



HAL
open science

Application of the Paternò-Büchi Reaction to the Synthesis of Novel Fluorinated Scaffolds

Mario Andrés Gomez Fernandez, Corentin Lefebvre, Alexander Sudau, Pierre Genix, Jean-Pierre Vors, Manabu Abe, Norbert Hoffmann

► **To cite this version:**

Mario Andrés Gomez Fernandez, Corentin Lefebvre, Alexander Sudau, Pierre Genix, Jean-Pierre Vors, et al.. Application of the Paternò-Büchi Reaction to the Synthesis of Novel Fluorinated Scaffolds. BOSS XVII 17th Belgian Organic Synthesis Symposium, Jul 2022, Namur, Belgium. hal-03737604

HAL Id: hal-03737604

<https://hal-cnrs.archives-ouvertes.fr/hal-03737604>

Submitted on 25 Jul 2022

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Mario Andrés Gomez Fernandez¹, Corentin Lefebvre¹, Alexander Sudau², Pierre Genix³, Jean-Pierre Vors³, Manabu Abe⁴, Norbert Hoffmann¹

¹ ICMR, Equipe de Photochimie, CNRS, Université de Reims Champagne-Ardenne, UFR Sciences B.P. 1039, 51687 Reims, France.

² Research and Development, Crop Science, Lab 2, Bayer AG, 2 Alfred Nobel-Str., 40789 Monheim, Germany.

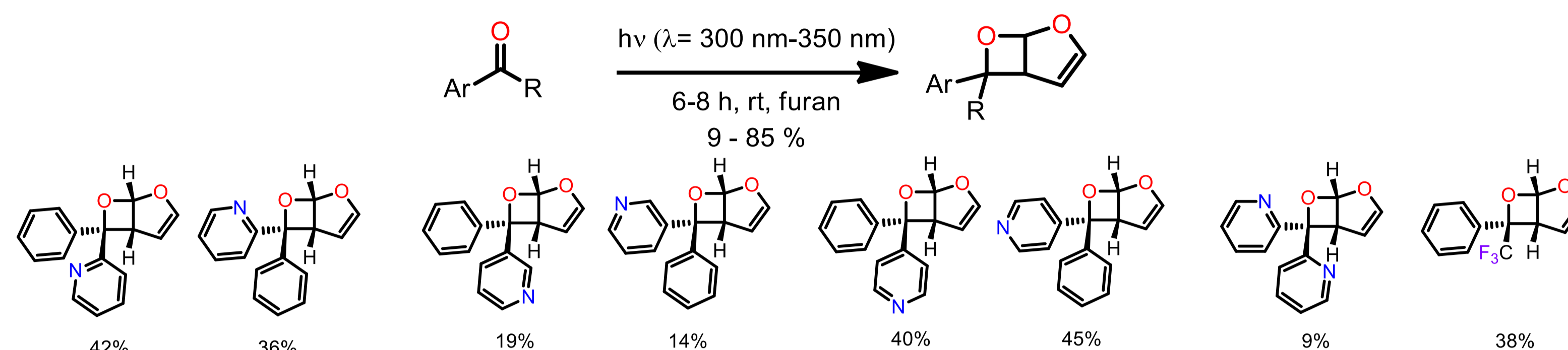
³ Crop Science Division, Disease Control Chemistry 2, Bayer S.A.S., building La Dargoire, D1 366, 69263 Lyon, France.

⁴ Department of Chemistry, Graduate School of Science & Hiroshima Research Center for Photo-Delivery Systems (Hi-P-DDS), Hiroshima University, 739-8526 Hiroshima, Japan.

