

2020 Literature report II

nature | **methods**

ARTICLES

<https://doi.org/10.1038/s41592-020-0782-3>



A 6-nm ultra-photostable DNA FluoroCube for fluorescence imaging

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Reporter: Li Jin

Date:2020-03-24

The author



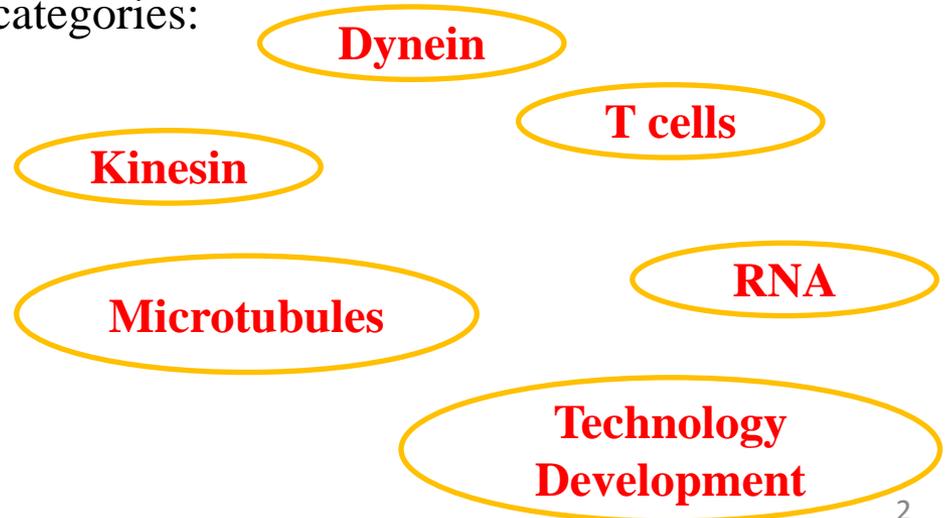
Ron Vale 罗纳德•韦尔
拉斯克医学奖

驱动蛋白和动力蛋白分子马达

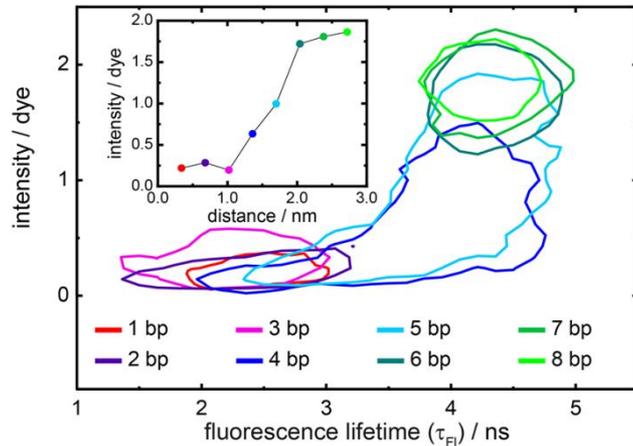
1996年，与Fletterick合作首次解析
kinesin的结构；

自己做实验首先直接看到kinesin单分子
运动

The Vale Lab combines cell biological and biophysical approaches to understand spatial organization, movement, and signaling within cells. The lab integrates biochemical, structural, and microscopy-based approaches to study these questions at scales that span from atomic information of proteins to the behavior of cells in living organisms. This has led us down diverse avenues of research, but most of the lab projects fall into one of the following categories:

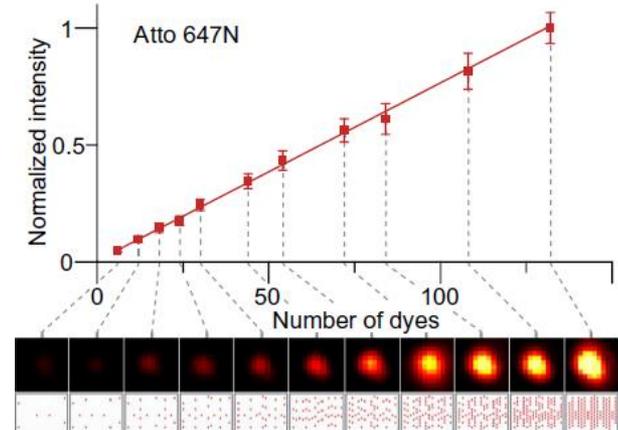


Design and assembly of six-dye DNA FluoroCubes



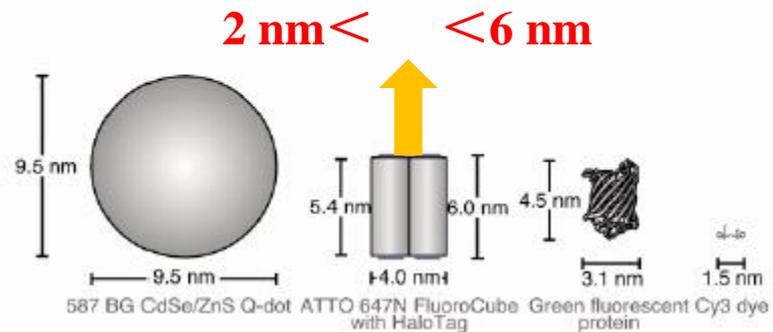
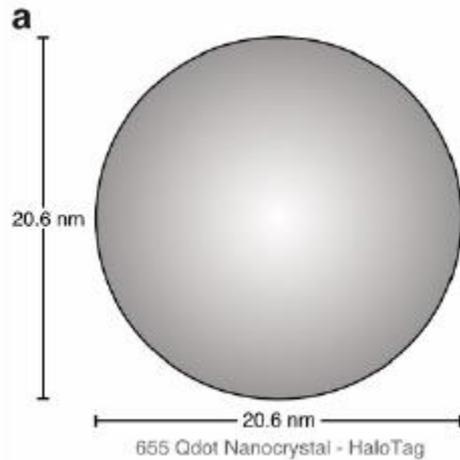
< 2 nm

