SFB 1078 Protonation Dynamics in Protein Function

Colloquium

Mon, **Feb. 27**, 2023
15:15 – 17:30

Freie Universität Berlin
Physics Department
Hörsaal B
(Arnimallee 14, 14195 Berlin-Dahlem)

Dr. Chen Song – Institut für Analytische Chemie, Universität Leipzig, DE

Solid-state NMR on trehalose-embedded phytochromes

Phytochromes represent a diverse family of photoreceptors that enable plants and microorganisms to adapt to changes in ambient light environment. Common to all phytochromes is the temperature-regulated thermal reversion. Despite methodological advances, short-lived photoproducts of phytochromes remain challenging for biophysical techniques such as solid-state NMR that require repetitive measurements due to rapid thermal reversion. To inhibit this light-independent reaction, we recently developed a simple method for photoproduct stabilisation by incorporating the protein into amorphous trehalose glasses (TGs). The resulting trehalose matrices exhibit the outstanding efficacy in this regard for long periods of time (weeks) at room temperature. More importantly, the advantages of trehalose–protein glassy matrices also allow to isolate individual transient reaction intermediates and to measure them separately under non-cryogenic conditions. In this talk, I will provide an overview of our recent solid-state NMR results of the TG-trapped photocycle states of a phytochrome-related cyanobacteriochrome which reflect changes in the local electronic structure, geometry, dynamics, and charge distribution of the chromophore during the photocycle.

Prof. Indra Schröder – Institut für Physiologie II, Universitätsklinikum Jena, DE

Investigating the principles of gating in the model system of minimal viral potassium channels

Potassium channels integrate a wide range of physiological cues to translate them into electrical signals. This is possible due to the modular build of this protein class and an intricate network of interactions between the pore and regulating protein domains. However, this complexity also poses a huge challenge. Minimal viral proteins of the Kcv family are prototypical potassium-selective channels that allow us to take a step back and investigate the isolated pore domain, unaffected by evolutionary adaptation to regulating domains. The high reliability and kinetic reproducibility of these channels in single-channel recordings in artificial bilayers let us determine experimental parameters that are also accessible to computational methods, for example the ion occupation in the binding sites of the selectivity filter, which regulate selectivity filter gating.

Coffee and tea will be available during the break from 16:15-16:30. www.sfb1078.de

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