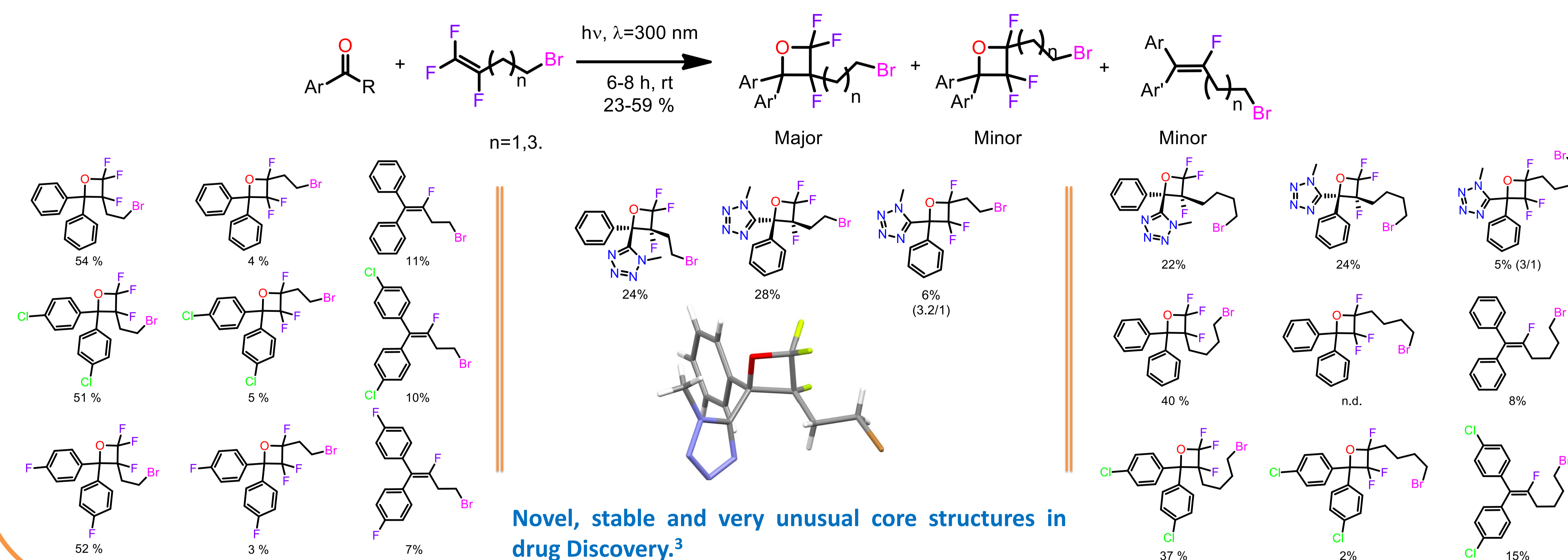
Main objectives

- Establish routes for the synthesis of new scaffolds using photochemical reactions.
- Use simple and inexpensive starting materials to create complexity.

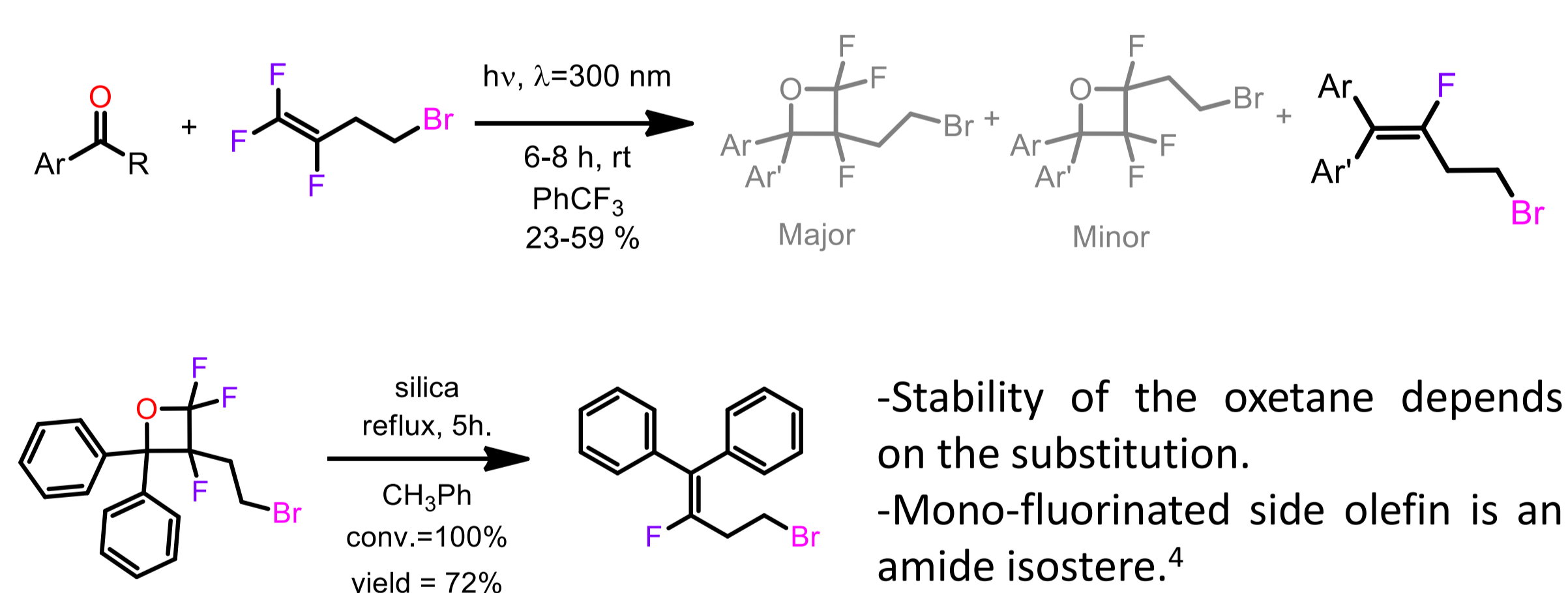
First Results: The Paternò-Büchi reaction¹



