

# Using Azobenzene Photocontrol to Set Proteins in Motion

Peter Hamm

*Department of Chemistry, University of Zurich, Switzerland*

Controlling the activity of proteins with azobenzene photoswitches is a potent tool for manipulating their biological function. With the help of light, one can change e.g. binding affinities, control allostery or temper with complex biological processes. Additionally, due to their intrinsically fast photoisomerisation, azobenzene photoswitches can serve as triggers to initiate out-of-equilibrium processes. Such switching of the activity, therefore, initiates a cascade of conformational events, which can only be accessed with time-resolved methods; in particular transient IR spectroscopy. We will show how combining the potency of azobenzene photoswitching with transient spectroscopic techniques helps to disclose the order of events and provide an experimental observation of biomolecular interactions in real-time, see Fig. 1 [1-5]. This will ultimately help us to understand how proteins accommodate, adapt and readjust their structure to answer an incoming signal and it will complete our knowledge of the dynamical character of proteins.

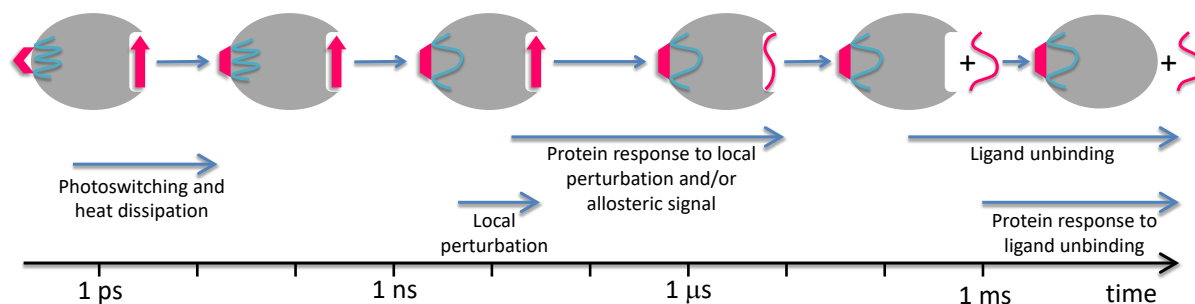


FIG. 1. Full sequence of events of allosteric propagation inside a protein domain and ultimate ligand unbinding together with their typical timescales.

- [1] O. Bozovic, B. Jankovic and P. Hamm, Using Azobenzene Photocontrol to Set Proteins in Motion, *Nature Rev. Chem.*, 2021, in press
- [2] B. Jankovic, O. Bozovic and P. Hamm, *J. Phys. Chem. Lett.* 2021, 21, 5201-5207
- [3] B. Jankovic, J. Ruf, C. Zanobini, O. Bozovic, D. Buhrke, and P. Hamm, *Biochemistry* 2021, 60, 1755-1763
- [4] O. Bozovic, J. Ruf, C. Zanobini, B. Jankovic, D. Buhrke, P. J. M. Johnson, and P. Hamm, *J. Phys. Chem. Lett.*, 2021, 12, 4262
- [5] O. Bozovic, C. Zanobini, A. Gulzar, B. Jankovic, D. Buhrke, M. Post, S. Wolf, G. Stock and P. Hamm, *Proc. Natl. Acad. Sci. USA*, 2020, 117, 26031