



Proposition d'un stage M2 printemps 2018

Can fluorescent proteins be useful as biological oxygen sensors ?

Fluorescent proteins of the GFP-type are known to need the presence of molecular oxygen for maturation of the chromophore and hence fluorescence. This property led rapidly to the idea to use them not only as genetically encoded markers in cell microscopy for the localization of the targeted objects (mostly proteins) but also as an oxygen sensor with high structural resolution.

The problem with the maturation-dependent approach is that it works only for the first contact with oxygen. Once matured, the chromophore fluorescence is established and subsequent changes in oxygen level will have no impact on that. There is no time resolution. We ask the question whether it is possible to obtain, above the high spatial resolution, also a continued sensitivity to local oxygen level in the sample environment.

Considering the various pro's and con's, it becomes clear that, though highly desirable, the construction of an EGFP-based oxygen sensor with high spatial and temporal resolution is far from obvious and further in-depth characterization of the oxygen-related photophysics of EGFP is required.

In our team ("Pixel" at the IBS), at the crossing of crystallography, microscopy and spectroscopy of fluorescent proteins, we have the equipment, knowledge and habitudes to tackle the question.

We are looking for a student that is eager to apply her physical expertise to a fancy but capricious (class of) proteins that still hold ready the most interesting surprises.

The project consists of:

- learning to pilot the Cal(ai)2doscope, a versatile homebuilt fluorescence microspectrometer,
- measuring fluorescence kinetics in various protein samples under a range of conditions (illumination, environment)
- data treatment using Origin,
- and, in a feedback-loop manner, reflections on how to overcome the observed limitations.

Finally, in the team, the competences are available for mutagenesis and/or crystallography, if interest meets needs. There exists a possibility to apply for a PhD fellowship.

If you are interested, don't hesitate to contact

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