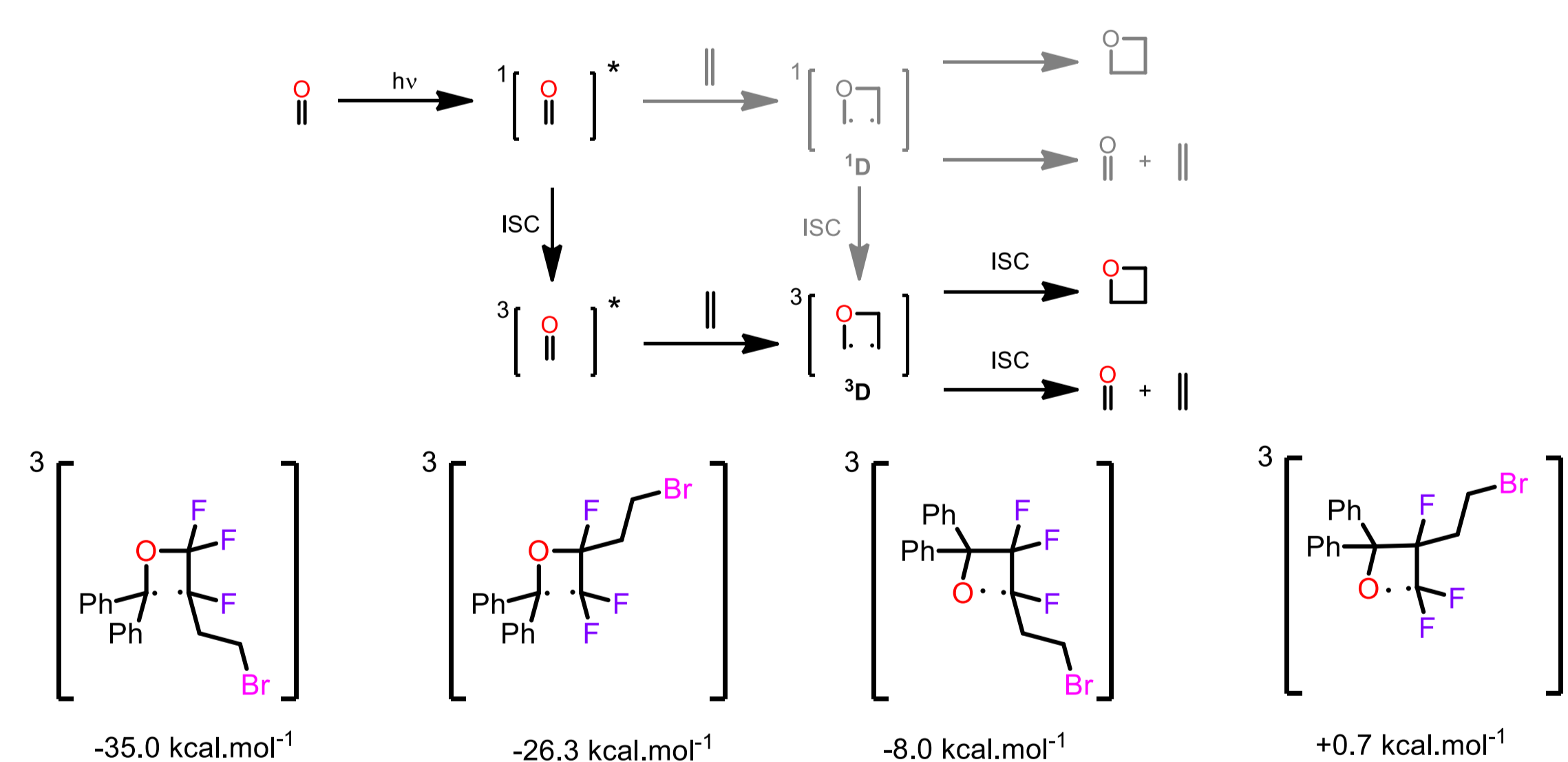
Paternò-Büchi reaction using fluorinated olefins²



