

Literature Report

Reporter: Guangying Wang

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COMMUNICATION

Photocleavable Fluorescent Membrane Tension Probes: Fast Release with Spatiotemporal Control in Inner Leaflets of Plasma Membrane, Nuclear Envelope, and Secretory Pathway

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Stefan Matile

Stefan Matile 是日内瓦大学有机化学系的正教授，国家能力研究中心 (NCCR) 化学生物学的创始成员和 NCCR 分子系统工程的创始成员。2010 年，他成为 ERC 高级研究员，2017 年成为 SNSF 一级研究员。



Stefan Matile课题组荧光探针方向（机械敏感的小分子荧光探针）

该项目于 2010 年启动，第一个可操作的 Flipper-TR® 探针已于 2018 年商业化。目前，对质膜、线粒体、内质网和溶酶体中的张力成像的 Flipper 探针已经商业化。HaloFlippers 与目标膜 (MOI) 中表达的 HaloTag 共价连接 SupraFlippers 可以通过化学刺激（在 RUSH 型链霉亲和素生物技术操作）在 MOI 中释放。目前的重点是 HydroFlippers 用于 FLIM 图像对膜脱水/水化和去/压缩同时成像，PhotoFlippers 用光在 MOI 中释放，以及用于超分辨率显微镜成像。

