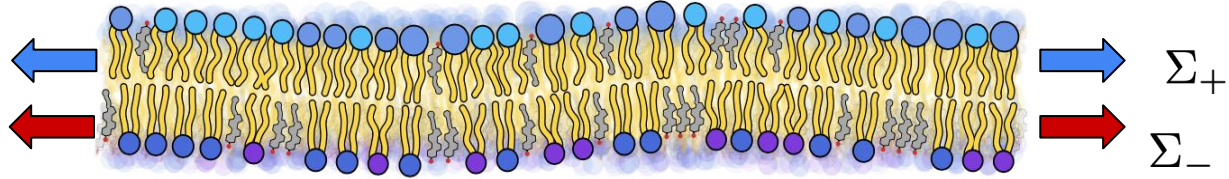


Measuring Differential Stress in GUVs

Group 1

Amer Al-Hiyasat, Agnish Behera, Billie Meadowcroft,
Carlo Giorgetti, Joel Hochstetter, Luyi Qiu,
Pragya Arora, Raghavendra Nimiwal, Tammy Qiu, Wei Wang

Overview

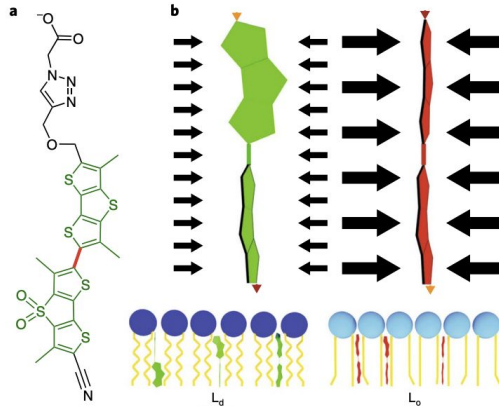


Differential Stress: $\Delta\Sigma = \Sigma_+ - \Sigma_-$

Total Tension: $\Sigma = \Sigma_+ + \Sigma_-$



GUV



Tension sensitive probe



Aspiration experiments

“Our” tension probe

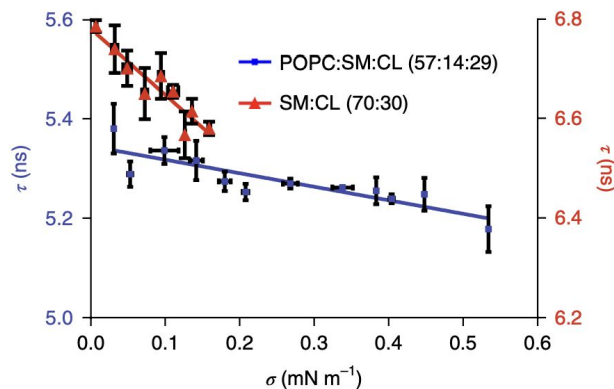
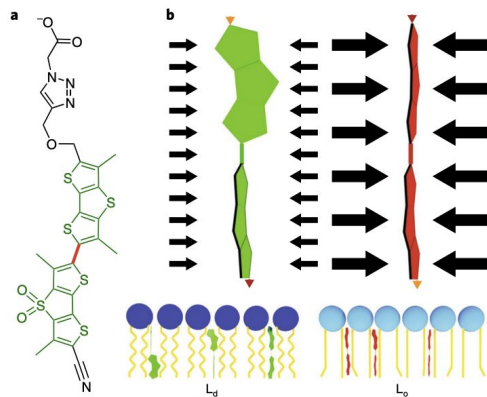
ARTICLES

