Spray Dry Method for Calcium Cross-linked Alginate Encapsulation of Biological and Chemical Moieties via the Use of Chelating Agents

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ABSTRACT

Researchers at the University of California, Davis have developed a one-step spray dry calcium cross-linked alginate encapsulation process where the calcium is released from a chelating agent.

FULL DESCRIPTION

Microencapsulation of biological molecules, cells, and chemicals is often used in food and pharmaceutical industries to increase the stability and shelf life of the encapsulated material and to control the pattern of release. Among encapsulation matrices, alginate is preferred due to its low-cost, biodegradability, and biocompatibility. Traditional alginate droplet-calcium bath encapsulation procedures are difficult to scale up and often produce undesirably large alginate beads.

Researchers at the University of California, Davis developed a method for the production of Cross-linked Alginate Microcapsules (CLAMs) using a single step spray drying process which utilizes a calcium chelating agent and volatile base. The reduction in pH with volatilization of the base releases calcium ions from the calcium-chelate complex initiating alginate cross-linking. Particle size is in the range of 5-10 microns and the degree of cross-linking and hence release rate can be controlled by the level of calcium ion introduced. The process is flexible enough to accommodate other anionic polymers. In addition, the process can be modified to produce fibers or films.

APPLICATIONS

- Can be used to encapsulate pharmaceuticals, food additives, nutraceuticals

FEATURES/BENEFITS

* One step spray dry process

- Alginate is natural polymer that is both biogradable and biocompatible
- Alginate matrix particle is uniformly cross-linked
- Release rate from cross-linked alginate matrix particle can be controlled by adjusting cross-link density
- Process can accommodate other anionic polymers

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	12,018,135	06/25/2024	2017-123

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OTHER INFORMATION

KEYWORDS

Alginate Encapsulation, Spray Drying, Calcium-Mediated Cross-linking

CATEGORIZED AS

- **Agriculture & Animal Science**
  - Processing and Packaging
- **Biotechnology**
  - Food
  - Health
  - Industrial/ Energy
- **Engineering**
  - Engineering
- **Materials & Chemicals**
  - Agricultural
  - Polymers

RELATED CASES

2017-123-0

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
- One Step Process of Forming Complex Coacervation During Spray Drying

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