

Press Release
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FOR IMMEDIATE RELEASE

New Study Demonstrates Antimicrobial Potential of CH-Bioforce LIGNENSE® in Microbiological and Challenge Test Studies

CH-Bioforce announces new scientific findings highlighting the antimicrobial potential of its high-purity lignin material **LIGNENSE®**, produced using the company's patented **BIOFORSENSE® fractionation technology**. Recent microbiological studies and third-party preservative challenge testing conducted according to Eur. Pharmacopoeia 5.1.3 demonstrate that aqueous-based lignins derived from biomass side streams exhibit broad antimicrobial activity against viruses and bacteria, including in cosmetic formulations.

The results, published in the peer-reviewed journal *International Journal of Biological Macromolecules*, show that lignins derived from birch, wheat and oat biomass can significantly inhibit microbial activity through multiple mechanisms.

Key microbiological findings

The study demonstrated that aqueous lignin solutions exhibit **broad-spectrum antimicrobial activity**, acting directly on microbial structures and limiting their ability to infect host cells or proliferate.

Key findings include:

- **Antiviral activity**
Lignins showed strong activity against both enveloped and non-enveloped viruses. The treatment stabilised enterovirus structures, preventing genome release and viral replication, while disrupting coronavirus particles and reducing their ability to enter host cells.
- **Antibacterial effects**
All tested lignins significantly delayed the growth of Gram-positive *Staphylococcus aureus* and reduced population density of Gram-negative *Escherichia coli*.
- **Direct microbial interaction**
Imaging techniques revealed structural changes in viral particles and bacterial cell membranes, suggesting that lignin acts directly on microbial integrity and functionality.

In addition to the academic microbiological findings, third-party preservative challenge testing conducted with an industry partner according to Eur. Pharmacopoeia 5.1.3 indicated that LIGNENSE® may support preservation systems in cosmetic formulations. Depending on the formulation, preservative load reductions of at least 25% — and in some cases significantly higher — were observed while maintaining antimicrobial performance.

These findings confirm that high-purity lignin fractions can function as **natural antimicrobial agents**, opening new possibilities for bio-based protective materials.

From biomass side streams to functional antimicrobial materials

The lignins studied were produced from **birch chips, wheat straw and oat husks**, using CH-Bioforce's patented **BIOFORSENSE® technology**, which fractionates biomass into high-purity biopolymers including cellulose, hemicellulose and lignin.

The resulting lignins can reach **purity levels up to 99% with minimal carbohydrate contamination**, which is considered an important factor contributing to consistent antimicrobial performance.

Unlike many conventional antimicrobial solutions that rely on synthetic chemicals or metal-based additives, lignin offers a **bio-based alternative derived from renewable biomass side streams**.

Potential applications

The antimicrobial properties of lignin open new opportunities for sustainable functional materials and cosmetic applications, including:

- Antimicrobial coatings for public and medical surfaces
- Safer food packaging materials
- Healthcare, hygiene and cosmetic products
- Functional textiles and materials with microbial protection

By harnessing lignin's natural protective chemistry, CH-Bioforce is helping develop **new bio-based solutions for microbial control** that combine performance with sustainability.

Advancing the science of lignin-based biomaterials

The findings contribute to the growing scientific understanding of lignin as a functional biomaterial rather than simply a by-product of biomass processing. The study highlights how **structure, purity and biomass origin influence antimicrobial efficacy**, providing valuable insights for future material development.

Through continued research and collaboration with academic and industrial partners, CH-Bioforce aims to expand the application potential of **LIGNENSE®** in advanced materials and bio-based chemical solutions.

About CH-Bioforce

CH-Bioforce is a Finnish biomaterials company transforming how industrial biomass is converted into high-value raw materials.

Founded in 2016, the company's core BIOFORSENSE® technology fractionates biomass into extremely pure biopolymers — CELLENSE™, the dissolving cellulose, XYLENSE®, the polymeric hemicellulose and LIGNENSE®, the sulphur-free lignin — in a single, low-impact process. These materials can replace fossil- and food-based feedstocks across industries such as cosmetics and personal care, textiles, packaging, adhesives and specialty chemicals.

In 2025, CH-Bioforce achieved COSMOS certification for both XYLENSE® and LIGNENSE®, confirming their compliance with one of the most recognised international standards for natural and organic cosmetic ingredients; a strong endorsement of sustainability, traceability and performance in personal care applications.

With deep expertise in biomass chemistry, broad academic and industrial collaboration and a demonstration plant in Raisio, Finland, CH-Bioforce aims to unlock the potential of side streams and create raw material alternatives that support a cleaner, more circular world.

CH-Bioforce makes the world make sense by enabling high-quality, carbon-neutral and cost-efficient biopolymers from renewable sources through unique BIOFORSENSE® -technology.

For more information, visit www.ch-bioforce.com.

Photos: [Download here](#)

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CH-Bioforce – We make the world make sense.