<https://doi.org/10.1038/s41557-018-0127-3>

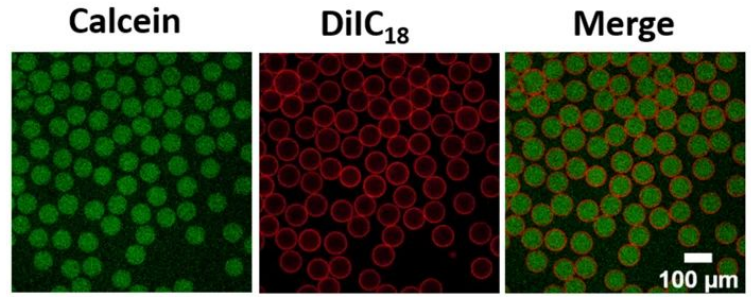
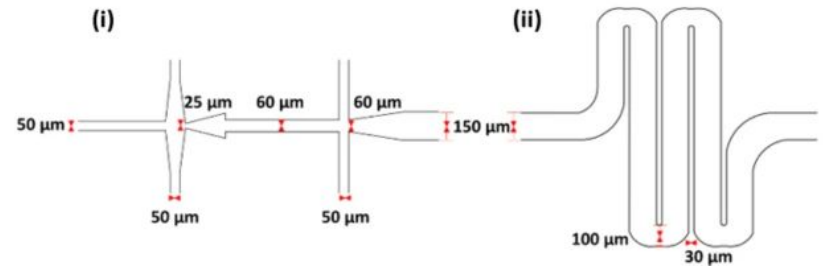
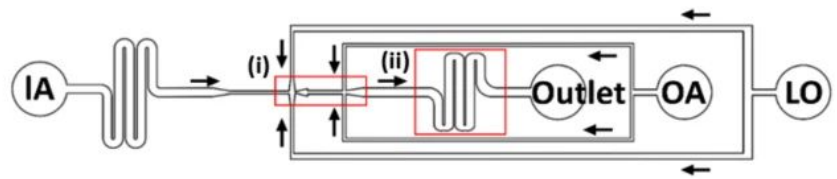
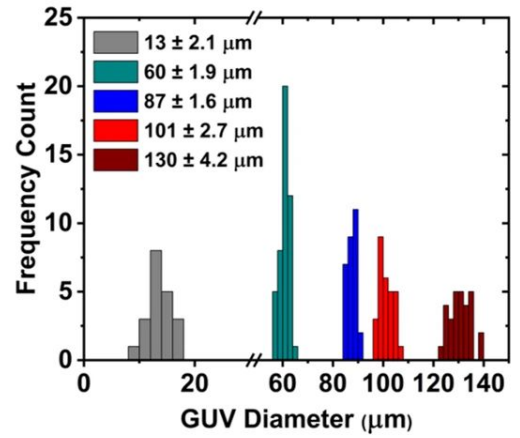
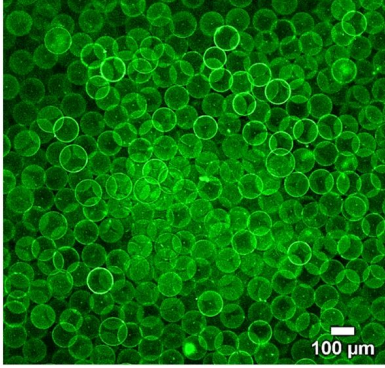
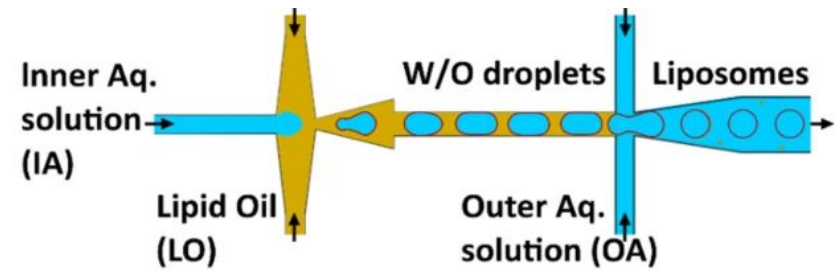
nature
chemistry

A fluorescent membrane tension probe

A dai Colom^{1,2,3}, Emmanuel Derivery^{1,2,3,4}, Saeideh Soleimanpour^{2,3}, Caterina Tomba^{1,3}, Marta Dal Molin^{2,3}, Naomi Sakai^{2,3}, Marcos González-Gaitán^{1,2,3}, Stefan Matile^{2,3} and Aurélien Roux^{1,2,3*}