除了这些不断努力推动 Flippers 探针趋于完美之外，他们还将继续探索用于活细胞力成像的替代分子设计策略，并参与针对特定挑战的各种合作。

可平面化推拉低聚噻吩：寻找完美的扭曲

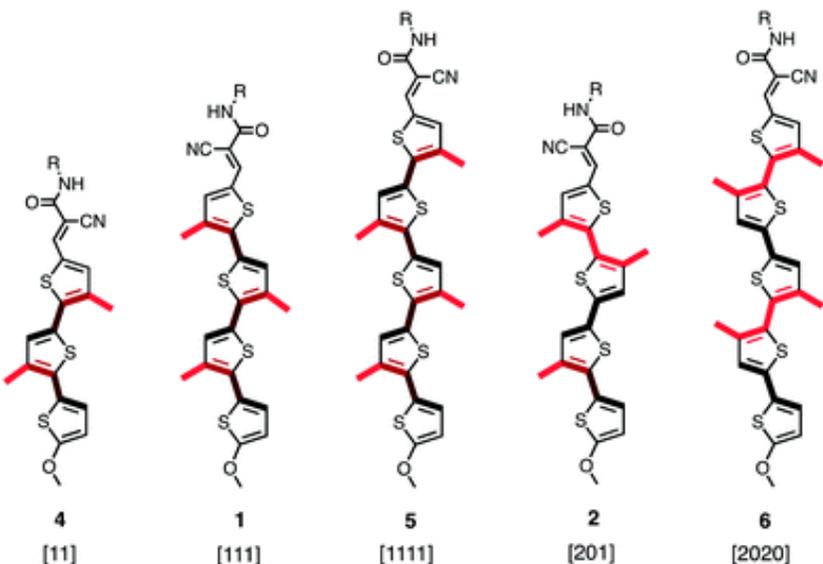


图2 不同长度的可平面推拉低聚噻吩

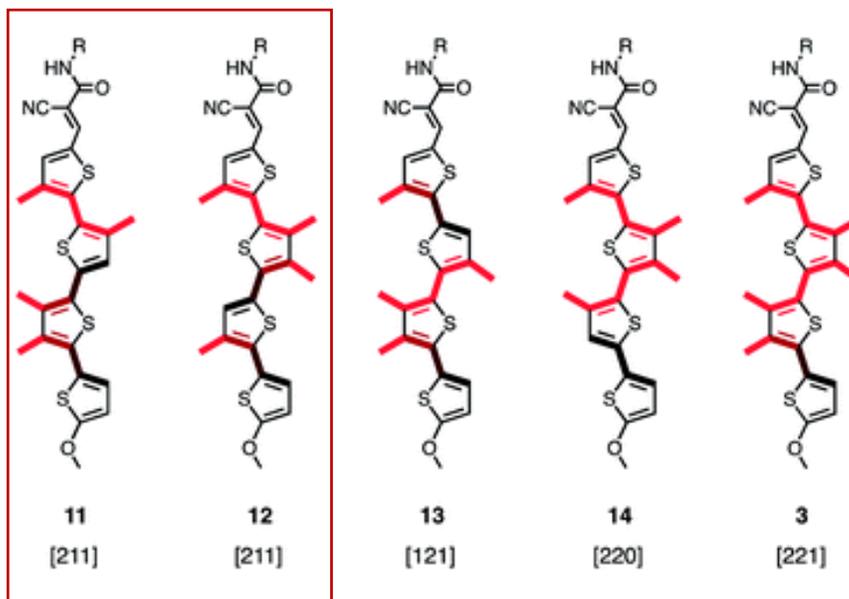
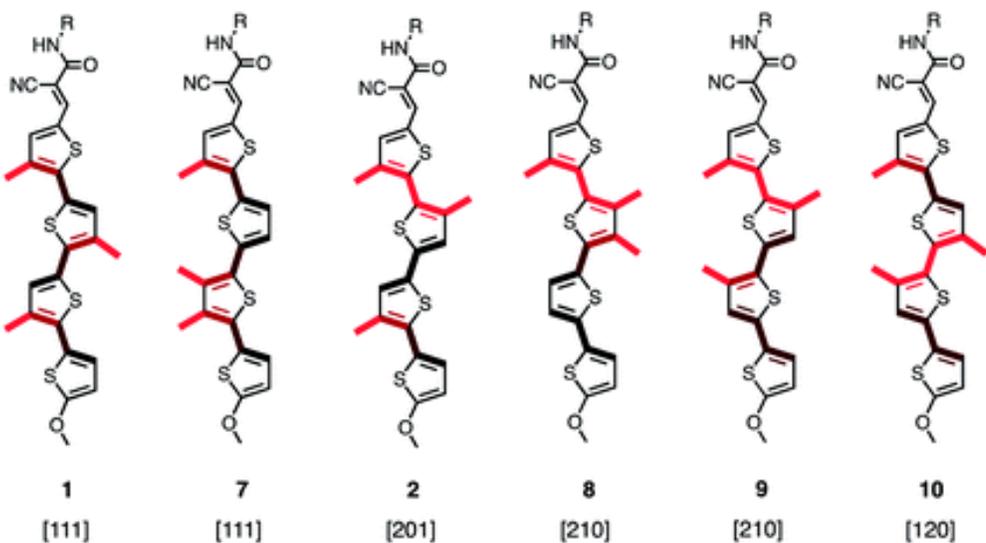
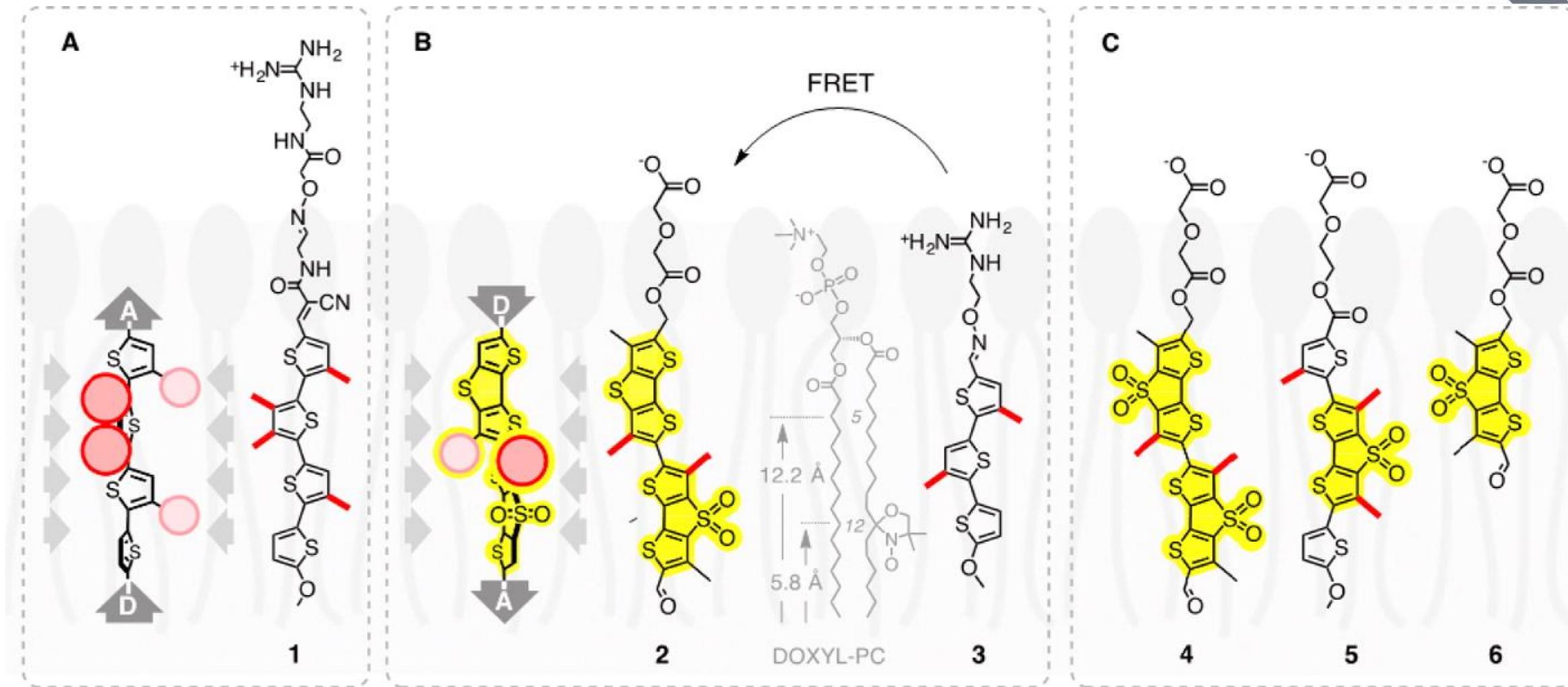


