

Soutenance



THESE

Mardi 03 Mai 2022 à 15h

Salle des
séminaires IBS &
visioconférence

Institut de biologie structurale - 71 avenue des Martyrs CS 10090 38044 Grenoble Cedex 9 - T.+33 (0)4 57 42 85 00

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Groupe Dynamique et Cinétique des processus moléculaires

Time-resolved serial femtosecond crystallography at X-ray free electron lasers to study light-sensitive proteins on the ultra-fast time scale

Thèse de Doctorat de la Communauté Université Grenoble Alpes

X-ray free-electron lasers (XFELs), as large-scale facilities that produce highly brilliant and short X-ray pulses, allow the determination of the structure of fragile proteins to be solved from tiny microcrystals using a suite of techniques known as serial femtosecond crystallography (SFX). The goal of this Ph.D. work was to examine short-lived intermediates ranging from pico- to microseconds in two light-sensitive proteins using time-resolved SFX (TR-SFX) at XFELs.

The two systems that have been studied were a photoenzyme named fatty acid photodecarboxylase (FAP) and a reversible photoswitchable fluorescent protein (RSFP) named rsEGFP2. FAP is one of the three enzymes discovered so far whose catalytic activity requires a continuous flux of light. FAP, which harbors a FAD cofactor, is involved in the metabolism of lipids in microalgae and catalyzes the decarboxylation of free fatty acids to alkanes or alkenes in response to blue light. RSFPs and thus rsEGFP2 are essential tools in advanced fluorescence microscopy of live cells. They can be repeatedly toggled back and forth between a fluorescent (on) and a non-fluorescent (off) state by irradiation with light at two different wavelengths.

This work adds more insights to the understanding of enzymatic catalysis, rational design of proteins improving the application of super-resolution microscopy, and time-resolved structural biology to a broader extent.

L'accès au campus EPN nécessite un avis de rendez-vous,
merci de le demander, au moins 48h, à l'avance à ibs.seminaires@ibs.fr

Cette soutenance sera retransmise par visioconférence :

<https://univ-grenoble-alpes-fr.zoom.us/j/95994298675?pwd=Y1FIK0paWFlac250YWxkdGJOT0dhQT09>
(Meeting ID: 959 9429 8675, Passcode: 214609)