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Fundamental Studies on Elastin-Like Oligo- and Polypeptides

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Abstract
The potential applications afforded by elastin-based materials are primarily a product of their stimulus-responsive nature at both the microscopic and macroscopic level. The details of this report are intended as an investigation of stimulus response at or near condition boundaries.

The first description of elastin-like peptides, or ELPs, presented here is considered to be largely relevant to the advent of protein engineering.

Guest residue modulation offers a potential control of both temperature stimulation and chemical functionality. The reported influence of ELPs with Tryptophan (Trp), Tyrosine (Tyr), or Histamine (His) at lengths defined by n $\leqslant$6 were studied in a context relevant to protein engineering. Primary results indicate that recombinantly expressed ELPs can exert a distortion of local secondary structure; further, under the constraints of system design, the hydrophobicity of guest residue and number of pentapeptide repeats did not exert a significant influence in determination of the temperature value associated with conformation change, T_t.

The second description of elastin-like proteins, or ELPs, is of their use as a molecular probe. Ionic liquids are a novel class of solvents for which the potential application is still being realized. Generally, the literature reports of macroscopic phase behavior describe the solvency of macromolecules by ionic liquids and potential cosolvent mixtures, to an extent. There remains, however, a need to expand on the relationship between micro- and macroscopic transitions of elastin-like molecules. In this work, the phase behavior of an ELP having a particular defined length (n=128), concentration (C=20μM), and sequence (X=V) was considered in the context of four IL/buffer mixtures. Primary results support a description of the variation in phase behavior with IL/buffer composition that can largely be defined according to the physical properties of the complicated IL anion relationship between the physical properties of the anion and the solvent strength of the ionic liquid.

Ultimately, this report is intended to provide a novel description of elastin-based materials, such that the information will be useful to the development of two highly relevant technologies: protein engineering and green solvents.

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