Nano Lett. **2019**, 19, 1275

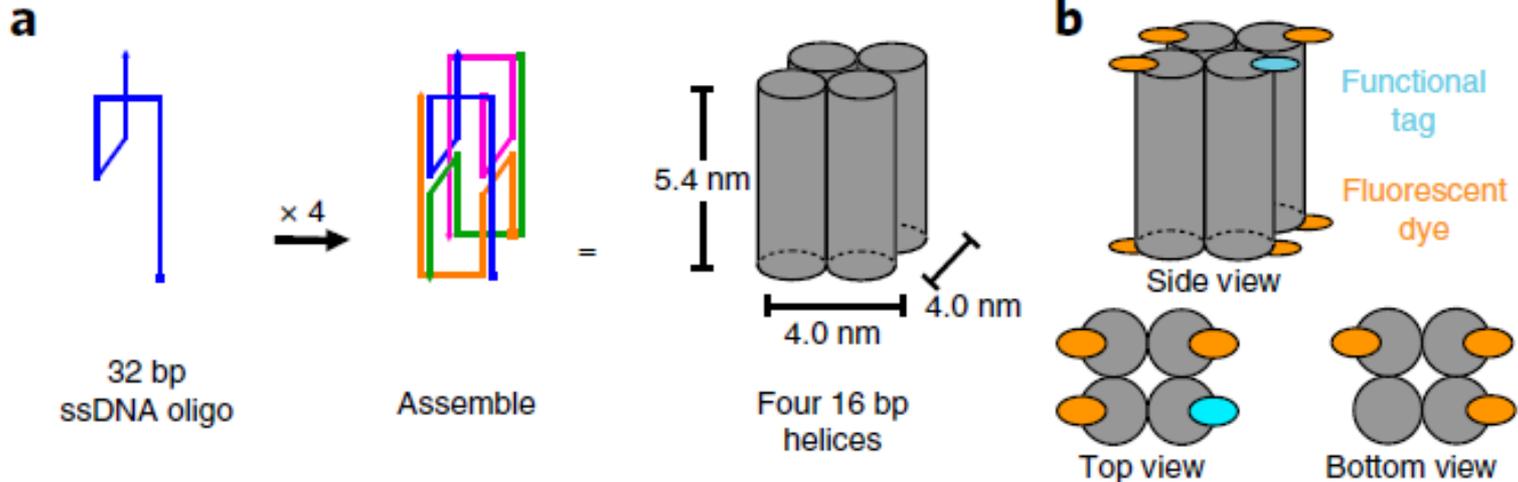


> 5 nm

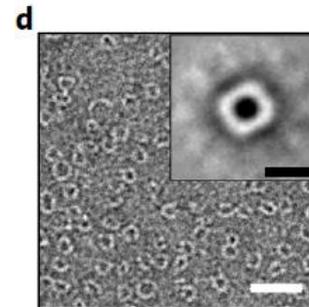
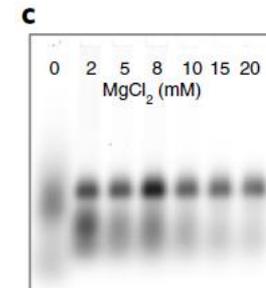
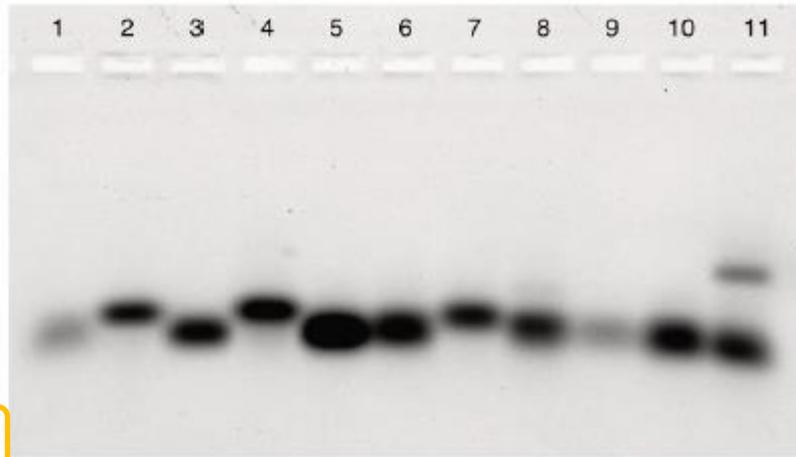
Sci. Adv. **2017**, 3, 1602128



Design and assembly of six-dye DNA FluoroCubes

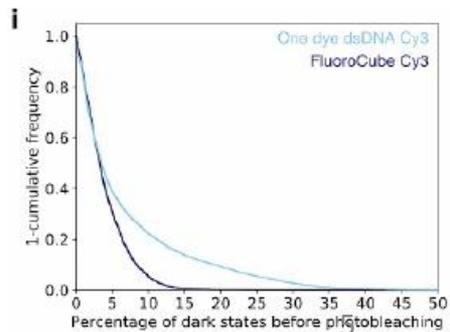
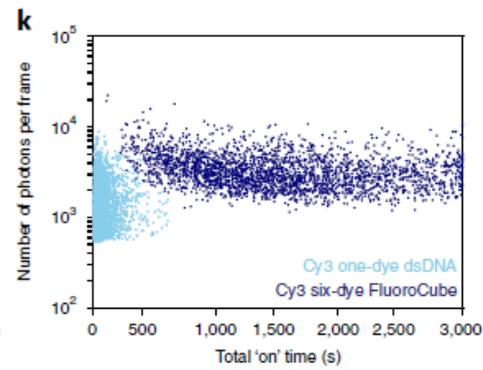
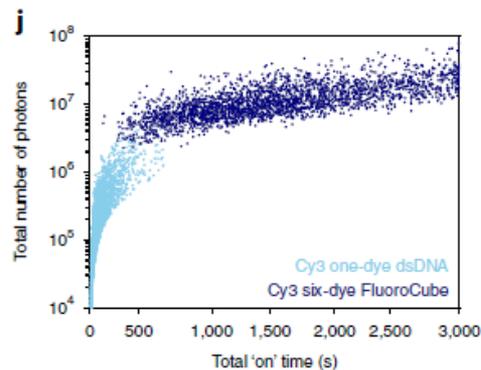
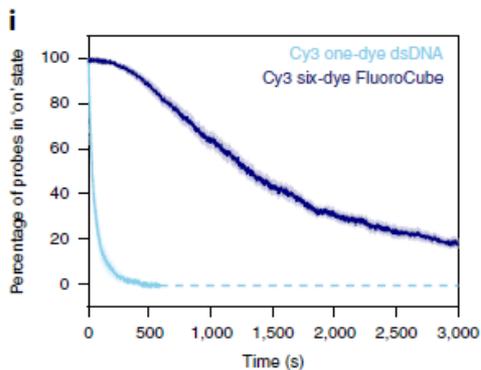
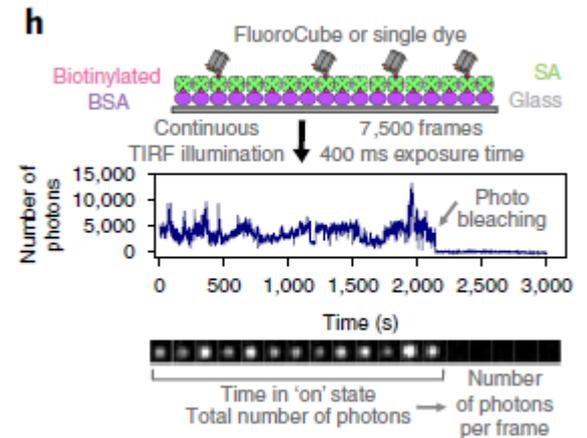
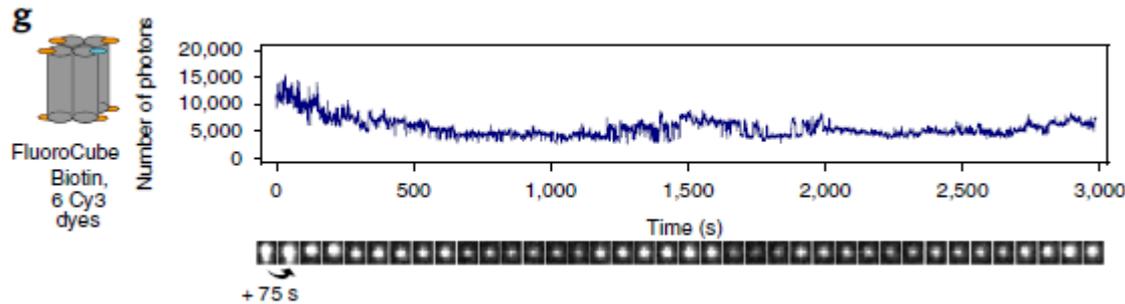
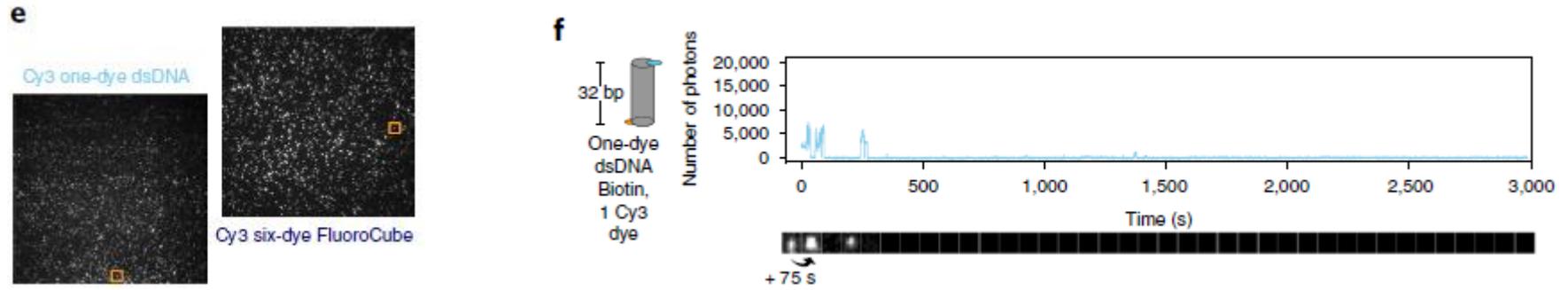


Lane	Oligos in folding reaction
1	Strand 1
2	Strand 2
3	Strand 3
4	Strand 1, Strand 2
5	Strand 1, Strand 3
6	Strand 2, Strand 3
7	Strand 1, Strand 2, Strand 3
8	Strand 1, Strand 2, Strand 4
9	Strand 1, Strand 3, Strand 4
10	Strand 2, Strand 3, Strand 4
11	Strand 1, Strand 2, Strand 3, Strand 4



