附件 1. 摘要模板（Abstract Template）

Tailoring fluorophore single-molecule photophysics for super-resolution imaging

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ABSTRACT

Super-resolution imaging breaks the diffraction limit, ongoingly pushing the resolution boundary of fluorescence imaging and revolutionizing the research paradigm of life and material science. However, the key media, fluorophores, demonstrate disappointed single-molecule brightness and blinking, forming temporospatial resolving and applicational barrier for super-resolution imaging. Thus, it is necessity and demanding back to the fundamental structural level to developing fluorescent tools with superior single-molecule photophysics, addressing the scientific shift from ensemble molecular groups to an individual molecule.

Through introduction of electron-withdrawing quaternized piperazine units, we enhanced the the brightness of push-pull fluorophores by > 2 fold and improved the localization precisions. By adjusting the nucleophilic and hydrogen-bonding capability of spiro substituents, we control the dark-bright transiting kinetics of rahodamines, expanding the analyzing capability for fast localization super-resolution imaging. Incorporating protein tag and biorthogonal labeling systems, we expand the applicational space of super-resolution imaging and explore the potential molecular diagnostics from the molecular distribution and dynamics.

The advancement of single-molecule superior fluorophore would push the boundary of temporospatial resolution for super-resolution imaging, setting a new stage of super-resolving for primary life study and medical diagnostic tools.

Keywords: Super-resolution imaging; Single-molecule fluorescence; Fluorophores; Rhodamines

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