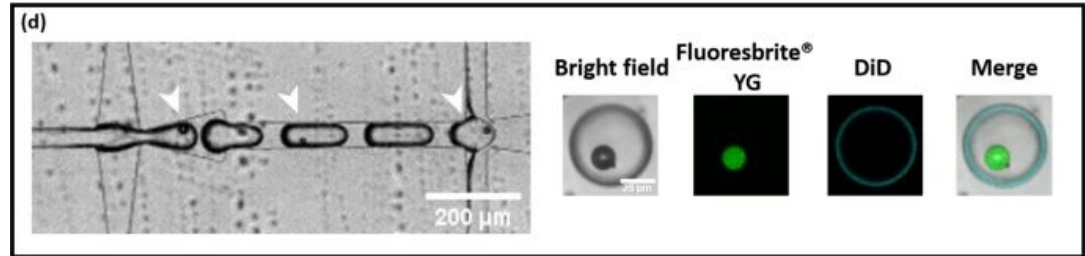
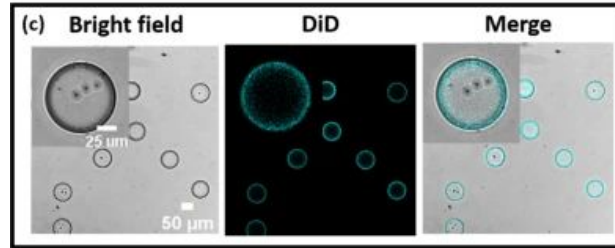
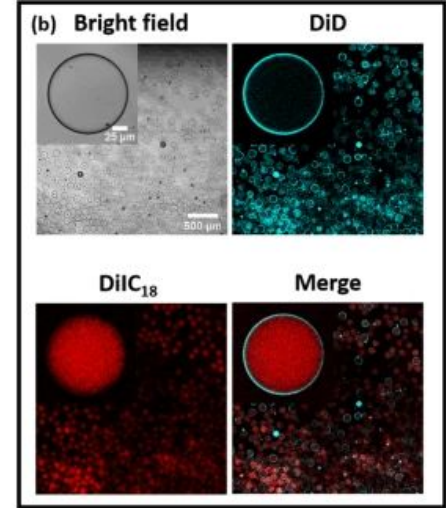
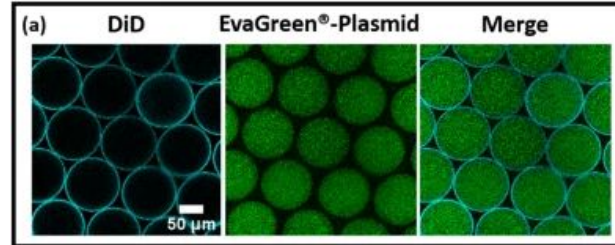


Production of biomimetic GUV



Production of biomimetic GUV

- High control of size
- High production rate
- High encapsulation efficiency

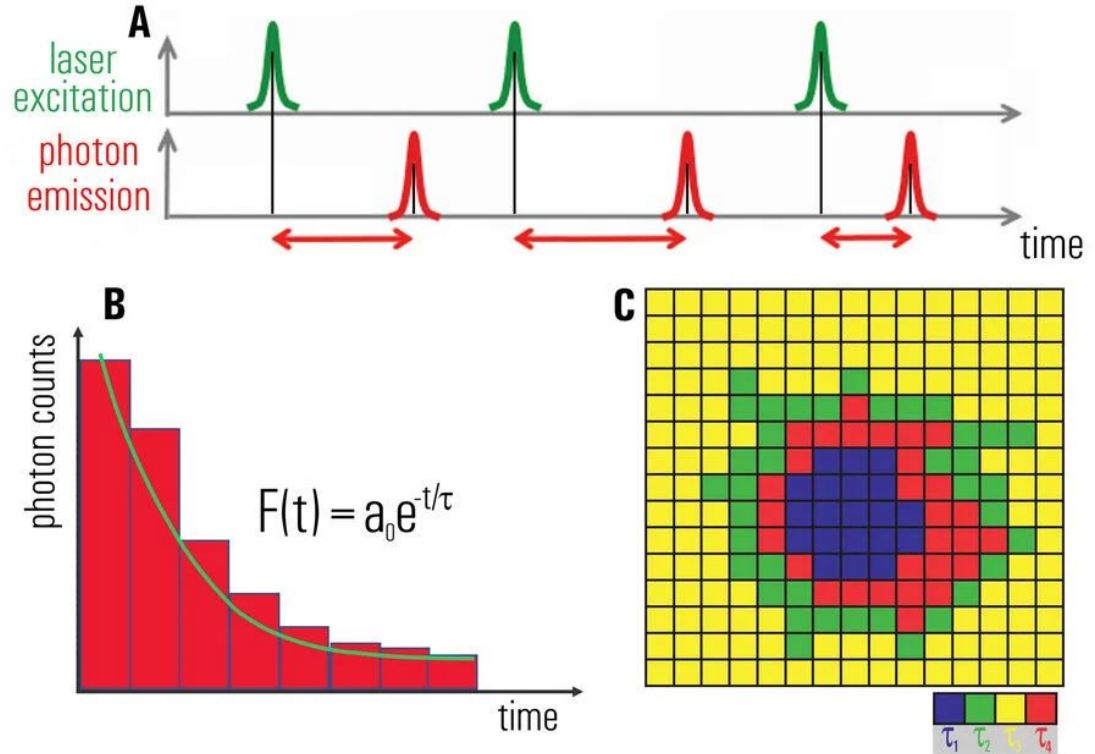


Principle of FLIM data acquisition and analysis

Fluorescence Lifetime
Imaging Microscopy

Not dependence on
concentration, absorption by
the sample, sample thickness,
excitation intensity

