Indolenine Oxazaborinine Styryl Dyes as a New Fluorescent Scaffold to Assess the Effect of Furan Position on Directed Photooxidation-Induced Conversion

Louis Evrard*[1]

[1]Chémo-Biologie Synthétique et Thérapeutique – université de Strasbourg, Centre National de la Recherche Scientifique – France

Résumé

Photomodulable fluorescent probes have many applications in advanced bioimaging and microscopy. Upon light irradiation, these molecules can undergo various modifications affecting their photophysical properties and leading to photoconversion or photoactivation. Recently, our group established a new mechanism called "Directed Photooxidation Induced Conversion" (DPIC)1–3. When exposed to light, a fluorophore produces singlet oxygen which can then react with the fluorophore, often leading to photobleaching. In the DPIC mechanism, the oxidation is directed towards an Aromatic Singlet Oxygen Reactive Moiety (ASORM) such as furan, which disrupts its conjugation with the fluorophore.
These chemical transformations lead to photophysical variations, namely hypsochromic shifts and fluorescence enhancement. The DPIC concept has already been demonstrated with several fluorophores such as BODIPYs1,2 and styryl coumarins3 . In this work, we extend the scope of this mechanism by providing a new class of photoresponsive fluorophores, the Indolenine Oxazaborinine Styryl Dyes (IOS). Based on this new scaffold, we synthesized a total of five fluorescent probes in which the furan was introduced at different positions. Here we show that depending on its location, the conjugation of the furan moiety influences both the photophysical properties of the fluorophore and its photomodulation properties. Overall, this work provides new insights into the DPIC mechanism through a comprehensive structure/properties relationship study on a new class of photomodulable fluorophores.

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Mots-Clés: Fluorescent probe, photoconversion, Borondifluoro Indolenine

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*Intervenant