why trifluoromethoxy-containing compounds are promising candidates for drug elaboration and development of its synthesis is urgently needed.

Project summary

We are using advantages of continuous-flow technique for the implementation of photo-RedOx catalysis regarding to the synthesis of CF_3O-bearing building blocks also containing others functionalities (such as halogen atom, protected amine group or others).

Photo-RedOx catalysis employs metal complexes which absorb light and then transfer accumulated energy to CF_3O-source molecule, that leads to realizing of CF_3O-radical that undergoing addition to aromatic core. Finally photo-RedOx catalyst oxidize aryl radical to cation and its reaction with nucleophile species or base regenerates aromaticity.



Light irradiation plays a crucial role in this reaction. Implementation of continuous-flow reactor with better light penetration in comparison to a batch reactor would accelerate reaction's rate leading to the dramatically reduction of reaction time. Moreover, continuous-flow setup will alloy to perform further functionalization, *e.g.* deprotection, cross-coupling reactions, oxidation, *etc.*

This procedure open a prospects for the synthesis of a wide range of trifluoromethoxylated compounds for designing of new generation of drugs and functionalized materials.

Project goals

The main goal of the project is to develop an efficient and scalable method for the synthesis of trifluoromethoxy-bearing molecules which are of great interest for both drug development and materials science.

Contact information

Alexander Nyuchev, a.nyuchev@tue.nl, STO 1.38
Timothy Noël, t.noel@tue.nl, STO 1.37
CHEMICAL ENGINEERING AND CHEMISTRY