图4 具有不同扭曲度的可平面推拉四噻吩

Chem. Sci., 2014,5, 2819-2825

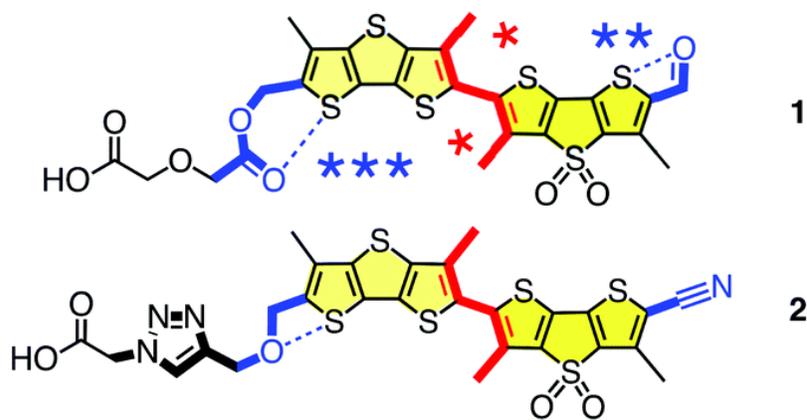
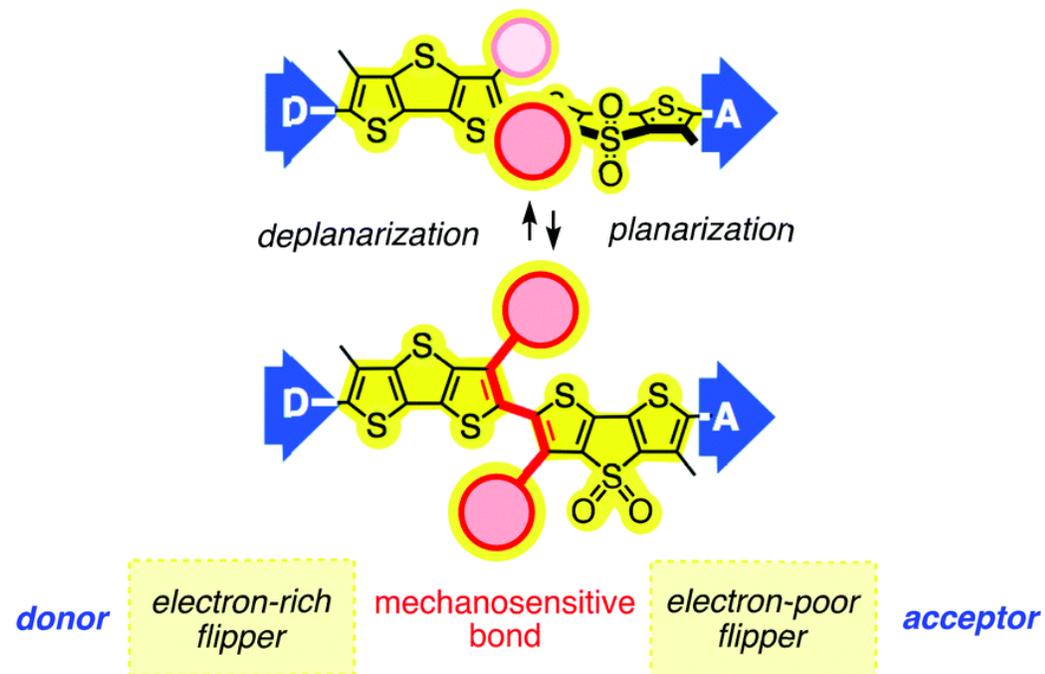


用于机械敏感膜探针的荧光Flippers

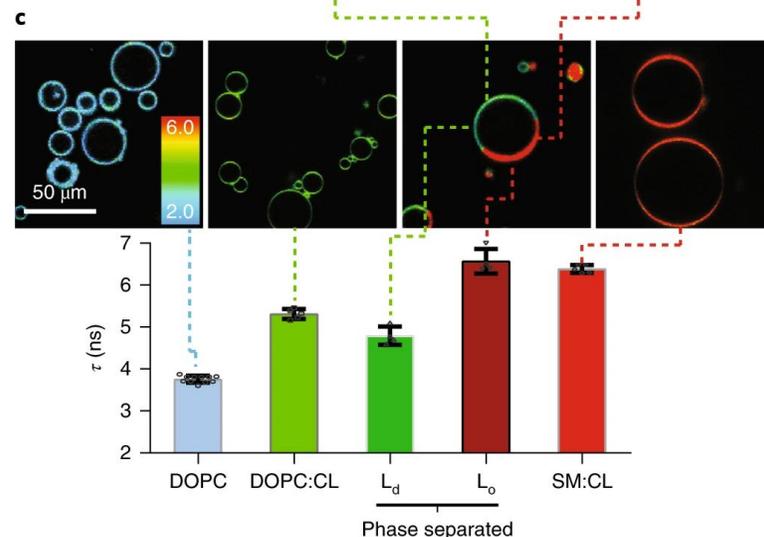
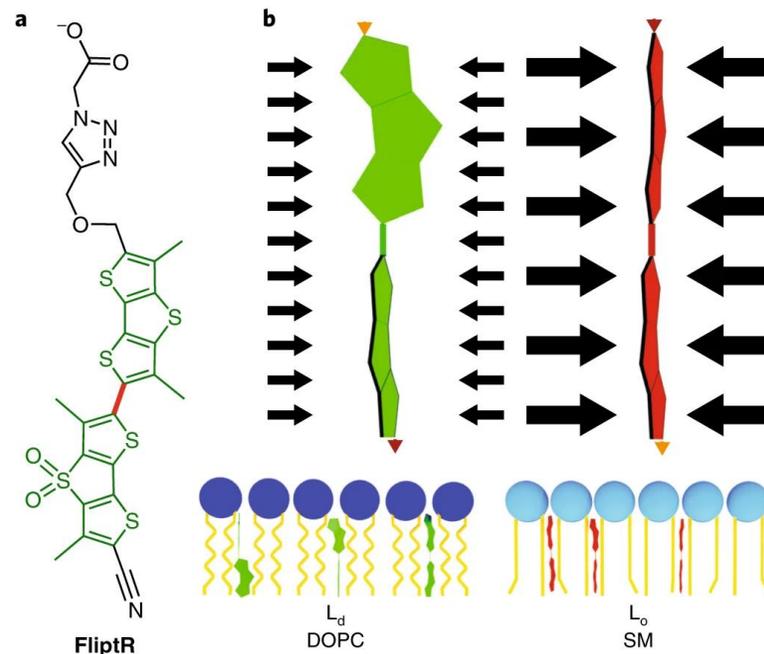