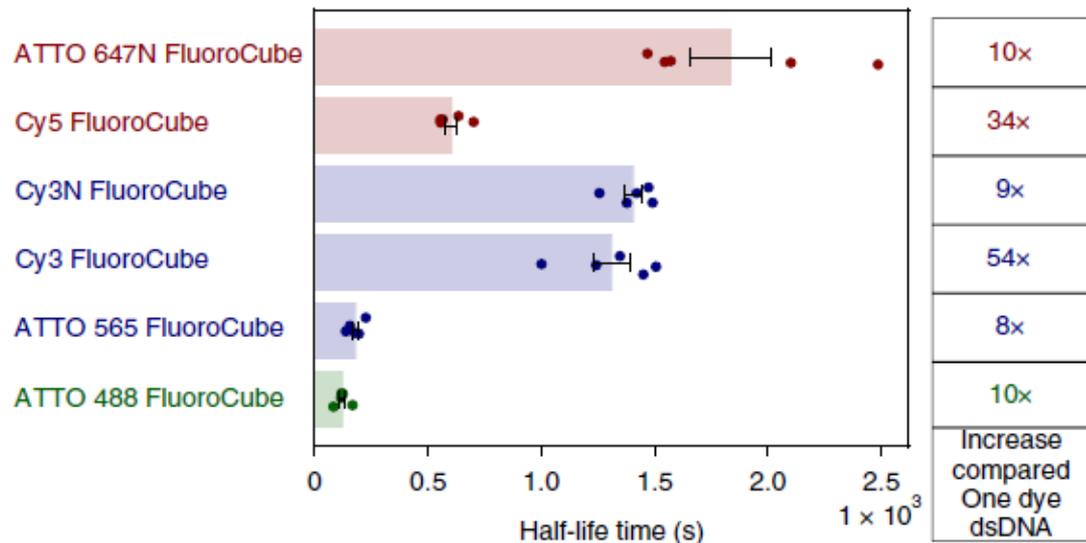
Negative-stain TEM

Photophysical properties of six-dye DNA FluoroCubes

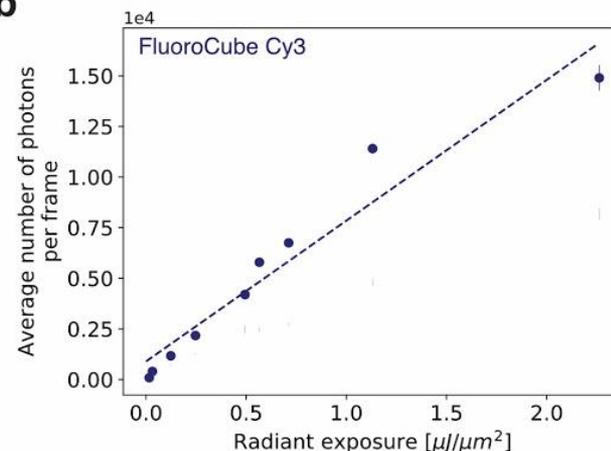


Photophysical properties of six-dye DNA FluoroCubes

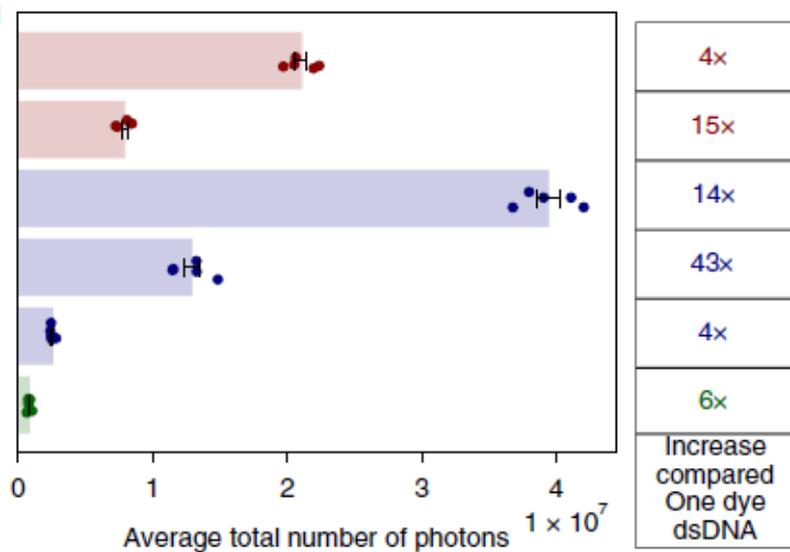
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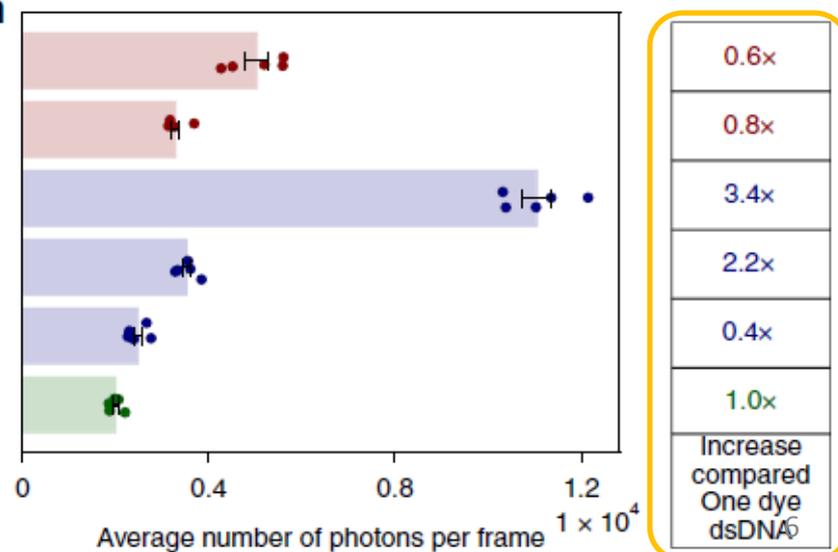
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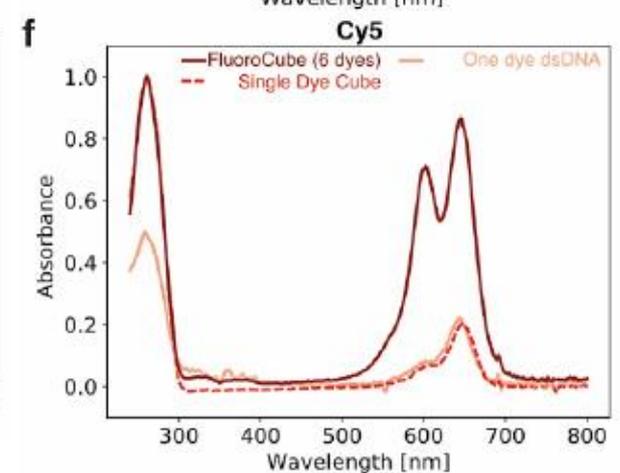
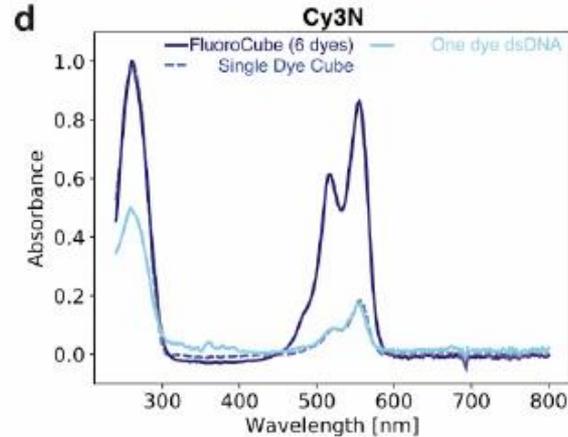
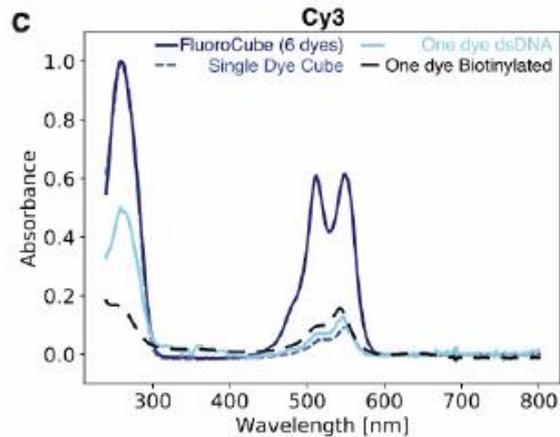
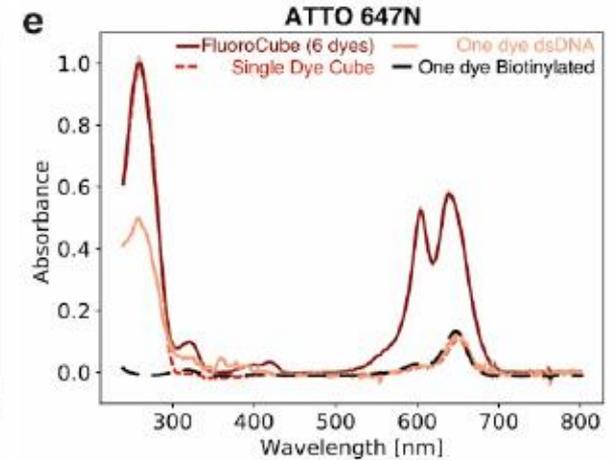
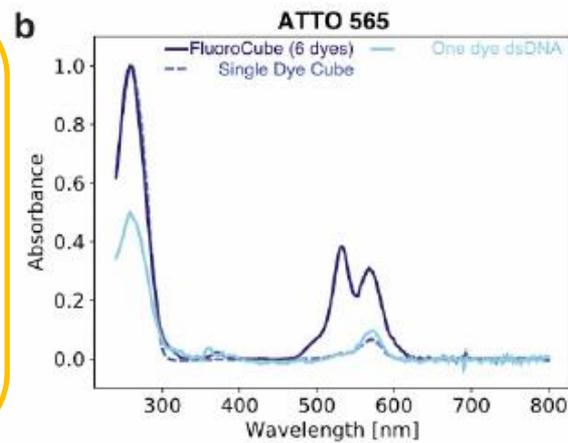
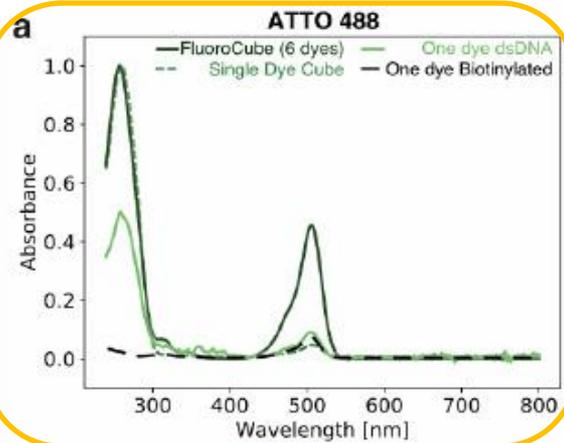
m