Side Product: Photo-Wittig reaction

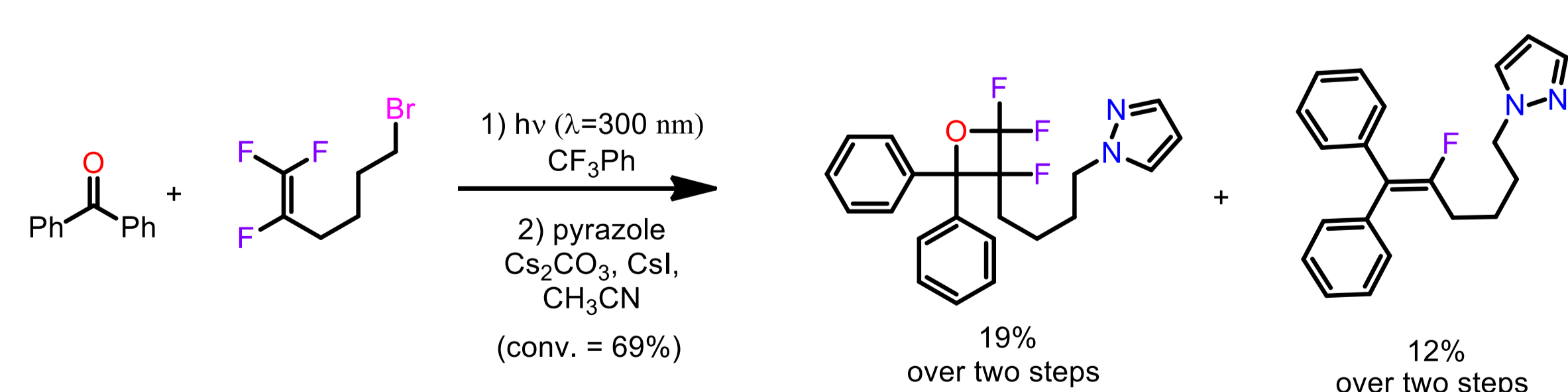


Regioselectivity: Theoretical calculations (Prof. M. Abe)

