Extruded Hydrogel Manufacturing Method for Adherent Cell Culture

Tech ID: 34411 / UC Case 2026-372-0

ABSTRACT

Researchers at the University of California, Davis have developed a method for producing aligned, food-grade hydrogel fibers at high throughput for scalable cultivated meat manufacturing.

FULL DESCRIPTION

This technology enables the rapid production of aligned hydrogel fibers through instant ionic crosslinking of food-grade sodium alginate in a stirred whirlpool bath. By extruding an alginate solution into a spinning crosslinker bath, continuous hydrogel fiber bundles with diameters are formed, with individual fiber diameters that are 100-200 μm. These fibers facilitate muscle cell alignment critical for structured cultivated meat products, offering significantly higher throughput than existing methods like electrospinning or bioprinting, with scalability suited for industrial cultivated meat manufacturing.

APPLICATIONS

- Scaffold production for cultivated meat manufacturing, especially structured products like steaks.
- Muscle tissue engineering and regenerative medicine requiring aligned cell scaffolds.
- Biomanufacturing processes demanding high-throughput hydrogel fiber materials.
- Food industry applications for alternative protein and cultured meat solutions.
- Research tools for cell culture laboratories focusing on muscle cell alignment and growth.

FEATURES/BENEFITS

- Delivers high throughput production rates (kilograms per hour), greatly surpassing electrospinning and bioprinting methods.
- Ensures safety and regulatory compliance by using food-grade (FCC) sodium alginate.
- Produces aligned fibers that support optimal muscle cell culture and tissue structure.
- Precisely controls fiber diameters between 100–200 microns for enhanced biological relevance.
- Enables continuous fiber formation for scalable and efficient manufacturing.
- Simplifies operation through ambient air extrusion and a stirred crosslinker bath.
- Overcomes low throughput and poor scalability in existing hydrogel scaffold production.
- Reduces costs and simplifies processes by eliminating complex polymer purification in cell culture hydrogels.
- Enables the fabrication of biologically relevant aligned fibers to accurately mimic native muscle structure.

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OTHER INFORMATION

KEYWORDS

alginate, cell culture, cultivated meat, food-grade, hydrogel, fiber alignment, muscle cell culture, myoblast alignment, polysaccharide processing, scalable production, scaffold, tissue engineering, whirlpool bath

CATEGORIZED AS

- **Agriculture & Animal Science**
  - Animal Science
- **Biotechnology**

- Addresses barriers in manufacturing structured, steak-like cultivated meat products.
- Mitigates environmental and supply uncertainties associated with traditional animal meat production.

- Food

RELATED CASES

2026-372-0

PATENT STATUS

Patent Pending

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Engineered Cell-Secreted Extracellular Matrix
- Filamentous Fungal Biomass as a Novel Biomaterial for Cultured Meat Production

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