n

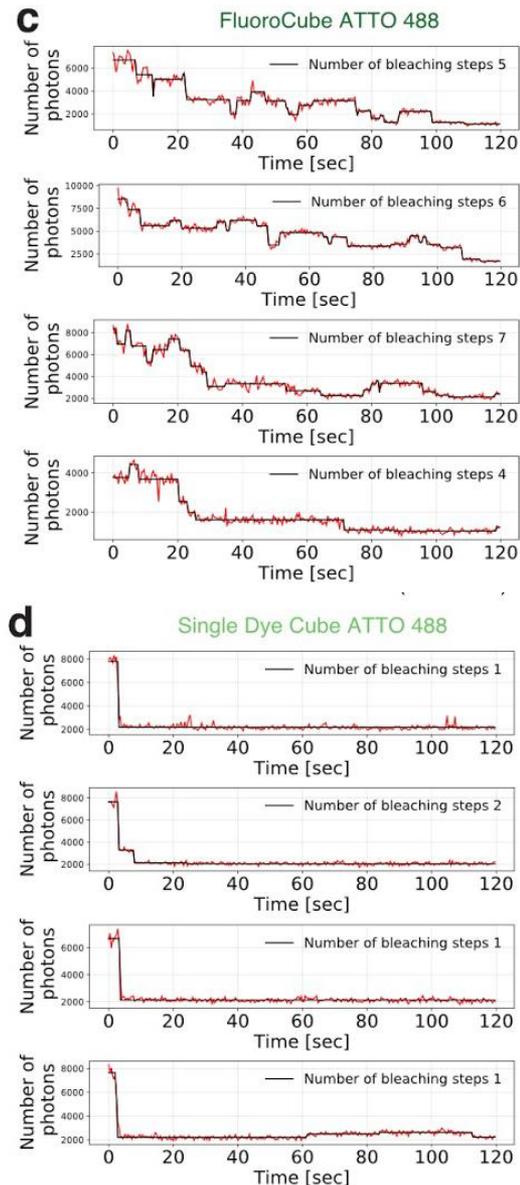
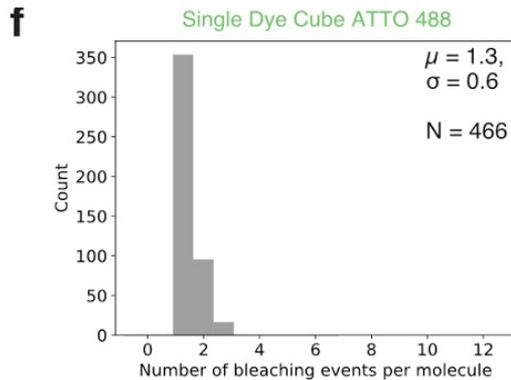
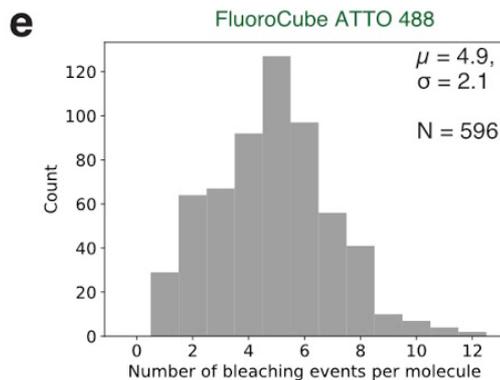
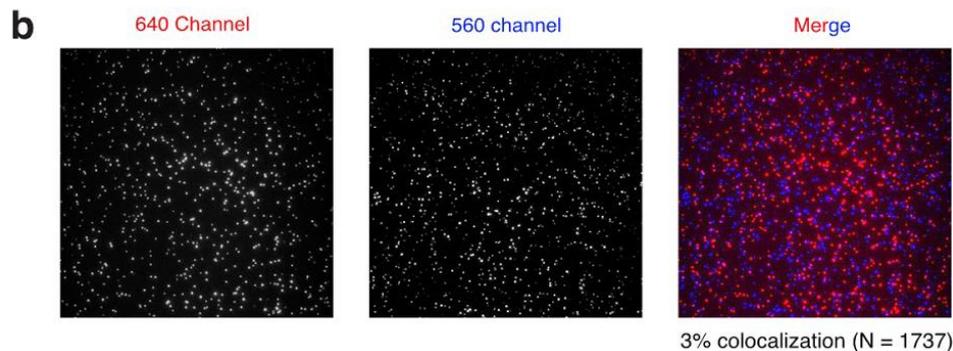
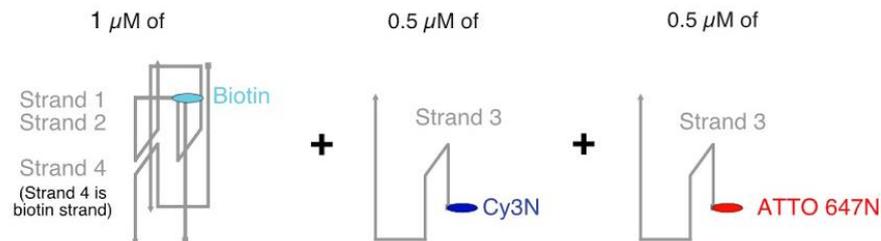


