POPULATION-BASED HETEROPOLYMER DESIGN TO MIMIC PROTEIN MIXTURES IN BIOLOGICAL FLUIDS

Tech ID: 33009 / UC Case 2023-061-0

PATENT STATUS

Patent Pending

BRIEF DESCRIPTION

Biological fluids are complex, with compositions that vary constantly and evade molecular definition. Nevertheless, within these fluids proteins fluctuate, fold, function, and evolve as programmed. Synthetic heteropolymers capable of emulating such interactions would replicate how proteins behave in biological fluids, individually and collectively, leading the way toward synthetic biological fluids. However, while there exist known monomeric sequence requirements, the chemical and sequence characteristics of proteins at the segmental level, rather than the monomeric level, may be the key factor governing how proteins transiently interact with neighboring molecules (and how biological fluids collectively behave).

To address this opportunity, UC Berkeley researchers have developed a new process of heteropolymer design for protein stabilization and synthetic mimics of biological fluids. The process leverages chemical characteristics and sequential arrangements along protein chains at the segmental level to design heteropolymer ensembles as mixtures of disordered, partially folded, and folded proteins. In studies, for each heteropolymer ensemble, the level of segmental similarity to that of natural proteins determines its ability to replicate many functions of biological fluids, including: assisting protein folding during translation; preserving the viability of fetal bovine serum without refrigeration; enhancing the thermal stability of proteins; and, behaving like synthetic cytosol under biologically relevant conditions. Molecular studies further translated protein sequence information at the segmental level into intermolecular interactions with a defined range, degree of diversity and temporal and spatial availability.

SUGGESTED USES

» Protein stabilization and synthetic mimics of biological fluids

» Engineering bio/abiotic hybrid materials, and ultimately, realizing matter-to-life transformations

ADVANTAGES

» Population-based heteropolymer design

RELATED MATERIALS

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OTHER INFORMATION

CATEGORIZED AS

» **Biotechnology**

» Health

» Other

» Proteomics

» **Materials & Chemicals**

» Biological

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» Research Tools

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ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Bioactive Plastics With Programmable Degradation And Microplastic Elimination
- Near Complete Depolymerization Of Polyesters With Nano-Dispersed Enzymes
- Synergistic Enzyme Mixtures to Realize Near-Complete Depolymerization in Blends
- Self-Assembled Concentric Nanoparticle Rings To Generate Orbital Angular Momentum
- Thermal Stabilization Of Embedded Proteins
- Preserving Protein Function Via Statistically Random Heteropolymers

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