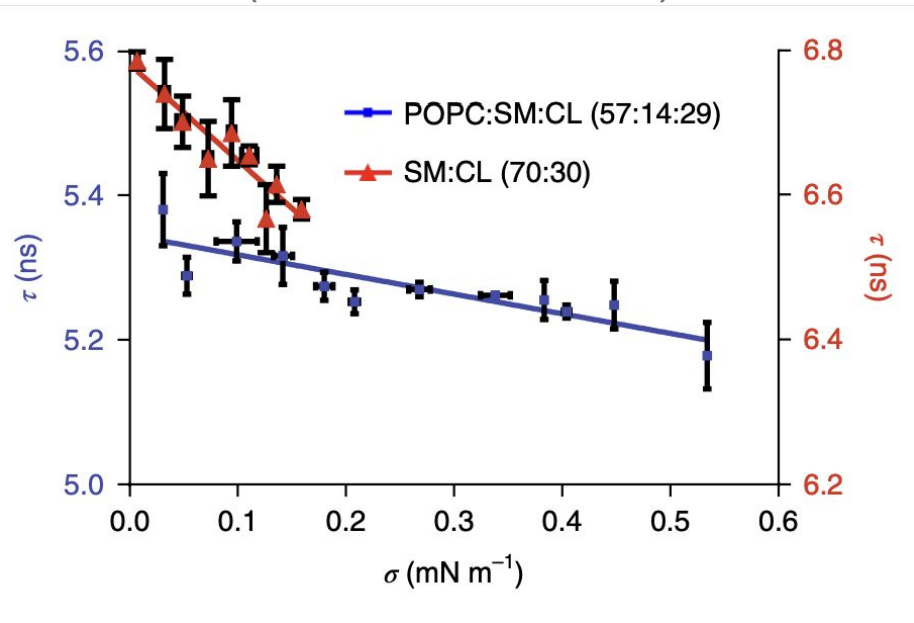
***More robust than intensity
based methods***



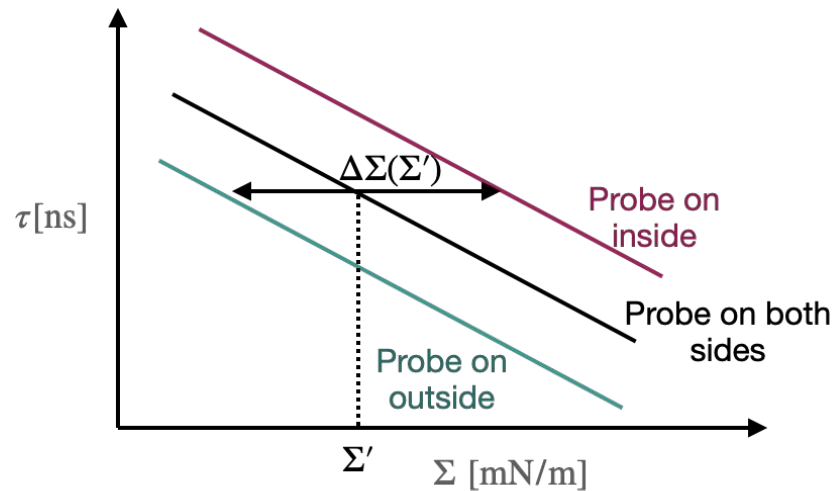
Extracting differential stress

Colom, A., et al *Nature Chem* **10**, 1118–1125 (2018)

(Probe on both sides of GUV)



