Open PhD thesis in organic photochemistry

Photochemistry of oxazolones

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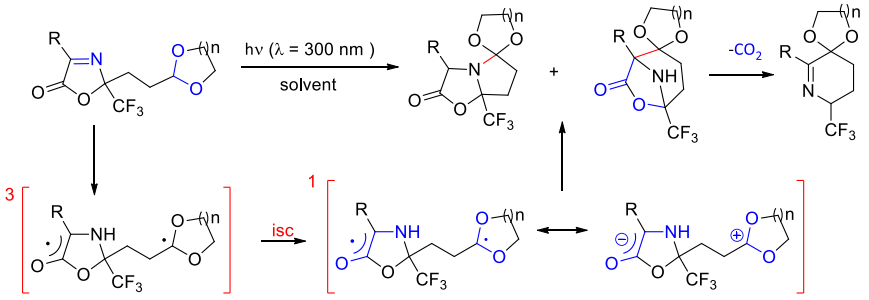
Photochemical reactions are an important tool in **organic synthesis**.[1,2] Compounds or compound families become available that can only hardly or not at all be obtained by classical methods of organic synthesis. Research activities in this domain are constantly increasing. Photochemical reactions are also interesting in the context of **sustainable chemistry** as in many cases, light (the photon) is considered as a **traceless reagent**.[3,4]

The subject of this thesis is related to **photochemical transformations of heterocycles** and more particularly oxazolones possessing an imine function. We have previously studied reactions involving **hydrogen transfer** [5] or a Norrish I or II reaction.[6] The results were obtained in the context of the ANR project "Photochemistry of imines: photoinduced radical reactions of imines" (IMPHOCHEM). One of these reactions has been studied using **continuous flow conditions**.[7] Some photo-cycloadditions have also been observed with oxazolones. All these reactions are extremely interesting because they generate a **high degree of molecular complexity** and an **unusual molecular diversity**.

These studies will be continued in two main direction:

- Photochemical reactions with **dichromophoric oxazolone** compounds will be studied. Two chromophors (imine and carbonyl) compete with different reactions. This investigation may involve time-resolved spectroscopic methods and theoretical studies both in cooperation. Different mechanisms of hydrogen transfer and intramolecular energy transfer will be characterized. The main challenge is to control the transformations.
- In the case of the intramolecular reactions depicted in Scheme 1, we have studied the origin of the regioselectivity of the reaction. We will now study the **stereoselectivity** with appropriate compounds. For example, oxazolones carrying chiral acetale functions on the side chain will be transformed. In this approach we are also interested in using **biomass derived compounds**, e.g. carbohydrates, as building blocks.[8]



Scheme 1.

Cooperation:

Our research work is carried out in the context of a long-term cooperation with **Prof. Manabu Abe (Hiroshima University, Japan)**.[5,9,10] Concerning photochemical reaction of biomass derived compounds, we have a cooperation with **Prof. Florent Allais** (URD Agro-Biotechnologies Industrielles (ABI), CEBB, **AgroParisTech**, Pomacle).[10,11] This project will enable me to continue these fruitful cooperations.

Candidates

Organic synthesis and structure determination of new compounds are important tasks in daily work of this thesis. Successful candidates should have a **solid experience in organic chemistry, an open mind for interdisciplinary research** (photochemistry, photocatalysis, chemistry of biomass and biomass derived compounds, physical chemistry, spectroscopy or theoretical chemistry), autonomy and teamwork. The candidate will be encouraged to present her/his results **on national and international conferences**. The thesis will be funded by the Ecole doctorale 182 at the University of Strasbourg.

Contact: To apply, please send your cover letter, CV (with references), and the marks of the M1/M2 degree (if available) to Dr. Norbert Hoffmann (norbert.hoffmann@ipcms.unistra.fr).

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