Photophysical properties of six-dye DNA FluoroCubes

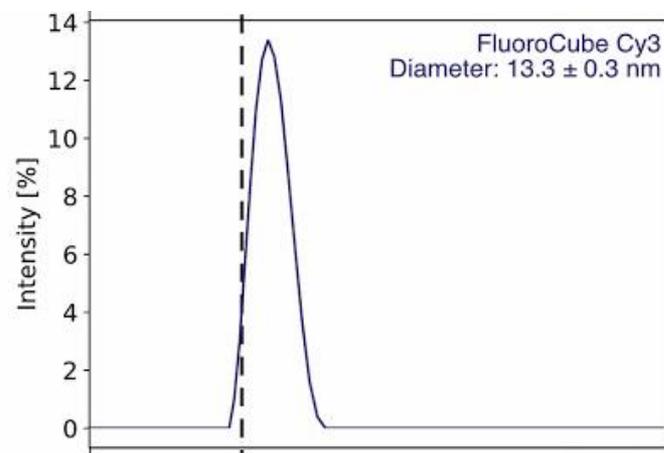
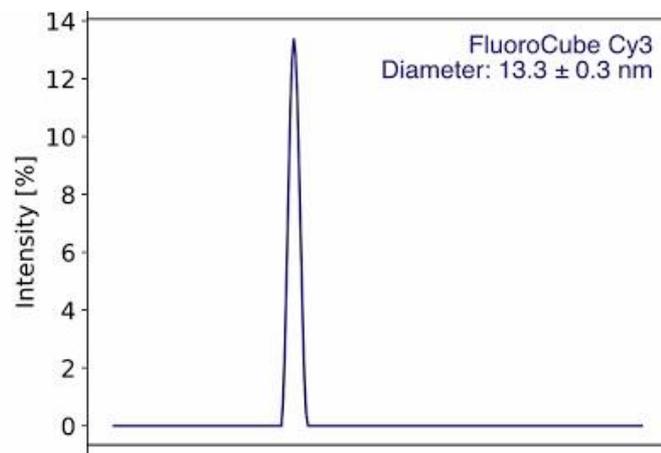


Photophysical properties of six-dye DNA FluoroCubes

a Folding competition

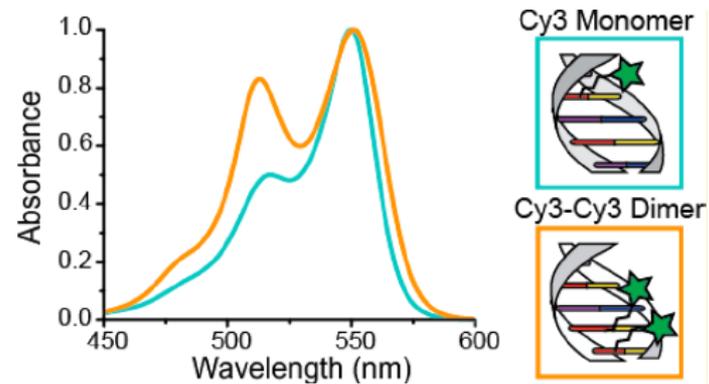
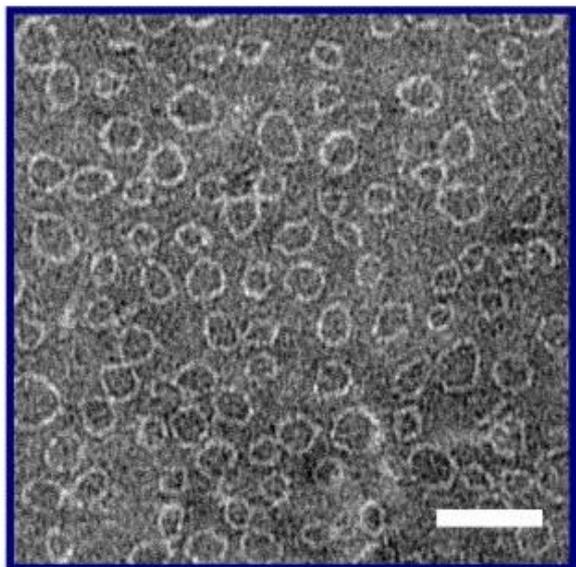


