Tethered particle diffusion on graphene

Patrick Schüler
Stefan Krause, Johann Bohlen, Tim Schröder, Philip Tinnefeld
Department of Chemistry and Center for NanoScience, Ludwig-Maximilians-Universität München, Butenandtstr. 5-13, 81377 München, Germany
Patrick.Schueler@cup.lmu.de

Graphene exhibits outstanding fluorescence quenching properties in a range up to ≈ 40 nm following a d^{-4} distance dependence [1, 2]. Additionally, it only absorbs 2.3 % of the visible light spectrum making graphene-on-glass coverslips sufficiently transparent for the application in state-of-the-art inverted microscopes [3,4].
Here we show an autocorrelation approach combined with fluorescence lifetime gating which has been used to study dynamic fluorescence intensity fluctuations caused by non-radiative energy transfer to graphene [5]. This gating approach offered the possibility to differentiate between photophysical and graphene-distance dependent intensity fluctuations. As an experimental platform a DNA origami structure [6] was developed consisting of a fluorescent dye, tethered to a DNA origami structure by a DNA double strand. This structure is able to perform a confined diffusion around its point of attachment and it is possible to sense protein binding as well as viscosity changes of the surrounding media.

References

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Figures

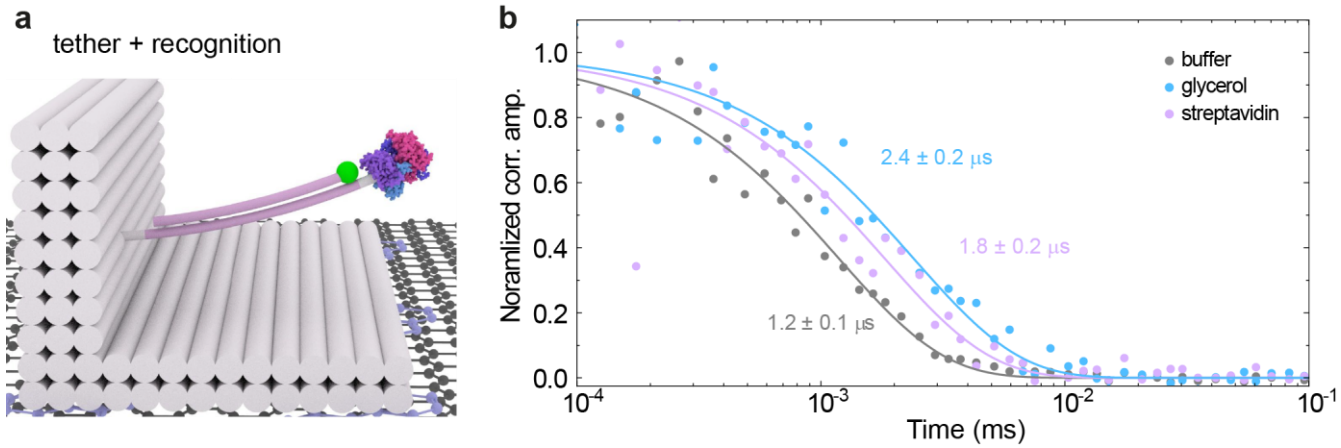

Figure 1: a DNA origami structure with bound protein **b** Autocorrelation curves of the dye on the biotin labelled tether in buffer, glycerol/buffer and after binding streptavidin.