Long Fluorescence Lifetime Molecular Rotors Based on the 4,4-dicyanoBODIPY core

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Résumé

Environmentally sensitive fluorescent probes with long emission lifetimes are essential for fluorescence lifetime imaging microscopy (FLIM) in living cells. Here, we report that substituting fluorine atoms in the BODIPY-based molecular rotors with cyano groups produced viscosity-sensitive probes with significantly increased fluorescence lifetimes.
The synthesized 4,4-dicyano-BODIPY derivatives exhibited physicochemical and spectroscopic properties comparable to 4,4-difluoro-BODIPY analogues. Importantly, time-resolved measurements revealed prolonged fluorescence lifetimes across a wide viscosity range, with increases of up to 1.6 ns, reaching 5.18 ns in some cases.

A membrane-targeting cyano-BODIPY probe was successfully applied to live *Staphylococcus epidermidis* cells, where it localized to the plasma membrane and enabled quantitative FLIM-based viscosity measurements.
Our result demonstrate that CN-BODIPY molecular rotors are promising viscosity-sensitive fluorophores for biological applications.

Mots-Clés: Live cell imaging, Fluorescent probes, FLIM

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