Photophysical properties of six-dye DNA FluoroCubes

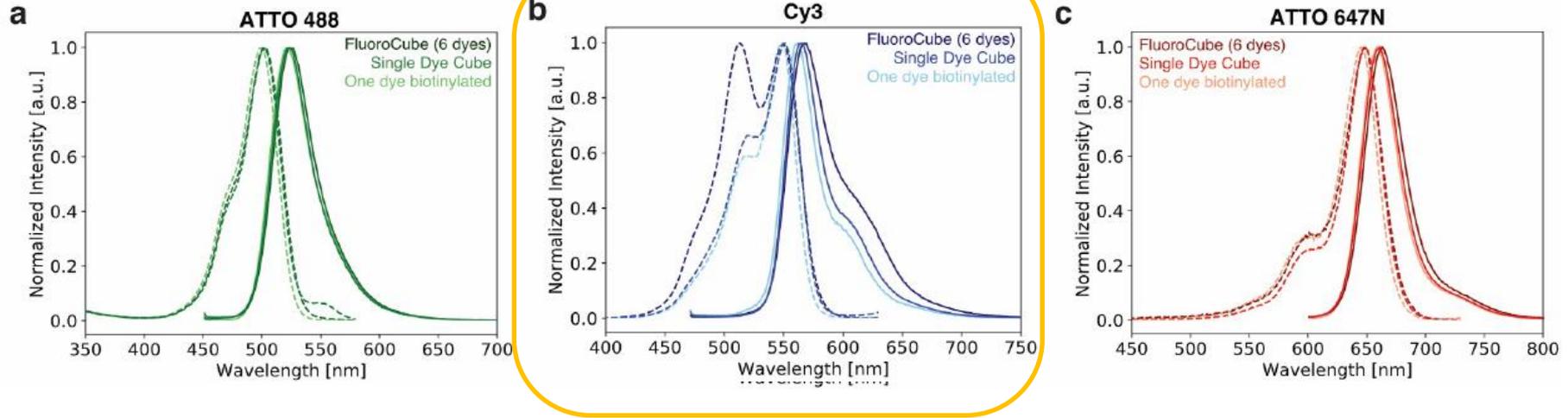


C

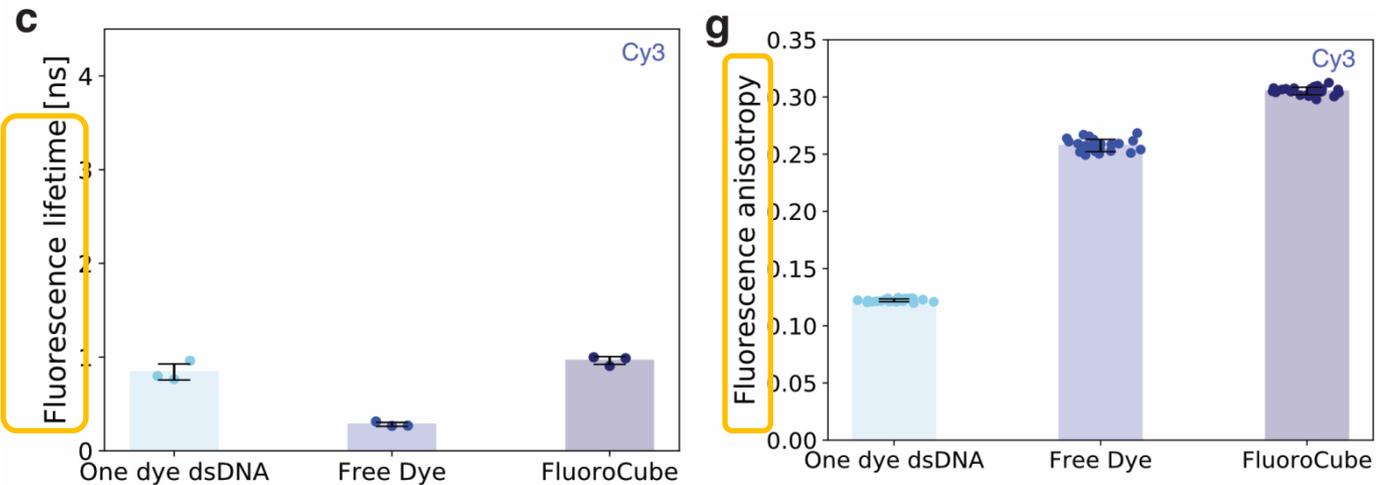
FluoroCube Cy3



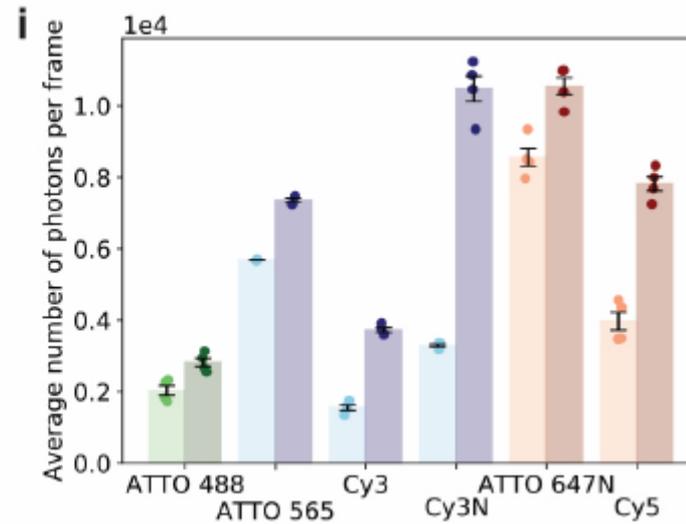
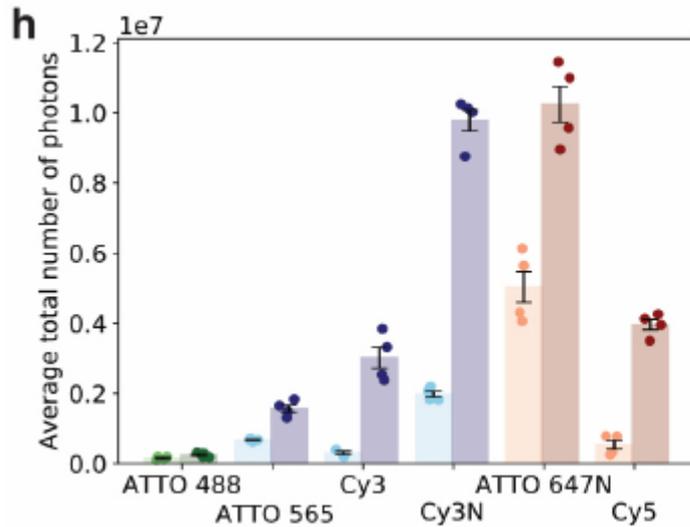
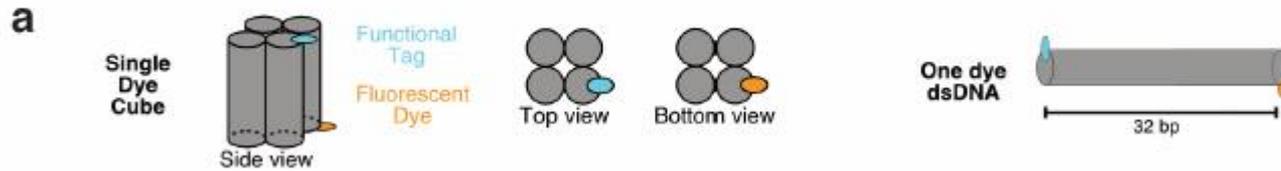
Photophysical properties of six-dye DNA FluoroCubes



与光稳定性无明显关系:

