PHOTO-*N*-TOOLS

New Synthetic Methods Enabled by the Photochemistry of Organic Molecules and Their Use in Drug Discovery and Bioconjugation

Timeline | 06/2020 to 05/2023

ICIQ People | Melchiorre Research Group

Budget | 254,100 €

Call | Proyectos I+D - Excelencia 2019

SUMMARY

Drug discovery must identify successful lead candidates. This requirement has challenged synthetic chemists to develop innovative strategies to rapidly generate screening collections of chiral molecules. PHOTO-N-TOOLS seeks to provide some solutions by developing more effective technology to rapidly generate, in one single step, biologically relevant, natural-like compounds. Specifically, we aim to exploit the powerful synthetic tools offered by the photochemistry and the excited-state reactivity of organic compounds to develop innovative catalytic strategies for the rapid, efficient, and scalable preparation of function-oriented molecules that will facilitate the identification of new drug candidates. A multifaceted study will be pursued in order to generate new visible light-mediated photocatalytic activation platforms for complex molecule synthesis and will synergistically feed into parallel projects that aim to translate these tools to synthesis-driven biomedical research.

Specifically, I will design novel visible light-driven processes for the late-stage derivatization of advanced biologically relevant intermediates and for the bioconjugation of proteins. I will also develop light-driven asymmetric catalytic cascade processes to synthesize novel N-containing chiral heterocycles, which are common motifs in biologically active molecules. The resulting synthetic platform will be used as an ideal starting point for assembling libraries featuring biologically privileged scaffolds. Together with biological screening carried out in collaboration with an internationally recognized pharma-company (Lundbeck A/S, Copenhagen, DK), these libraries will increase the probability of success in identifying drug-candidate structures Overall, this project is guided by the premise that investing in fundamental research into advanced synthetic chemistry is key to future advances in other scientific domains, such as biomedical research. By inventing new visible-light mediated photocatalytic activation platforms, we will offer fresh possibilities for streamlining the synthesis of compounds that may be relevant to human health, i.e. new bioactive compounds for the benefit of society

Follow us on Twitter!

Reference: PID2019-106278GB-I00