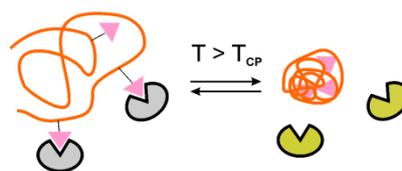

Bachelor or Master Thesis – Switching of enzyme activity by thermoresponsive polymers

The chair of Polymer Materials and Polymer Technologies offers interdisciplinary **bachelor- and master theses** for chemists, biologists or biotechnologists. As the chair is a joint appointment between the University of Potsdam and the Fraunhofer-Institute for Applied Polymer Research (IAP), we are located at the interface between fundamental and application driven research.

The regulation of enzyme activity has been of great interest for decades due to its broad application potential in fields such as sensors, (bio-)medicine, and bioelectronics. As versatile as the application fields are, so are the used regulating factors and mechanisms like ionic strength, pH, surface area, temperature, light, and others. Especially for temperature-controlled systems, thermoresponsive polymers have been used a lot to regulate enzyme activity.

Recently, we managed establish a new kind of temperature driven regulation of enzymatic activity making use of specific inhibitory motifs that are bound to thermoresponsive polymers. By a transgression through the cloud point of the polymer, the latter precipitates thereby lowering the concentration of inhibitor in solution, which causes a reactivation of the hitherto inhibited enzyme (see Scheme below). So far, the concept has been successfully demonstrated on the system Acetylcholinesterase/ Tacrine [1]. However, in order to demonstrate broad applicability, we want to widen the approach to other enzyme/inhibitor combinations. On top of that, we want to gain a deeper understanding of the switching process on the molecular level.

The project involves polymer synthesis, handling of enzymes, performance of enzyme activity assays as well as deeper investigations on polymer/enzyme interactions including isothermal titration calorimetry. Consequently, the project is settled at the interface between biotechnology, synthetic polymer chemistry and analytics.



If you are interested and feel encouraged to work on this topic, contact Dr. Stefan Reinicke for more information.

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