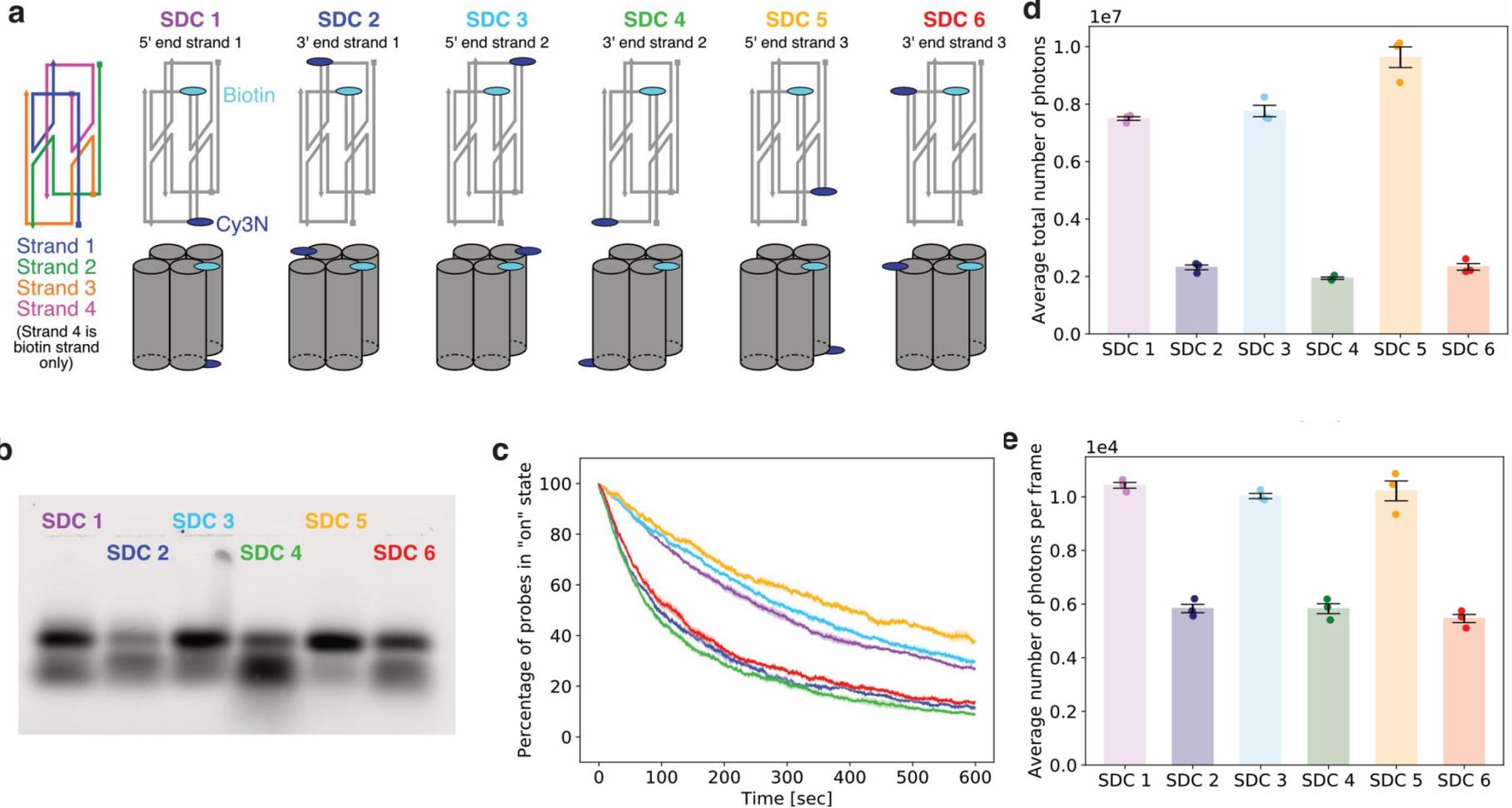


The influence of local environment of the DNA on photostability

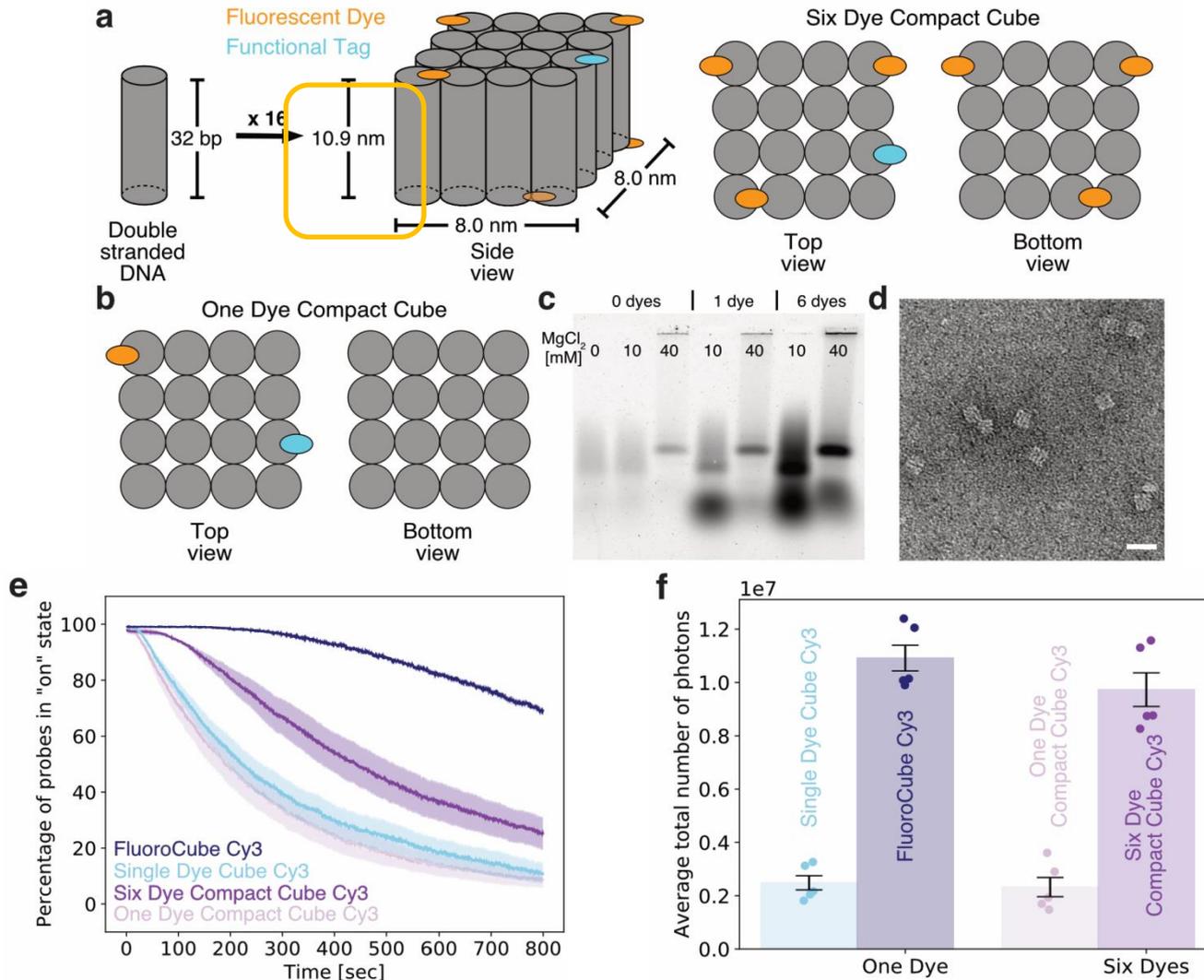


The influence of dye position on the DNA

on photostability

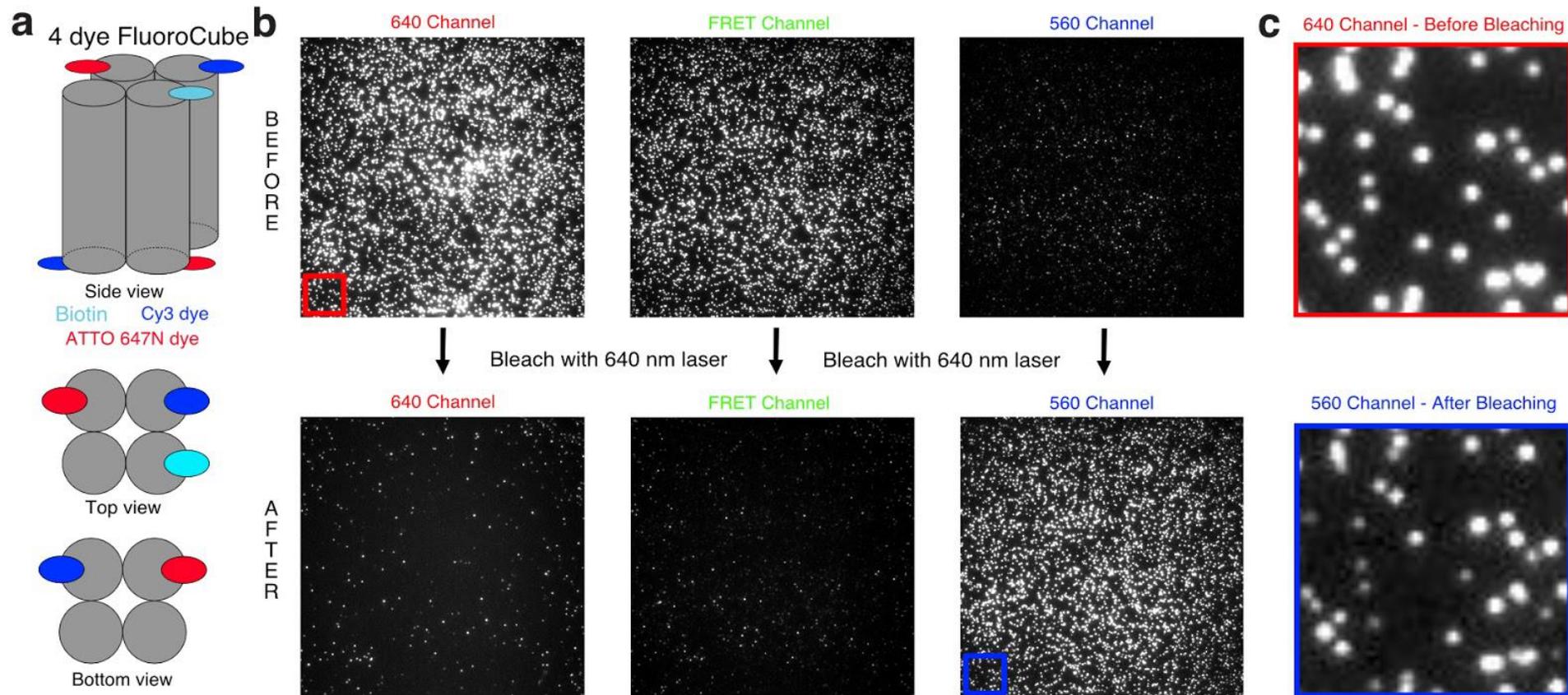


The effect of the geometry of dye placement on photostability



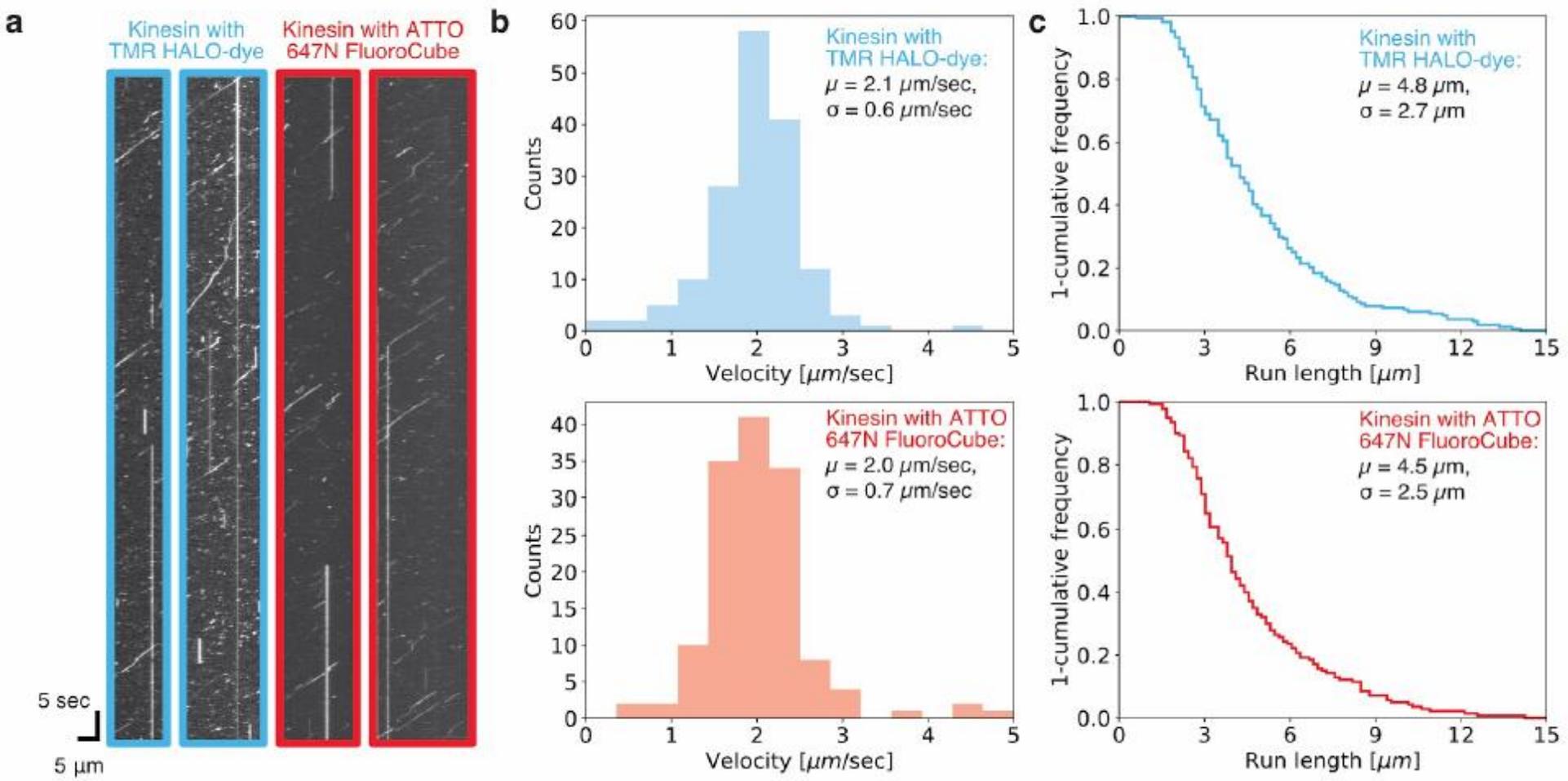
The importance of distance between dyes for the photostability effect

