Methods and Compositions for Protecting Gram-Negative Bacteria from Thermal and Osmotic Stress During Dehydration Using Gelatin

Tech ID: 34733 / UC Case 2026-448-0

ABSTRACT

Researchers at the University of California, Davis have developed a protein-based composition and method that protects bioactive bacteria from thermal and osmotic stress during dehydration to maintain viability and shelf life.

FULL DESCRIPTION

This technology involves a bioformulation strategy combining protein-based compositions, such as type A gelatin or other amphoteric biopolymers, with thermal drying methods like spray drying to produce shelf-stable, bioactive microbes. The protein matrix protects bacterial cells from the damaging effects of heat and osmotic stress during drying and storage, resulting in commercially scalable probiotics and microbial biostimulants for human, animal, plant, and soil health applications. The formulation can be optimized by adjusting pH and including excipients like osmoprotectants and oxygen scavengers to further enhance viability and stability.

APPLICATIONS

- Human and animal probiotic dietary supplements.
- Functional foods incorporating beneficial bacteria.
- Microbial biostimulants for sustainable agriculture and soil health.
- Seed coatings with nitrogen-fixing bacteria.
- Pharmaceuticals and nutraceuticals requiring stabilized bioactive microbes.

FEATURES/BENEFITS

- Improves bacterial viability by protecting microbes during thermal drying processes.
- Extends shelf life and maintains bioactivity of dried microbial products.
- Reduces production cost and scales efficiently for commercial manufacturing.
- Enables formulation flexibility by using proteins, polysaccharides, and soluble fibers as protective matrices.
- Optimizes encapsulation performance by tuning pH and excipient composition.
- Enables industrial drying of sensitive bioactive cargos that are otherwise unsuitable for standard processes.
- Provides cost-effective encapsulation approaches for probiotics and microbial biostimulants.

PATENT STATUS

Patent Pending

CONTACT

Amir J. Kallas
ajkallas@ucdavis.edu
tel: .



INVENTORS

- Carciofi, Bruno
- Jeoh, Tina
- Makeev, Emily

OTHER INFORMATION

KEYWORDS

bioactive cargo, bioformulation, dehydration, encapsulation, gelatin, osmoprotectant, probiotics, spray drying, thermal stress, viability

CATEGORIZED AS

- **Agriculture & Animal Science**
  - Chemicals
  - Nutraceuticals
  - Plant Traits
  - Processing and Packaging
- **Biotechnology**
  - Food
  - Health
  - Other
  - Proteomics
- **Materials & Chemicals**
  - Agricultural
  - Biological
  - Chemicals
  - Polymers

RELATED CASES

2026-448-0

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- A Spray-Drying Method for Encapsulating Biological Molecules in Cross-linked Alginate Microcapsules
- Protection of Beneficial Microbes During Spray Drying Using Food, Ag, or Forestry Residues
- Spray Dry Method for Calcium Cross-linked Alginate Encapsulation of Biological and Chemical Moieties via the Use of Chelating Agents
- One Step Process of Forming Complex Coacervation During Spray Drying

University of California, Davis
Technology Transfer Office
1 Shields Avenue, Mrak Hall 4th Floor,
Davis,CA 95616

Tel: 530.754.8649
techtransfer@ucdavis.edu
https://research.ucdavis.edu/technology-transfer/
Fax: 530.754.7620

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