**NMR spectroscopy examination of the interactions of Poly(N-isopropylacrylamide) with ordered and disordered proteins**

**Poly(N-isopropylacrylamide) (PNIPAAm) is widely applied in medical science, its interactions with different proteins have never been extensively studied so far. Our experiments focused on the interactions between PNIPAAm and two proteins of different structural properties. The proteins selected as model systems that have good water solubility, have been studied earlier so their structure is known and are sufficiently small that potential atomic-level interaction studies could be conducted.**

**The 44-residue-long tβ4 is an actin binding small protein that belongs to the group of IDPs and is disordered throughout its full sequence. NMR and UV-visible spectroscopy studies showed that the critical solution temperature of PNIPAAm does not change upon the addition of tß4 but the reversibility is incomplete over multiple thermal cycles, indicating that the molecules interact with each other. The time-dependent changes of the N-terminal half provided the atomic level proof of this interaction.**

**Next, the well-structured Tc5b miniprotein and its double point mutant (D9Q and S20Q) variant, (termed Tc5bQQ having 20 residues) was studied. The NMR and UV-visible spectroscopy studies confirmed the interactions of PNIPAAm with Tc5bQQ proteins at the concentration-dependent manner of the polymer. While the critical solution temperature shifted in the positive direction, the reversibility was unchanged. Using atomic level study of Tc5bQQ, the changes were mostly mapped on the helical glutamates and each of the extrahelical glycine and serine residues.**