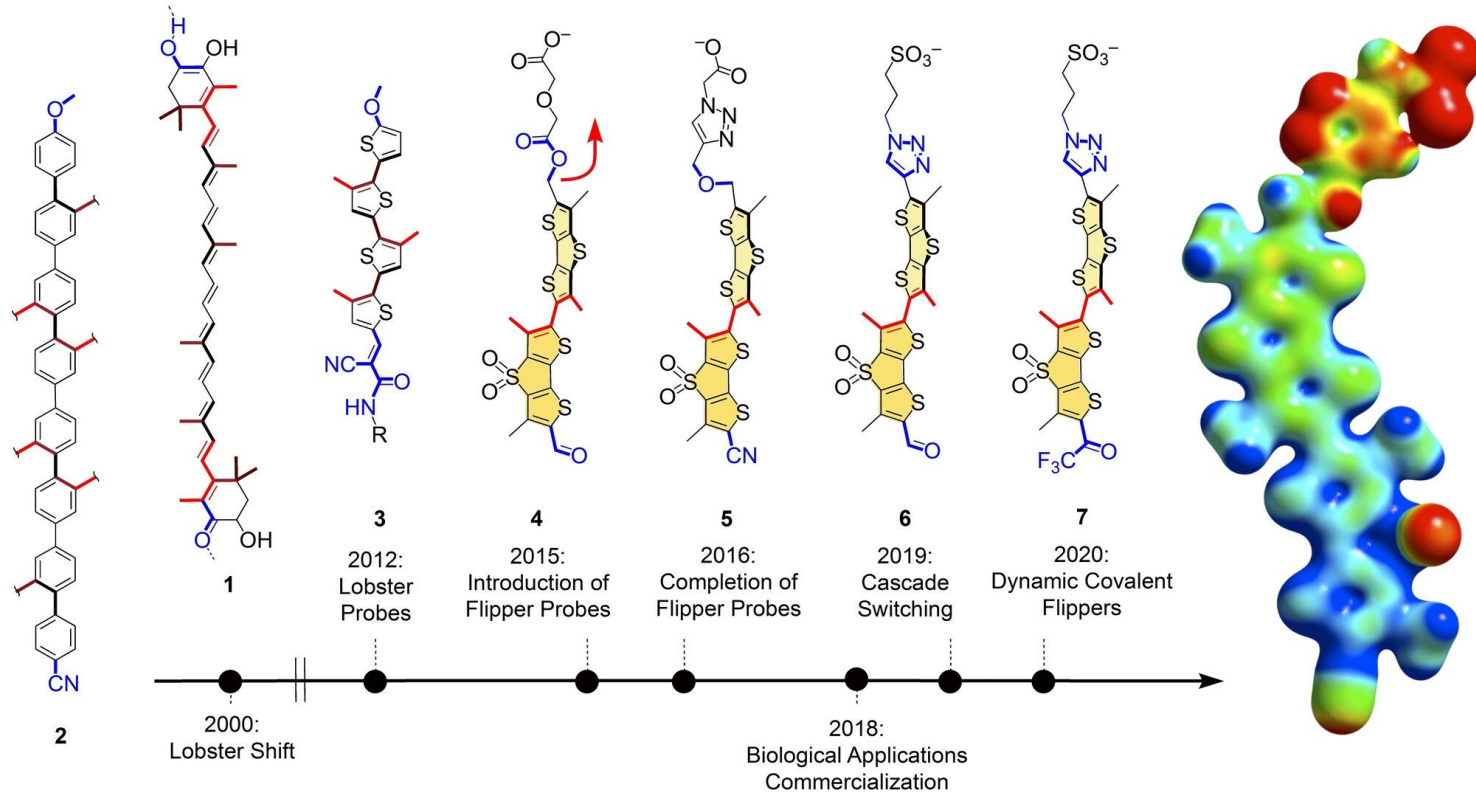
Our (future) results:



Bibliography

- Colom, Adai, et al. "A fluorescent membrane tension probe." *Nature chemistry* 10.11 (2018): 1118-1125.
- Chen, Xiao-Xiao, et al. "Fluorescent Flippers: Small-Molecule Probes to Image Membrane Tension in Living Systems." *Angewandte Chemie* 135.20 (2023): e202217868.
- Yandrapalli, Naresh, et al. "Surfactant-free production of biomimetic giant unilamellar vesicles using PDMS-based microfluidics." *Communications Chemistry* 4.1 (2021): 100.
- Ernits, Mart, et al. "Microfluidic production, stability and loading of synthetic giant unilamellar vesicles." *Scientific Reports* 14.1 (2024): 14071.

Major obstacle: FLIPPING OF PROBE



How long would such an experiment take, from start to finish? A week? A month? A year? Longer than a PhD thesis? POSTDOC!
How much would it cost?

Flipper-TR Kit For Fluorescence Cell Membrane Microscopy

Flipper-TR Kit, a probe for measuring plasma-membrane tension.

\$445.00

ADD TO CART

25mg

850467C-25mg

1 x 25mg 10mg/mL
2.5mL \$138.00

ADD TO CART

200mg

850467C-200mg

2 x 100mg
25mg/mL 4mL \$378.00



Price

I need a configuration or price info.