机械敏感膜探针中的头部基团； 荧光膜张力探针



Chem. Commun., 2016, 52, 14450-14453



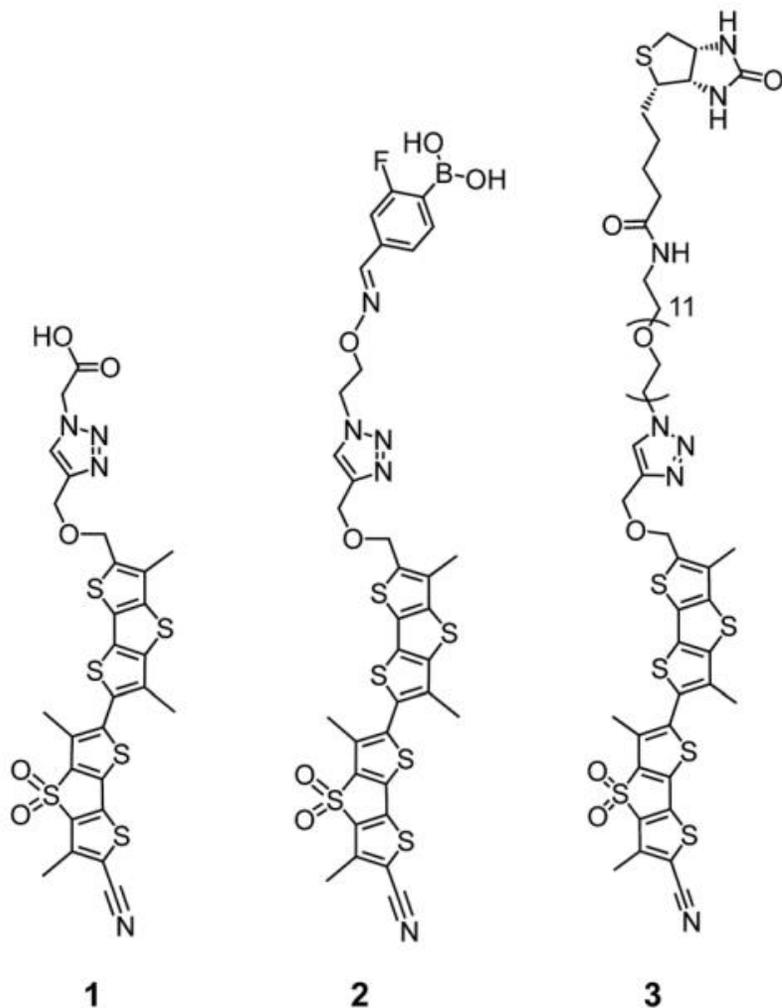
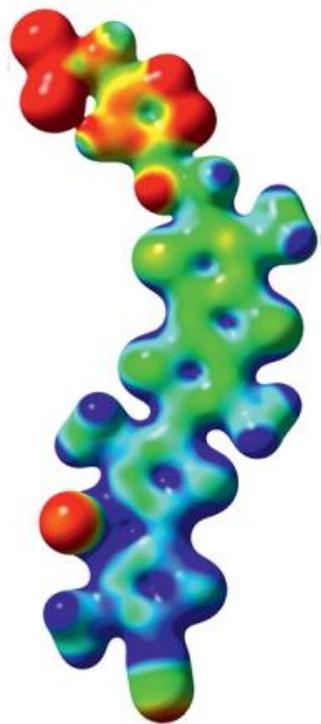
Nature Chemistry 2018, 10, 1118-1125



