Graphene Energy Transfer for Single-Molecule Experiments

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The high degree of broadband optical transmission of graphene [1] opens up many possibilities to use it as a substrate for optical spectroscopy over the whole visible wavelength range. It has been shown recently that graphene quenches fluorescence of organic dyes in a range up to ≈ 40 nm, following a d^{-4} distance dependence [2, 3]. In this talk, I will show how self-assembled DNA origami nanostructures [4] that are placed on top of a graphene layer enable the fluorescence quenching to be used for biophysics, biosensing and super-resolution microscopy applications [5] where we were able to detect the attachment and dynamics of biomolecules and can reach an axial resolution of < 3 nm on a standard fluorescence microscope. To obtain the required quality for single-molecule experiments on graphene, we developed an optimized protocol for the preparation of graphene-on-glass coverslips [6].
The range of examples shows the potential of graphene-on-glass coverslips as a versatile platform for single-molecule biophysics, biosensing, and super-resolution microscopy.

References

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Figures

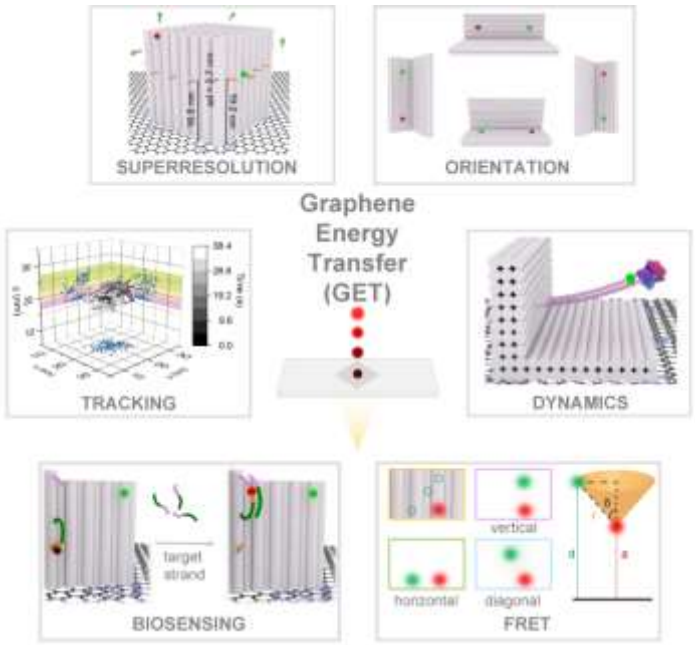

Figure 1: Applications of graphene for single-molecule biophysics, biosensing, and super-resolution microscopy.