

Highly Dispersible Filamentous Fungi with Reduced Hypoxia and Viscosity in Culture

Total improvement of the physical, chemical, and biological environment in the culture tank

→ Evolution of high cost-effectiveness, high-performance, high-density culture and fermentation

Overview

Filamentous fungi represented by *Aspergillus oryzae* have high production capacity of proteins and low molecular weight compounds and are utilized for industrial production by fermentation. However, in liquid culture, hyphae are entangled and clump together, and there is a limit to maximizing the space of the culture tank and increasing the production of substances. Highly dispersible filamentous fungi (AGΔ-GAGΔ, see Related Inventions and Documents), in which the viscosity of the culture solution and the formation of clumps are drastically reduced compared to the wild-type strain, is a technology to solve this problem.

On the other hand, AGΔ-GAGΔ has excellent culture properties as a filamentous fungus, but the viscosity of the culture solution is still higher than that of yeast and bacteria. Therefore, it is required to develop a low viscosity strain that enables high gas dispersion and product yield under lower agitation power (energy).

The present invention relates to the next generation highly dispersible filamentous fungus AGΔ-GAGΔ-ΔX, in which a deletion of the novel property modifying factor X gene is additionally introduced into AGΔ-GAGΔ strain. In this new strain, a significant drop in culture viscosity improved agitation efficiency and led to enhanced productivity compared to AGΔ-GAGΔ. Furthermore, the addition of a deletion of the *rolA* gene encoding surface-active protein RolA enhances the efficiency.

Potential Applications

- Industrial fermentation production (increased production) of enzymes and other biofunctional proteins and peptides
- Industrial fermentation production (increased production) of bioactive compounds such as amino acids and antibiotics
- Utilization of increased fungal biomass (e.g., as alternative meat ingredients)

IP Data

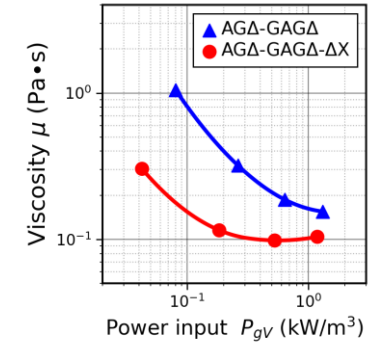
IP No. : JP2025-22774
 Inventors : ABE Keietsu, SUSUKIDA Shunya, MUTO Kiyooki, MIYAZAWA Ken, YOSHIMI Akira
 Reference No.: T24-082

Culture appearance



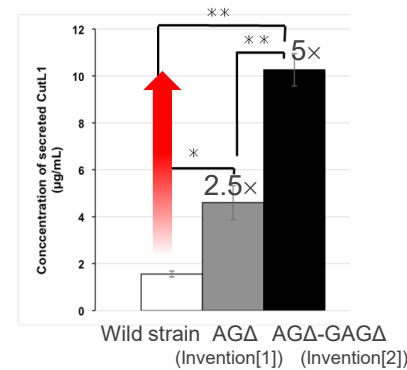
AGΔ-GAGΔ AGΔ-GAGΔ-ΔrolA AGΔ-GAGΔ-ΔrolA-ΔX

Culture viscosity

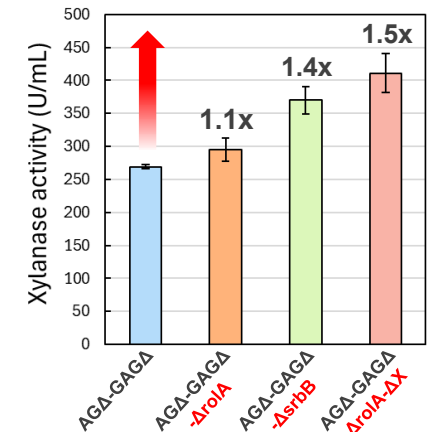


Recombinant enzyme production test

Enzyme production by AGΔ-GAGΔ strain



Enzyme activity of the newly developed strain



Related Works

- [1] Patent No. 6132847, etc. (United States and Europe) (Reference No. T12-060)
- [2] Patent No. 6647653, etc. (United States and Europe) (Reference No. T16-155)
- [3] *Front. Microbiol.* **10**:2090. doi:10.3389/fmicb.2019.02090
- [4] *Biotech. Bioeng.* **122**:2389 (2025) doi:10.1002/bit.70004

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