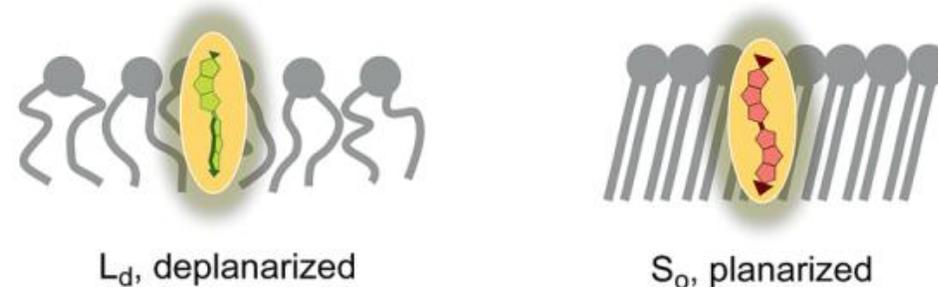
链霉亲和素接口作为在细胞中定位荧光膜张力探针的策略



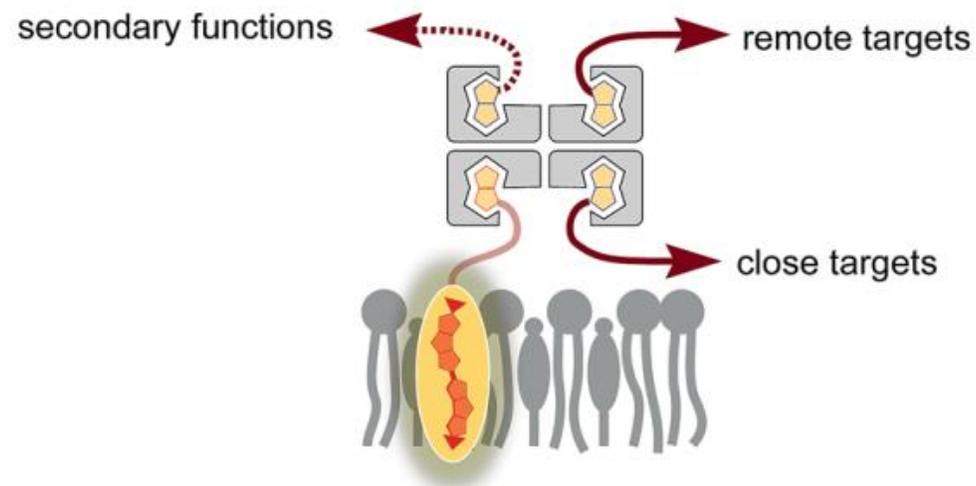
a)



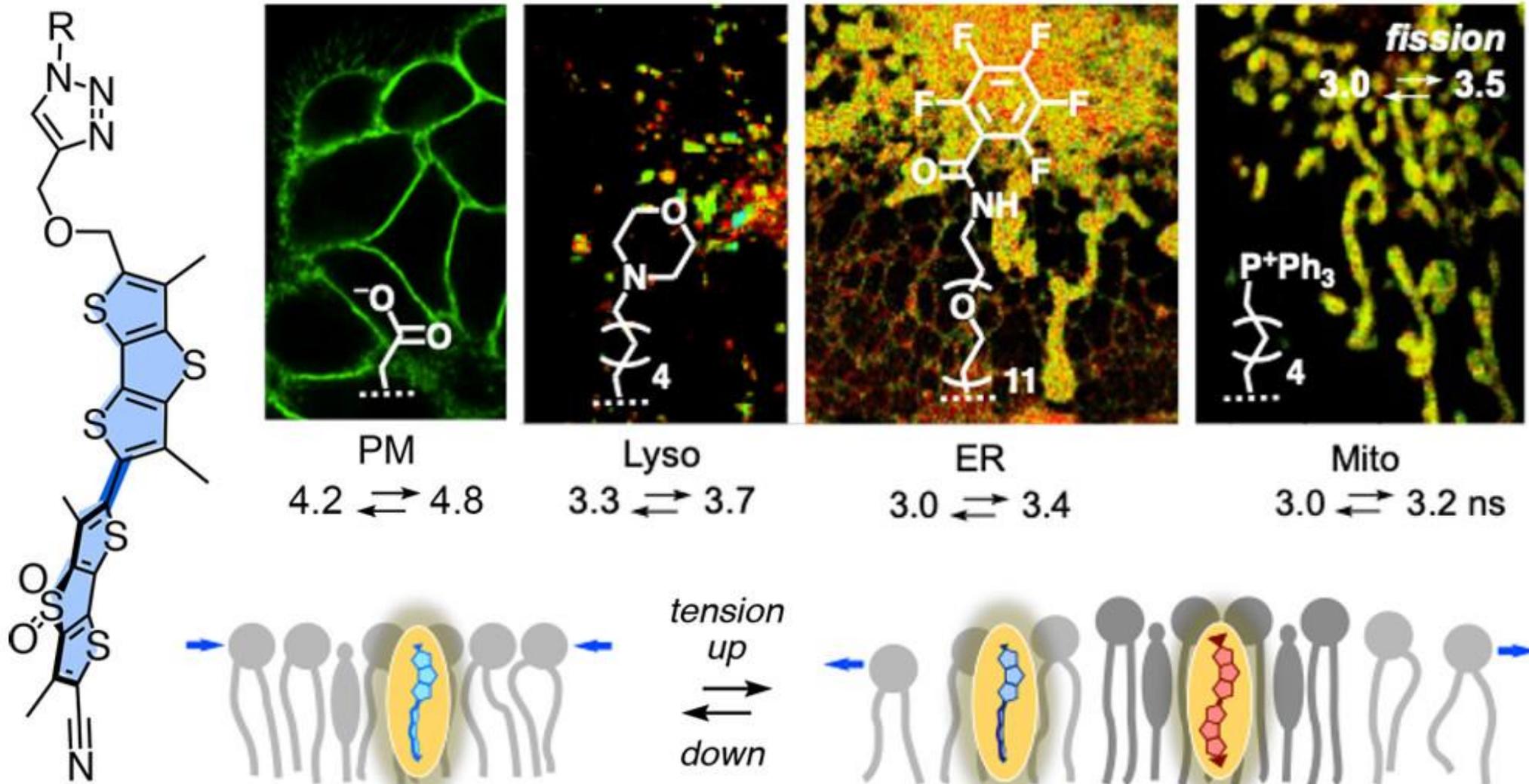
b)



c)

