

**PHOTOENZYME AT WORK: STRUCTURAL DYNAMICS OF FATTY ACID
PHOTODECARBOXYLASE**

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Photoenzymes require sunlight for catalysis. Among those, the recently discovered fatty acid photodecarboxylase (FAP) catalyses the generation of hydrocarbons from lipids, a process that bears great promise for the production of biofuels. How the enzyme accomplishes its function at the molecular level remained mysterious, however. Observing the inner workings of FAP in both space and time has been accomplished by an international consortium of scientists [1] that combined molecular biology, biochemistry and experimental and computational methods: kinetic crystallography at the ESRF and serial femtosecond crystallography (SFX) at an XFEL, in crystallo spectroscopy at the icOS lab, time-resolved vibrational and optical spectroscopies, mutagenesis and quantum chemical calculations. In the presentation, the contribution of static and time-resolved SFX will be highlighted.

[1] Sorigué, Hadjidemetriou, Blangy, Gotthard, Bonvalet, Coquelle, Samire, Aleksandrov, Antonucci, Benachir, Boutet, Byrdin, Cammarata, Carbajo, Cuiné, Doak, Foucar, Gorel, Grünbein, Hartmann, Hienerwadel, Hilpert, Kloos, Lane, Légeret, Legrand, Li-Beisson, Moulin, Nurizzo, Peltier, Schirò, Shoeman, Sliwa, Solinas, Zhuang, Barends, Colletier, Joffre, Royant, Berthomieu, Weik, Domratcheva, Brettel, Vos, Schlichting, Arnoux, Müller, Beisson (2021). Mechanism and dynamics of fatty acid photodecarboxylase, 372(6538), eabd5687. <https://doi.org/10.1126/science.abd5687>