Insights into potential mechanism(s) of increased photostability of six-dye DNA FluoroCubes



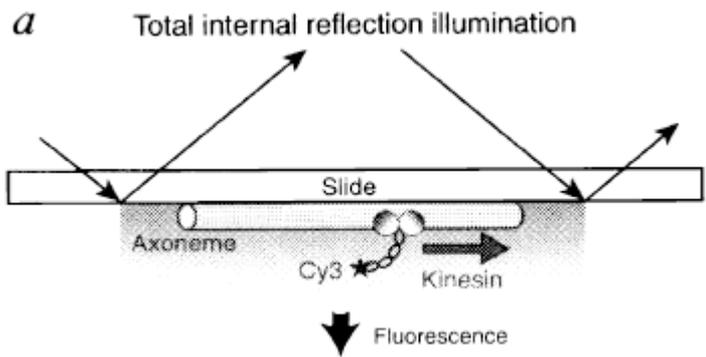
Both direct dye interactions as well as resonance energy transfer between individual dyes in a six-dye FluoroCube play roles in this phenomenon

Compared velocity and processivity

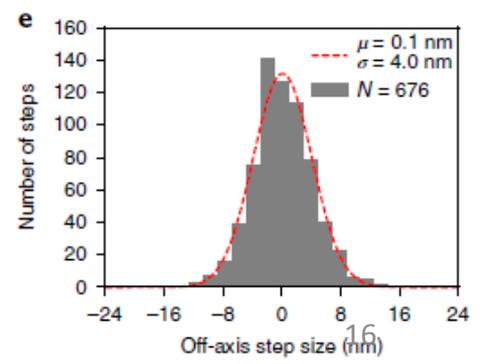
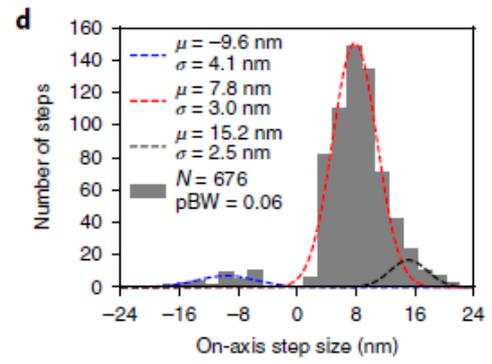
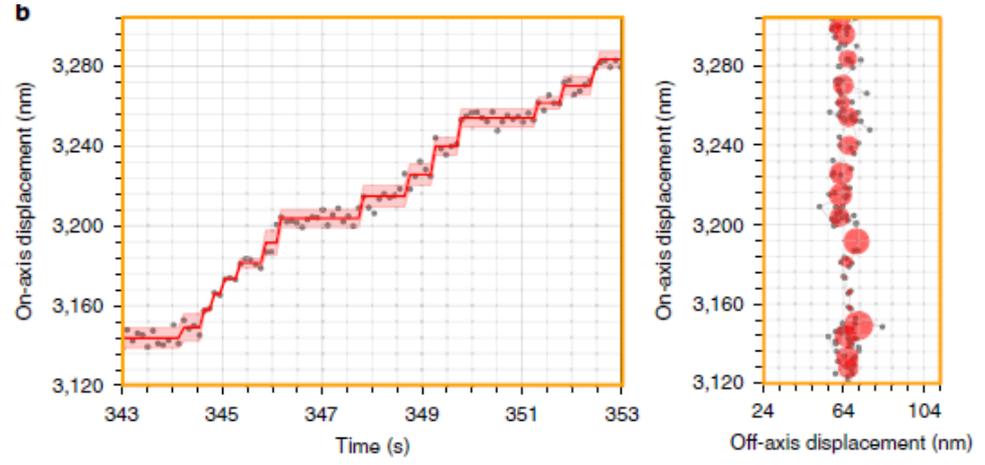
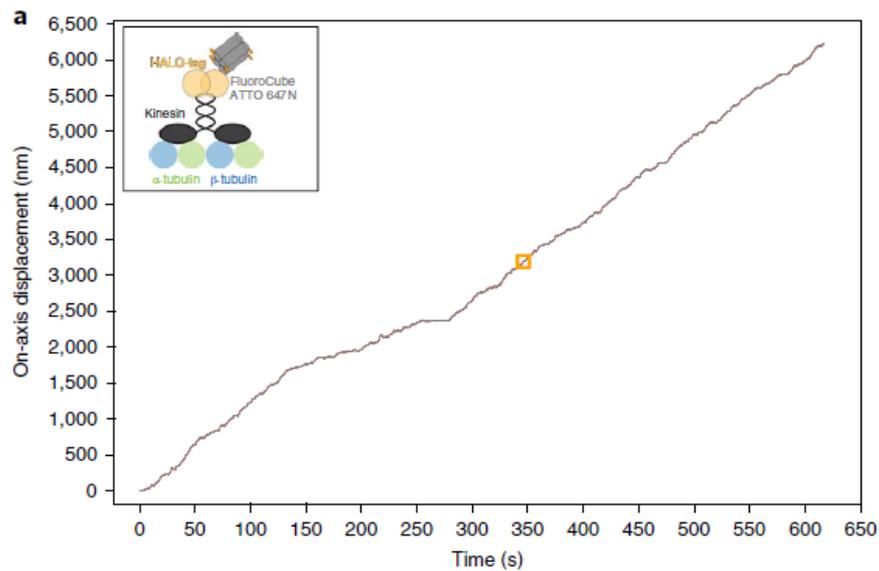
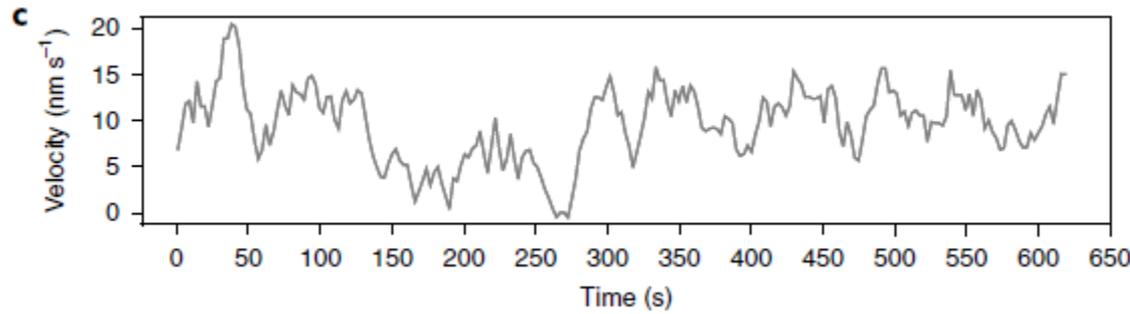


Do not interfere with protein function

Tracking steps of a single kinesin over more than 6 μm



Nature, 1996, 380, 451



Thank you for your attention!