SFB 1078 Protonation Dynamics in Protein Function

# Colloquium

Mon, **Nov. 11**,2024

**15:15 – 17:30**

Freie Universität Berlin

SupraFAB, Room 201

(Altensteinstr. 23a, 14195 Berlin)

**Dr. Gustavo Fuertes Vives** – Institute of Biotechnology of the Czech Academy of Sciences, Czech Republic

## Triggering and monitoring biological responses in natural and engineered photoreceptors with genetically encoded non-canonical amino acids

Non-canonical amino acids (ncAA) introduced by genetic code expansion are useful tools to generate proteins with novel properties and functions. In the field of photosensory reception, ncAA can be leveraged in, at least, two different ways: as reporters to monitor light-induced structural rearrangements in photoactive proteins, and as phototriggers to initiate reactions upon irradiation of non-photoactive proteins. On the one hand, I will show the power of ncAA carrying vibrational tags (nitriles, alkynes) to detect the evolution of EL222 (a transcription factor regulated by blue light) microenvironments along the photocycle by infrared/Raman spectroscopies. On the other hand, I will present our efforts to photocontrol protein conformational changes (variants of photoactive yellow proteins devoid of its native chromophore) and protein-protein interactions (complex formation between interleukin-24 and is receptors) based on photocaged/photoswitchable ncAA. Overall, our integration of ncAA and vibrational spectroscopy sheds light on the structural dynamics of light-oxygen-voltage (LOV) sensors. Similarly, by merging ncAA and protein design, we can create new-to-nature photofunctional proteins.

**Prof. Dr. Peter Brezinski** – Professor of Biochemistry, Department of Biochemistry and Biophysics, Stockholm University, Sweden

## Structure and mechanism of respiratory supercomplexes

In the final steps of energy conservation in aerobic organisms free energy from electron transfer through the respiratory chain is transduced into a proton electrochemical gradient across a membrane. In mitochondria and many aerobic bacteria reduction of the dioxygen electron acceptor is catalyzed by cytochrome c oxidase (complex IV), which receives electrons from cytochrome bc1 (complex III), via membrane-bound or water-soluble cytochrome c. These complexes function independently, but in many organisms they associate to form supercomplexes. I will discuss the functional significance of the non-obligate III2IV1/2 *S. cerevisiae* mitochondrial supercomplex as well as the obligate III2IV2 supercomplex from Actinobacteria.

*C offee and tea will b e a vailable during the break at 16:15*

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