Dipartimento di Scienze e Tecnologie Chimiche

SEMINARIO

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Novel Pathways in Photochemistry and Flow Chemistry

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Aula Seminari

Dipartimento di Scienze e Tecnologie Chimiche

Novel Pathways in Photochemistry and Flow Chemistry

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In recent years, we have witnessed a significant increase in the development of radical processes for the synthesis of organic molecules. This radical organic chemistry 'renaissance' has been spurred by the development and/or rediscovery of strategies, such as photochemistry and electrochemistry, for the production of transient radical intermediates under mild reaction conditions. Simultaneously, technological advancements have played a pivotal role in enabling these transformations to be more reproducible, scalable, and often selective.

The first part of this talk will detail how photocatalysis can be used to promote the [3+2] cycloaddition of azomethine ylides under extremely mild and simple conditions.[1] Subsequently, the impact of microfluidic setups on the overall efficiency of photocatalytic reactions will be discussed. Indeed, despite the immense synthetic power of photocatalysis, these processes are often hindered by long reaction times and poor scalability in batch environments due to photon transport limitations. However, by performing reactions in flow,[2,3] these problems can be easily avoided due to the greatly reduced optical path and increased throughput via continuous introduction of starting materials. As an example, we reported how photocatalytic C–H and C–Br functionalization reactions could be performed in only minutes under microfluidic conditions, while also successfully scaling them up.[4,5]

The second part of this talk will focus on the use of flow chemistry to handle heterogeneous processes by enhancing mass transfer, thereby increasing chemical efficiency and reducing reaction times. For instance, we demonstrated how solid-liquid-gas reactions can now be promoted to generate a large library of SuFExed compounds, including biorelevant molecules, peptides, and proteins.[6]

References:

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