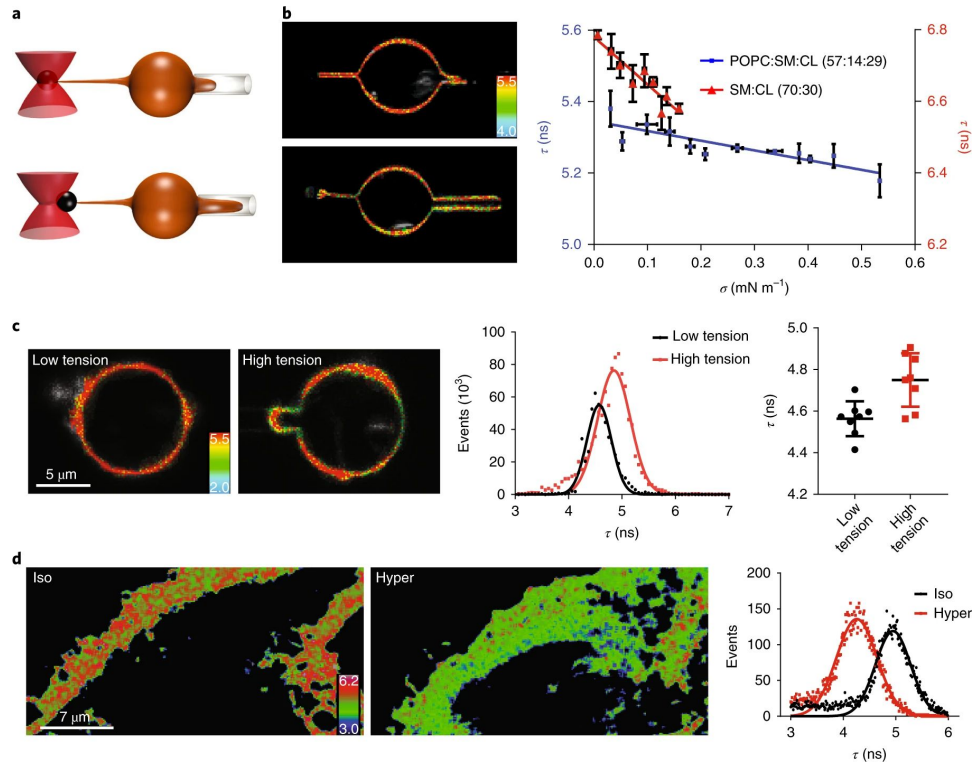


Demo

I need an on site or remote demo.

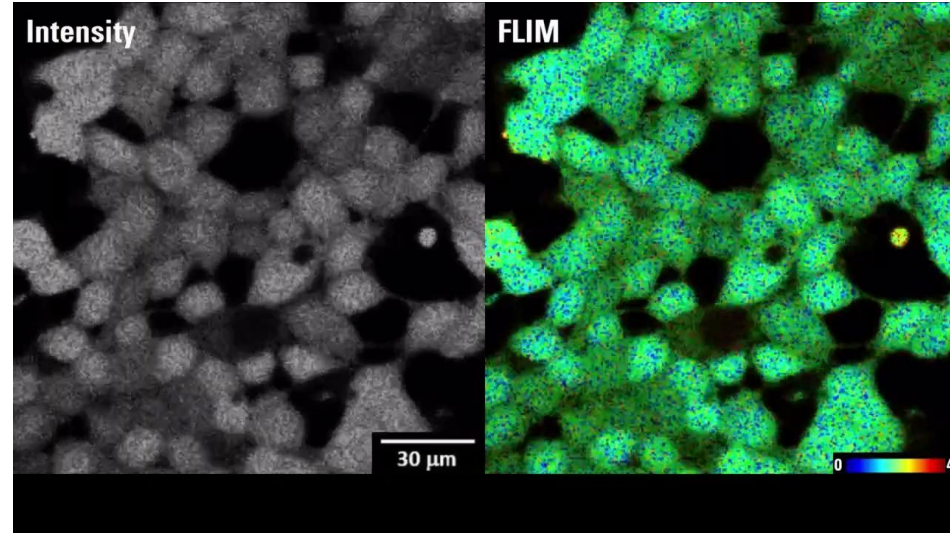
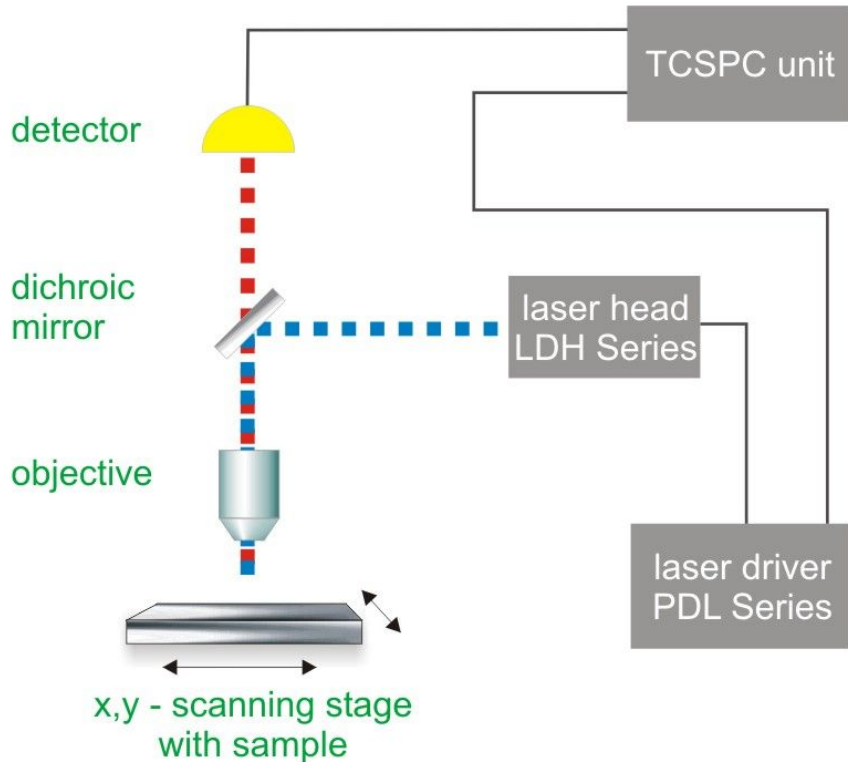
Step 3

