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Institute of Chemical Sciences and Engineering - ISIC
Swiss Cat+

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Offer for master thesis project within the SB/ISIC/SwissCAT+ research infrastructure

Project 1: Development of a method to quantify light sources of photochemical reactions in the context of an automated HTE laboratory.

Photochemical reactions have encountered a deep interest from the chemical community in the last decade due to the development of simple synthetic methods. If the catalytic part of the systems are well defined, there are as many protocols for light setup as reported methods, each group using customized systems. With time, some suppliers started to provide commercial photochemical reactors, improving reproducibility between experiments, however, low if no information was obtained concerning the performance of lights during experiments.
At SwissCAT+, we are aiming to perform photosynthetic reactions in parallel with high throughput experimentation in a very controlled environment in order to collect reliable experimental data. For this purpose, it is necessary to characterize precisely the light source used in each experiment. Some systems have been developed in the past, but never applied in the context of automation.
The goal of this project is to design, build and test a tool able to characterize the light sources of photochemical setups in the context of HTE. The intern will work in close collaboration with the chemistry team as well as robotics and data sciences specialists.

Expected deliverable:
1. Define physical parameters that can and need to be quantified.
2. Select appropriate technology to perform measurements.
3. Build a prototype integrating the defined in 1. and 2. sensors.
4. Test and validate the tool for given chemical reactions.

References:
1. Design and Simulation of a Uniform Irradiance Photochemical Platform (and references herein) https://pubs.rsc.org/en/Content/ArticleLanding/2022/RE/D2RE00329E
Dylan J. Walsh, Timo N. Schneider, Bradley D. Olsen, and Klavs F. Jensen
2. Visible Light Photoredox Catalysis with Transition Metal Complexes: Applications in Organic Synthesis https://pubs.acs.org/doi/10.1021/cr300503r
Christopher K. Prier, Danica A. Rankic, and David W. C. MacMillan