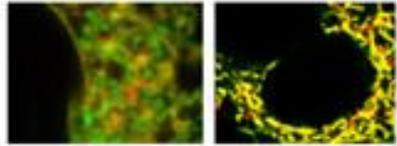


线粒体、内质网和溶酶体中成像膜张力的机械敏感荧光探针



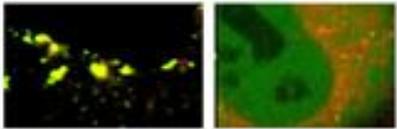
HaloFlippers: 活细胞中精确定位的膜张力变化的荧光成像的工具

membrane of interest



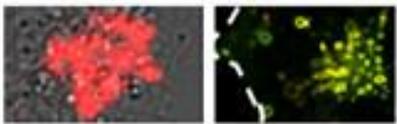
ER

mito



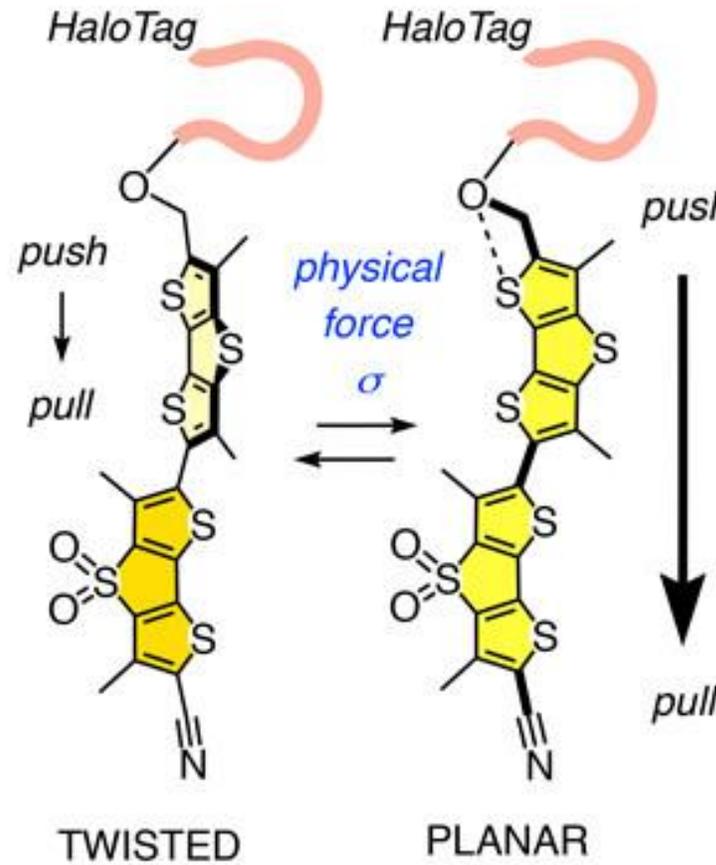
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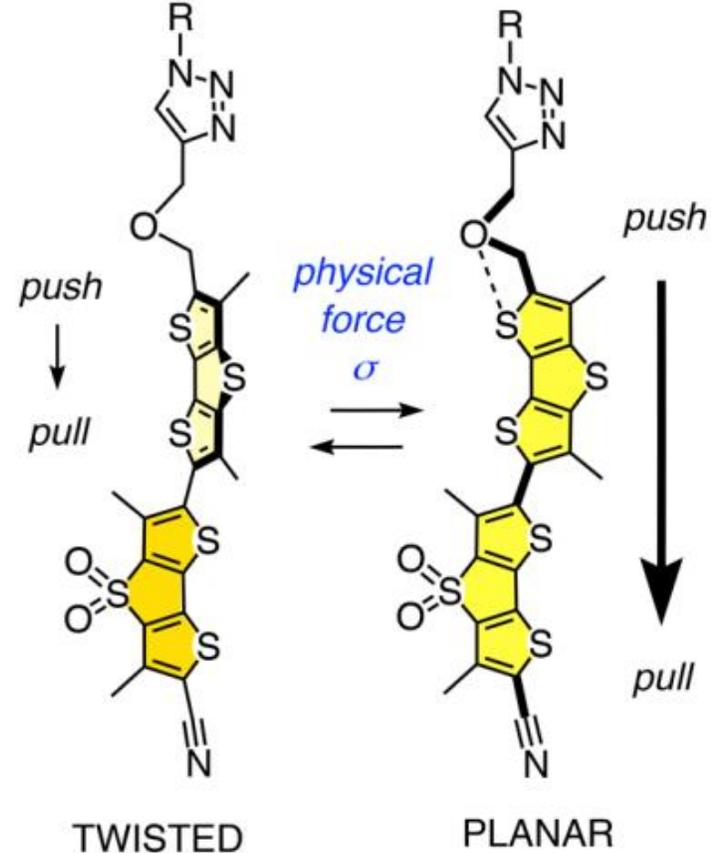