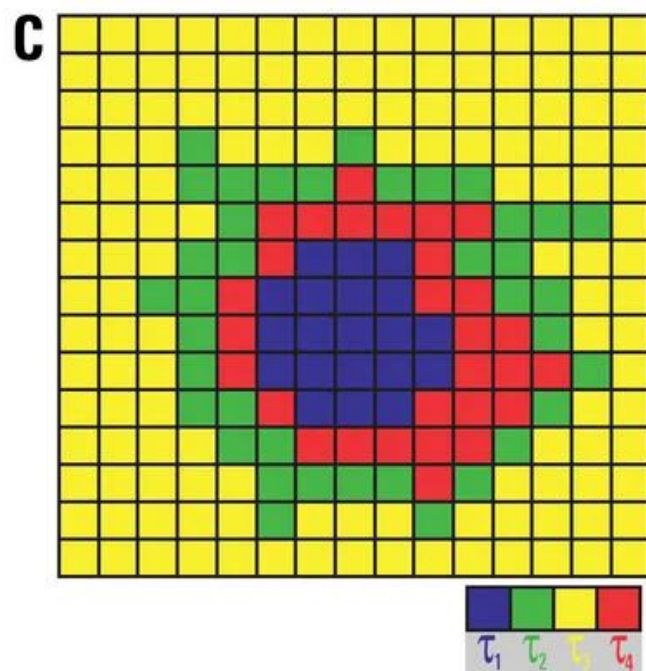
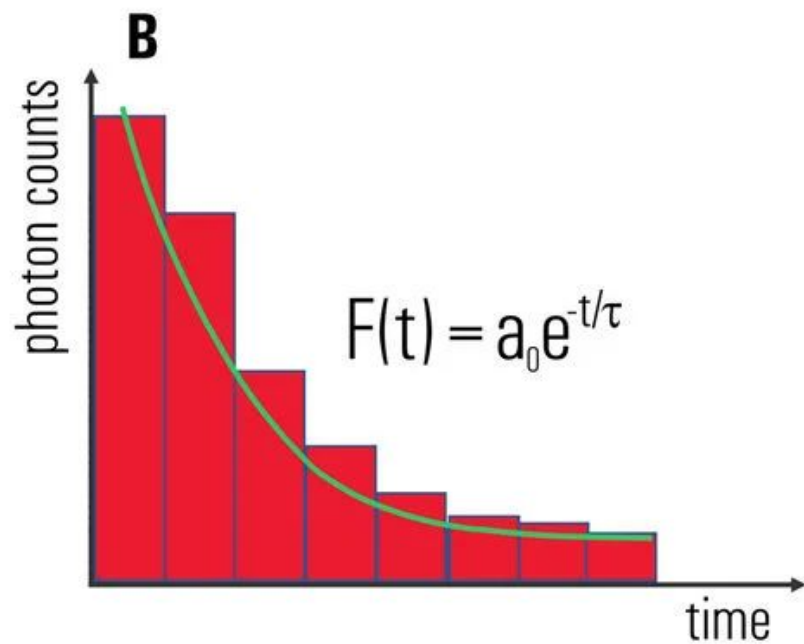
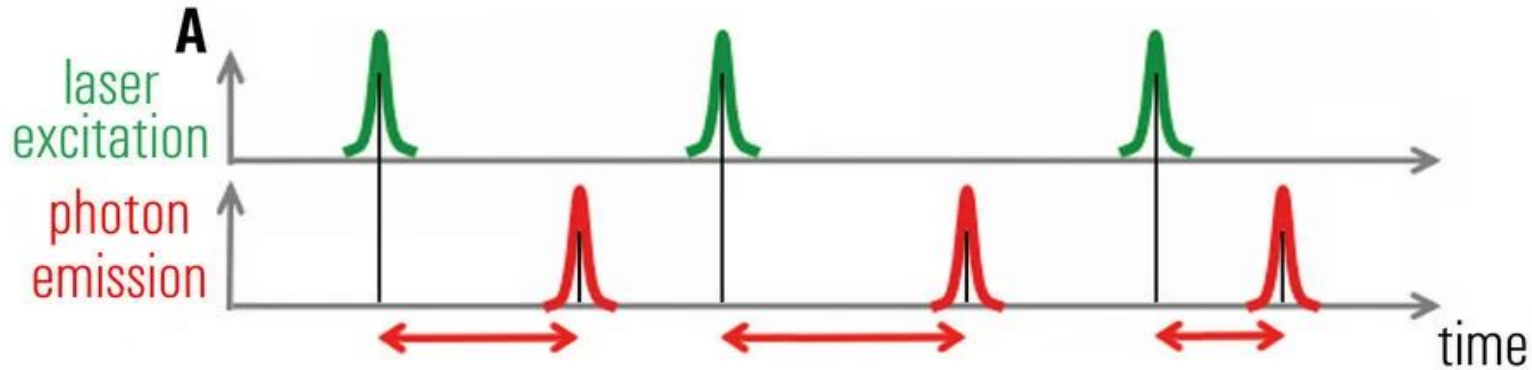
Control of flips Using functionalize flips

