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Using Elastin-Like Polypeptides for Better Retention of Biofuels

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ABSTRACT

Elastin-like polypeptides (ELPs) are synthetic molecules that exhibit an interesting property of inverse temperature phase transition; they exist as soluble monomers at low temperatures and form insoluble aggregates at higher temperatures. The transition temperature depends on the pH, salt concentration, and the amino acid sequence of the ELP. This unique and reversible behavior, along with their high biocompatibility has made them a strategic tool for various biomedical applications. However, their hydrophobic properties also make them a prime candidate for biofuel production. As high levels of many commercially important organic solvents are toxic to the cells that make them, ELPs can potentially alleviate the strain on cells by aggregating around the hydrophobic product. ELP's are simply purified by exploiting their phase transition property and through serial centrifugation at different temperatures. The retention of various bio-products and the cell survivability was analyzed for E. coli containing ELPs both in vivo and in vitro. Confocal microscopy and fluorescence measurements were used to verify the results. The present study provides proof of principle that ELPs have high affinity with certain commercially important biologics and can be a strategic tool to increase their yield.

KEYWORDS

Elastin-Like Polypeptides, Biofuels, Inverse Temperature Phase Transition