
Patent Portfolio Overview

Innovation Built Through Decades of Research

Since the development of LEM®, extensive research has led to a broad portfolio of patents covering manufacturing technologies, extraction methods, composition development, and functional applications.

Together, these patents demonstrate decades of scientific innovation and technological expertise that have supported the continuous evolution of LEM®.

Foundation Technologies

Core Manufacturing and Extraction Technologies

The earliest patents established the technological foundation of LEM®. They focused on proprietary manufacturing processes, extraction technologies, and production methods that have supported consistent product quality and scientific advancement for decades.

Key Foundation Patents

- No. 0846401** Method for Extracting Medicinal Components from Solid-Cultured Shiitake Mycelia
- No. 1184475** Method for Producing Powdered Food Containing Active Components and Dietary Fiber from Edible Mushroom Mycelia
- No. 1427435** Method for Producing Health Beverage Preparations
- No. 1991154** Method for Extracting Medicinal Components from Mycelial Cultures

Evolution of the Patent Portfolio

From Manufacturing Technologies to Functional Applications

Building upon the foundation technologies, subsequent patents expanded the scientific scope of LEM® into diverse functional applications. This progression reflects decades of continuous innovation, ranging from manufacturing processes to compositions designed to support a variety of biological functions.

Patent Focus	Japanese Patents
Manufacturing Technologies	0846401, 1184475, 1427435, 1991154
Immune & Antiviral Research	1855273, 1957839, 2938916, 2947560
Cellular Protection	3284097, 4427687, 5144112
Functional Health	1781400, 1781401, 5751849, 5938013, 5993112
Advanced Research	6814483, 6886188

Scientific Publications

Four Decades of Scientific Evidence

Since its introduction, LEM® has been the subject of extensive scientific research covering its composition, biological properties, and potential functional applications.

These findings have established a strong scientific foundation for LEM® as a functional food ingredient.

Research Area

Composition & Chemistry

Immunology

Antiviral Research

Liver Health & Oncology

Neuroprotection

Clinical & Functional Studies

Representative Topics

Lignin, polysaccharides, structural characterization

Macrophages, cytokines, immune modulation

Influenza, HSV, HIV

Hepatitis, liver injury, carcinogenesis

Brain injury, neuroprotective effects

Human studies, allergy

Key Scientific Findings

Major Areas of Scientific Investigation

Decades of scientific research have demonstrated that LEM® has been investigated across multiple biological systems. The collective findings continue to support scientific research and product development.

Research Focus

Bioactive Components
Immune Function
Antiviral Research
Liver Health
Neuroprotection
Clinical Research

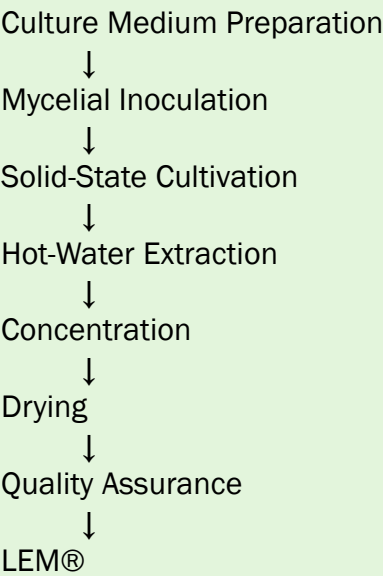
Key Scientific Findings

Lignin-related compounds and polysaccharides
Immune modulation and macrophage activation
Activity investigated against influenza, HSV and HIV
Liver injury, hepatitis and carcinogenesis
Neuroprotective effects in experimental studies
Human studies and allergy research

Quality & Manufacturing Excellence

Consistent Quality Through Advanced Manufacturing

LEM® is manufactured using a proprietary solid-state cultivation process followed by hot-water extraction under carefully controlled conditions. Consistent manufacturing practices and rigorous quality management ensure consistent product quality throughout the manufacturing process.



Quality Highlights

Manufacturing	Quality
Proprietary solid-state cultivation	GMP-certified manufacturing
Hot-water extraction	FSSC 22000 certified facilities
Carefully controlled production	Batch-to-batch consistency
Validated manufacturing process	Quality assurance system