THERMAL STABILIZATION OF EMBEDDED PROTEINS

Tech ID: 33661 / UC Case 2025-003-0

PATENT STATUS

Patent Pending

BRIEF DESCRIPTION

Preserving the functionality of biological molecules within synthetic environments remains a significant challenge in materials science. To address this, researchers at UC Berkeley have developed specialized plastic compositions designed to dramatically enhance the thermal stabilization of embedded proteins. These compositions utilize a strategic blend of salts and optional polymeric protectants to create a supportive microenvironment for the protein. By leveraging a synergistic effect between the salt and the polymer, the material prevents protein denaturation even when exposed to high temperatures that would typically lead to structural failure. This innovation allows for the creation of "living plastics" and bio-hybrid materials that maintain enzymatic or biological activity under demanding industrial or environmental conditions.

SUGGESTED USES

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Self-Decontaminating Surfaces: Creating plastics for healthcare or food-processing environments that contain embedded enzymes capable of breaking down biofilms or pathogens.

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Biocatalytic Materials: Developing robust plastic films or beads embedded with enzymes for use in industrial chemical synthesis or plastic recycling.

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Biosensing Strips: Manufacturing durable, heat-stable diagnostic tools where embedded proteins must remain active during transport and storage in varying climates.

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Smart Packaging: Integrating active proteins into food packaging to monitor spoilage or actively extend shelf life by scavenging oxygen or ethylene.

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Environmental Remediation: Engineering plastic-based filters embedded with proteins designed to capture or neutralize heavy metals and toxins from warm wastewater streams.

ADVANTAGES

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Superior Heat Resistance: The synergistic interaction between the salts and random heteropolymers allows proteins to survive processing temperatures that would otherwise destroy them.

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Extended Shelf Life: Stabilization significantly reduces the degradation of biological components over time, minimizing the need for specialized cold-chain logistics.

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High Biological Activity: Unlike traditional encapsulation methods that can block active sites, this stabilization method maintains the protein's native conformation and functional efficiency.

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Versatile Integration: The compositions are compatible with various plastic types, allowing for the functionalization of diverse consumer and industrial products.

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Reduced Material Costs: By increasing the durability of the embedded biological agents, fewer proteins are required to achieve the desired functional effect over the lifetime of the product.

RELATED MATERIALS

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

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INVENTORS

» Xu, Ting

OTHER INFORMATION

CATEGORIZED AS

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RELATED CASES

2025-003-0

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- 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
- Population-Based Heteropolymer Design To Mimic Protein Mixtures In Biological Fluids
- Preserving Protein Function Via Statistically Random Heteropolymers

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