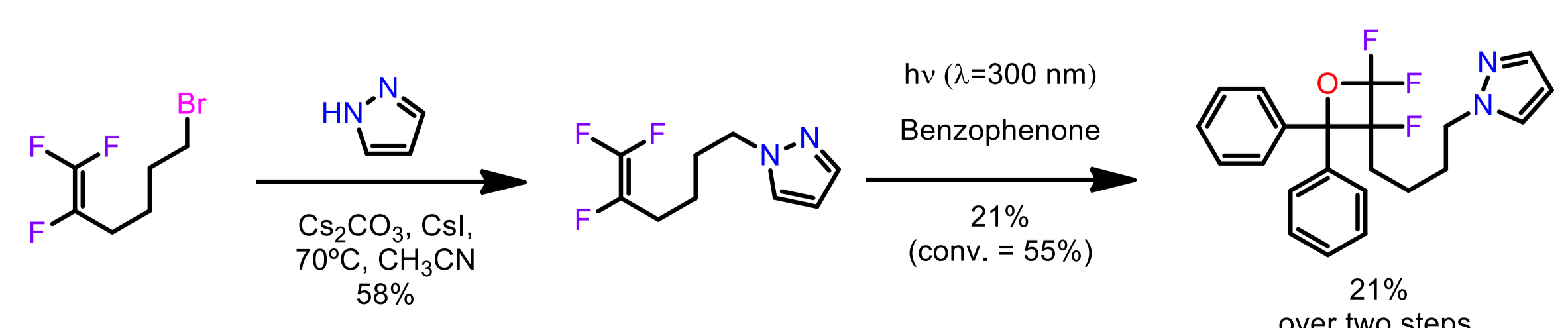


Application to the obtention of Libraries of fluorinated oxetanes³

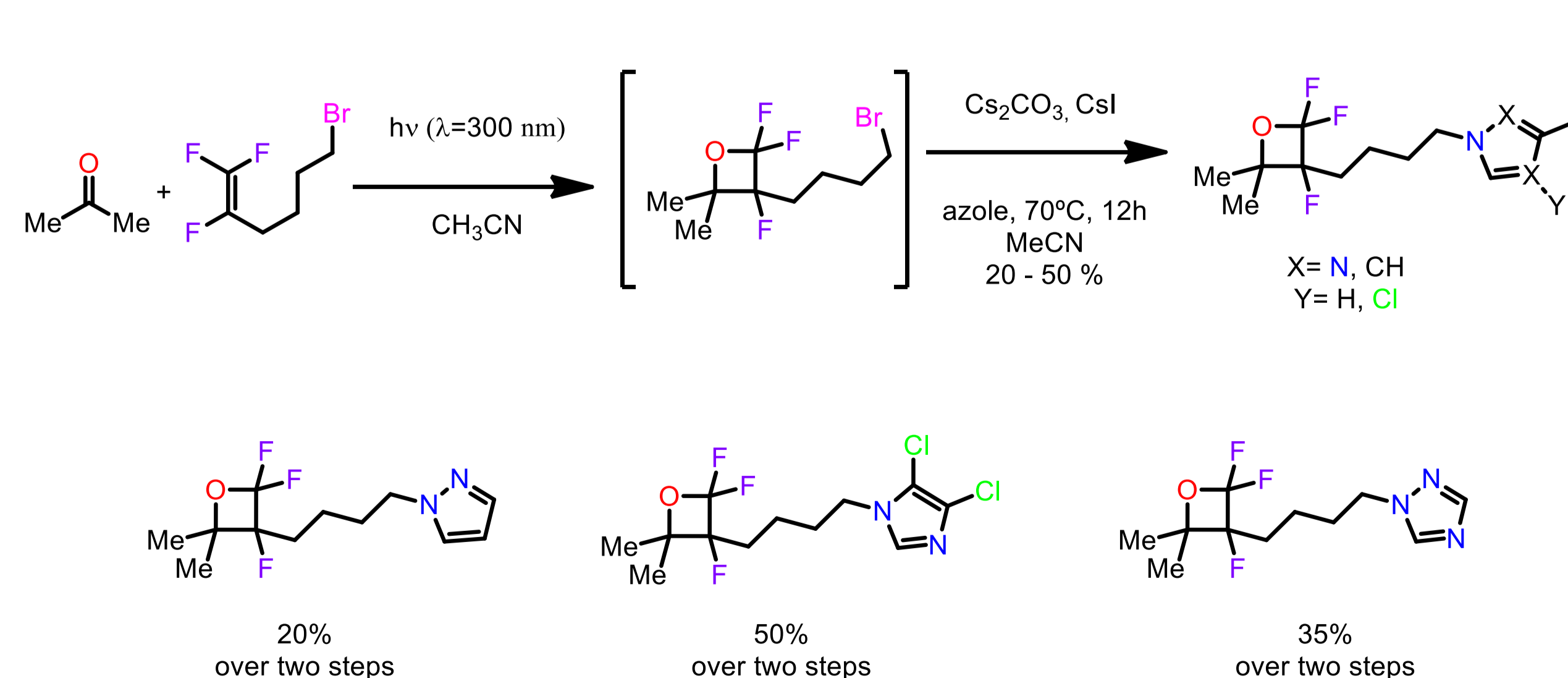
Photocycloaddition followed by nucleophilic substitution



Nucleophilic substitution followed by photocycloaddition



Use of acetone to obtain small lipophilic pending motifs



1) a) M. D'Auria, The Paternò-Büchi reaction-a comprehensive review, *Photochem. Photobiol. Sci.*, **2019**, *18*, 2297-2362. b) M. Fréneau, N. Hoffmann, The Paternò-Büchi reaction-Mechanism and application to organic synthesis, *J. Photochem. Photobiol. C*, **2017**, *33*, 83-108.

2) J. F. Harris, D. D. Coffman, Synthesis of Polyfluorooxetanes by Photoinitiated Addition of Fluorocarbonyl Compounds to Fluoroolefins, *J. Am. Chem. Soc.*, **1962**, *84*, 1553-1561.

3) M. A. Gomez Fernandez, C. Lefebvre, A. Sudau, P. Genix, J.-P. Vors, M. Abe, N. Hoffmann, Studies on The Application of The Paternò-Büchi Reaction to The Synthesis of Novel Fluorinated Scaffolds, *Chem. Eur. J.*, **2021**, *27*, 15722-15729.

4) D. O'Hagan, Understanding organofluorine chemistry. An introduction to the C-F bond, *Chem. Soc. Rev.*, **2008**, *37*, 308-319.