Bachelor-/Masterthesis, Research Internship (Chem.Eng./Chemistry):

Synthesis, Calibration and Application of a New Actinometer

Scope of the Project:
The main goal of the project “Photon Fluxes in microstructured photoreactors” is the development of general design and application rules for photochemical process concepts. Combined with radiometric measurements, the whole radiation field can be characterized to optimize the efficiency of numerous specific photoreactions.

For this purpose, different reactor setups are investigated by conducting photochemical reactions with well-known properties in the reaction volume to calculate the available photon flux from the conversion over irradiation time. This technique is called actinometry.

Current Scientific Work:
In the research group of Prof. Ziegenbalg, basic experimental methods for the evaluation of photochemical processes in continuously operated standard microreactor setups have been developed.

Some elementary reactor concepts were characterized by convenient figures of merit allowing an unbiased and meaningful comparison. While numerous actinometric systems for the UV region are established, only few are described to provide convenient precision and reproducibility in the visible range.[1] Most of them are no longer commercially available and thus need to be explicitly synthesized. Recently, a new fulgide derivative (see figure 1) has been proposed as universal actinometer for the UV to NIR region.[2] One of its main advantages is the reversibility of the photochemical reaction not only allowing a re-use instead of disposal but also offering the opportunity of online measurements.

Your Profile and Possible Working Packages:
You are proficient in chemical synthesis and confident in performing the reaction steps self-planned. Of course, you will be supported if needed as our research group originates from a chemical institute in Stuttgart and some of us like myself even studied chemistry. Additionally, you should be keen to test the performance of your synthesized molecule in a real scientific application. Once the measurement procedure is calibrated in the whole wavelength range and verified against other established actinometers, experiments and evaluation of different photochemical setups can follow. This way, you will be able to guide a chemical idea-to-application process from the flask to a scalable reactor.


If you are interested, please contact:
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