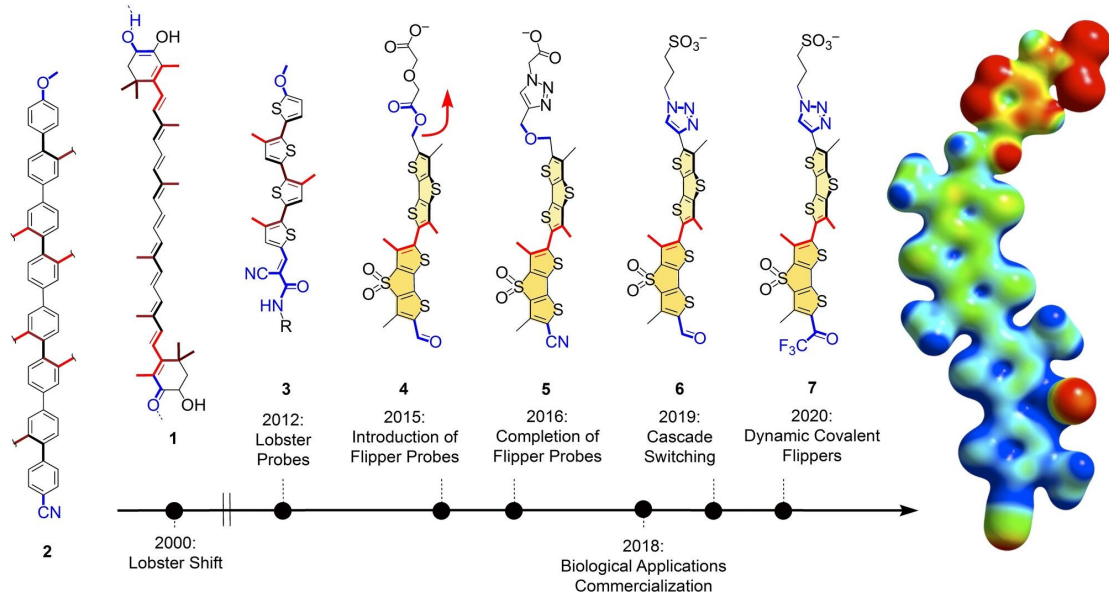


Principle of FLIM data acquisition and analysis

Time-Correlated Single Photon Counting (TCSPC) is used to determine the fluorescence lifetime. In TCSPC, one measures the time between sample excitation by a pulsed laser and the arrival of the emitted photon at the detector.







Differential Stress: $\Delta\Sigma = \Sigma_+ - \Sigma_-$

Total Tension: $\Delta\Sigma = \Sigma_+ - \Sigma_-$

$$\Sigma = \Sigma_- + \Sigma_+$$