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Towards a Comprehensive Picture of Temperature-responsive Elastin-like Peptides

Elastin-like peptides (ELPs) mimic the hydrophobic repeat units of elastin, a protein rendering biological tissues such as lung, ligaments and blood vessels elastic. ELPs collapse hydrophobically upon crossing a lower critical solution temperature (LCST). Due to their stimulus-responsive properties, ELPs are of interest for many application areas including biomaterials, protein purification and drug delivery. However, a comprehensive mechanistic characterisation of the static and dynamic aspects of the collapse has not yet been obtained. By combining SANS, QENS, molecular dynamics simulations and selective deuteration, we investigate the temperature response of selectively deuterated ELPs. Here, we focus on the SANS data which reveal differences in the behaviour of short and long ELPs. In agreement with simulations, a shift towards more compact ELP structures with increasing temperature is observed. Based on our results, we aim at establishing a framework for the investigation of stimulus-responsive molecules and materials.

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