Golgi

endo

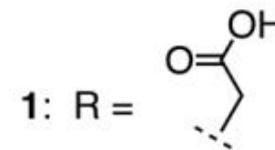


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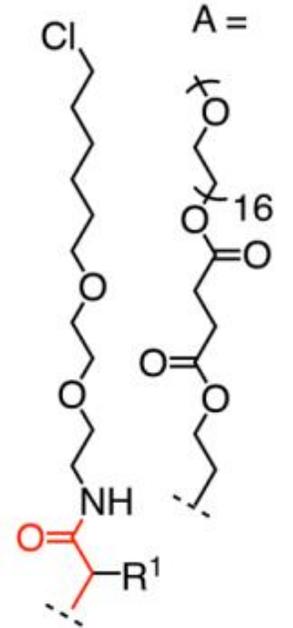


$l \sim 6 \text{ nm}$
($n = 1$)

2: $n = 2$
3: $n = 1$
4: $n = 0$ } R =



5: $R^1 = \text{H}$
6: $R^1 = \text{A}$ } R =





光裂解荧光膜张力探针：在质膜、核膜和分泌途径的有时空控制的快速释放

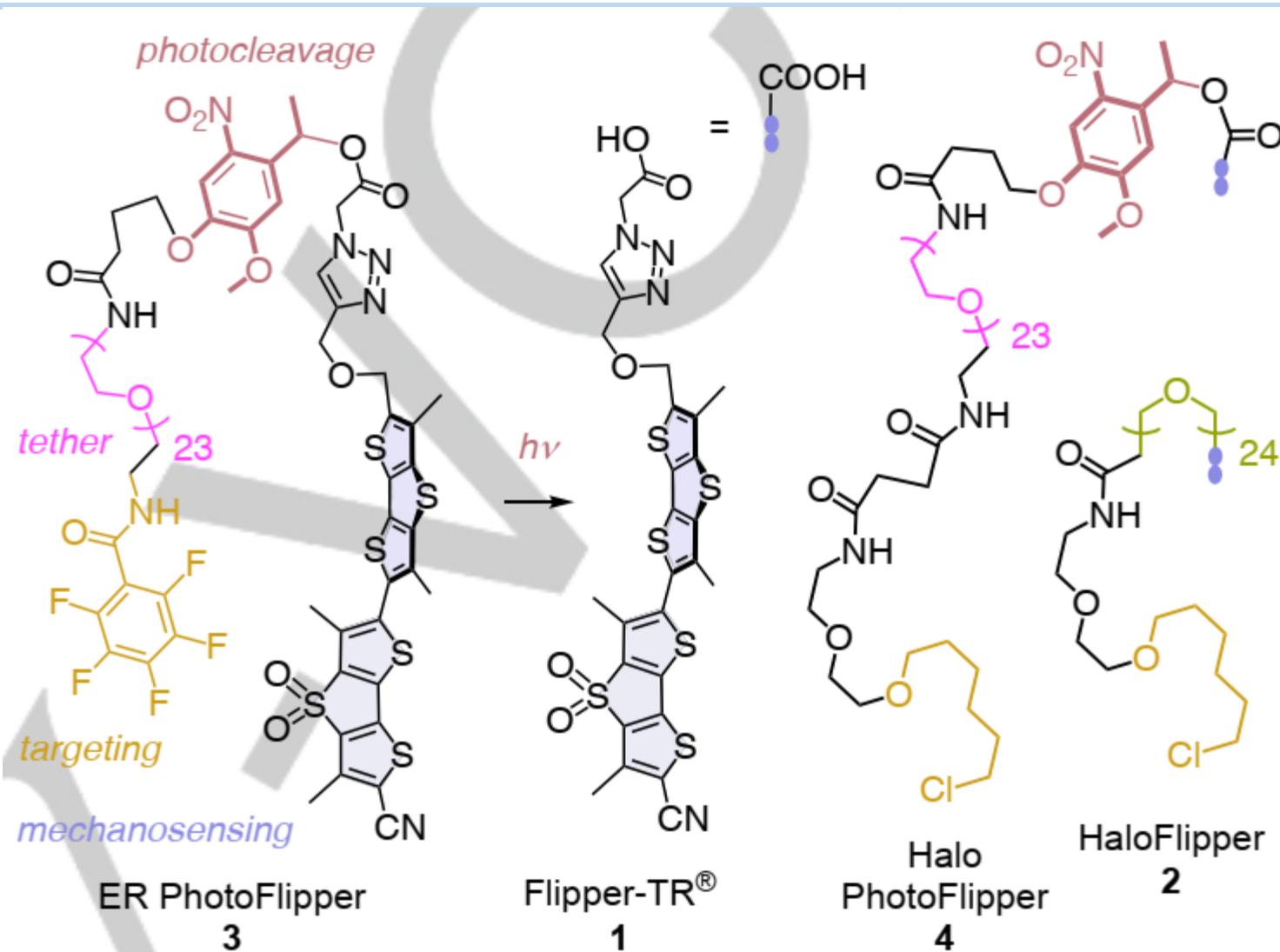
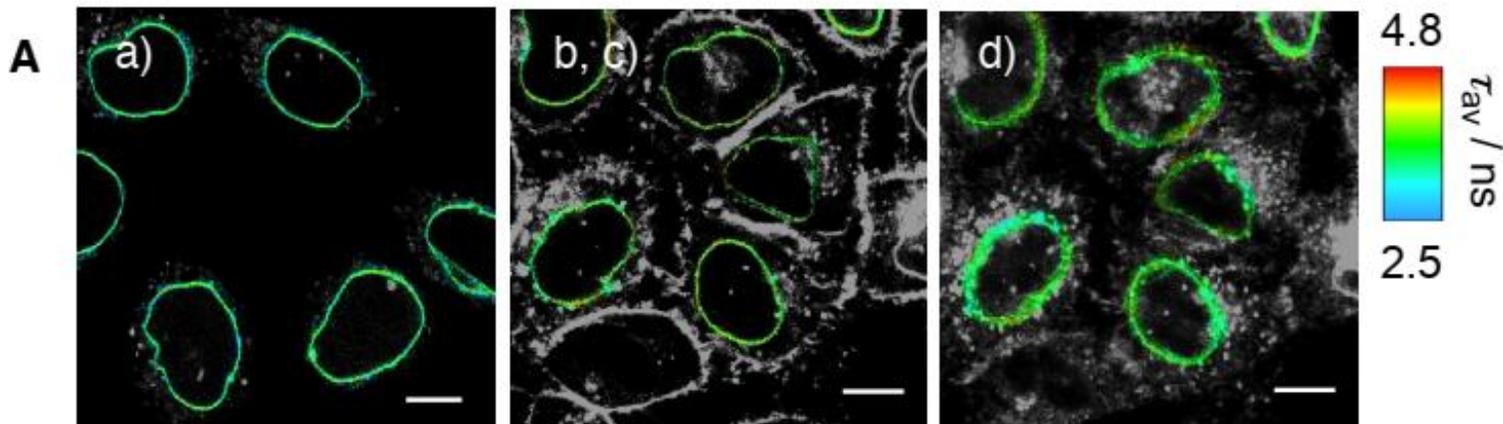
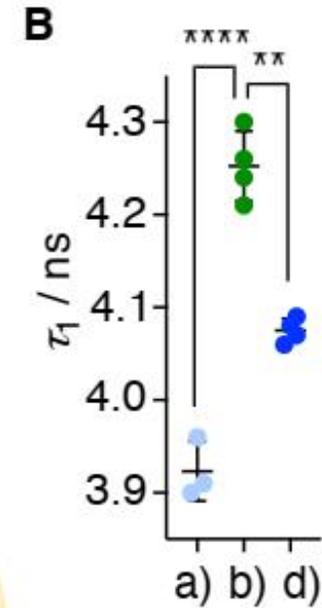
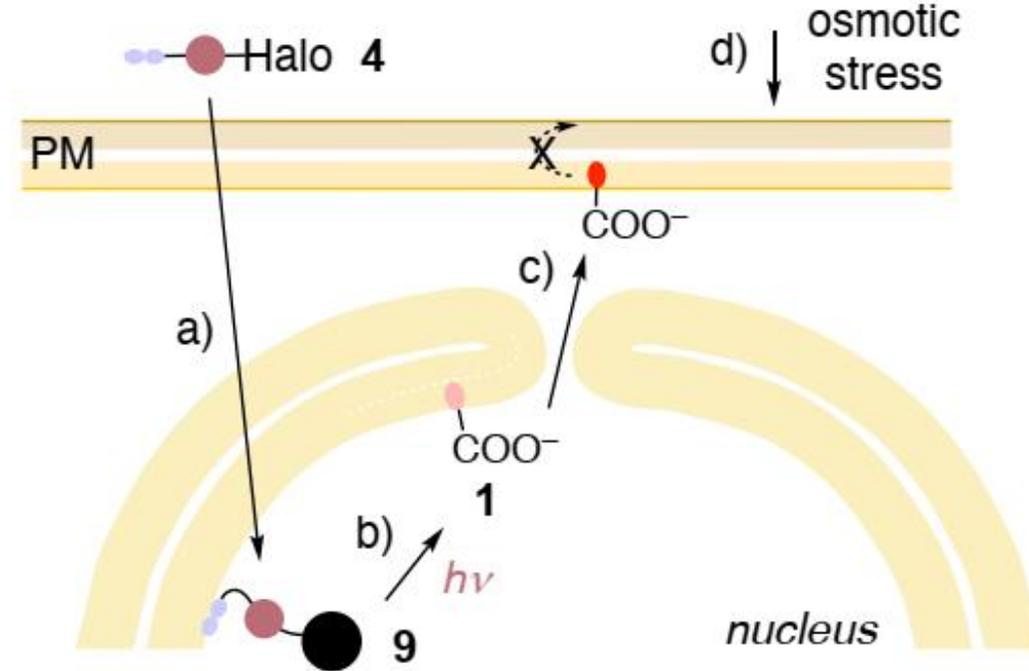


Figure 1. Structure of photocleavable flippers 3 and 4 compared to the original 1 and 2



光裂解荧光膜张力探针：在质膜、核膜和分泌内叶中具有时空控制的快速释放





Thank you!