Tohoku Univ. Technology

Highly Dispersible Filamentous Fungi with Reduced Adhesion and Aggregation to Culture Tank Equipment

Improved in-tank environment + energy & cost-saving cultivation
→ Enabling high-performance, high-density culture and fermentation

Overview

Filamentous fungi represented by Aspergillus oryzae have higher production capacity of proteins and complex low-molecular compounds than bacteria and yeast, and are utilized for industrial production of a wide variety of useful substances by fermentation. However, in liquid culture, hyphae entangle and clump together, and there is a limit to high-density culture and increased production of useful substances by maximizing the space of the culture tank. Highly dispersible filamentous fungi (AGΔ-GAGΔ, see Related Inventions and Documents), which drastically reduce the viscosity of the culture solution and the formation of clumps, is a technology to solve these problems.

On the other hand, even in the case of AGΔ-GAGΔ, the adhesion of the fungus to the inner structure of the culture tank, such as the inner wall of the culture tank and the agitation blade/shaft, is observed as in the case of the wild strain, and it remains to be solved in order to achieve further improvement of the productivity.

The present invention relates to a new highly dispersible filamentous fungus AGΔ-GAGΔ-ΔrolA strain, in which a deletion mutation of the rolA gene encoding the surface-active protein is additionally introduced into AGΔ-GAGΔ strain. Compared with the AGΔ-GAGΔ strain, the adhesion to the inner structure of the culture tank is suppressed, and the productivity is also improved. In addition, the reduction of the agitation power and the cultivation time are also obtained by the reduction of the viscosity of the culture solution in a large-scale real machine (tank).

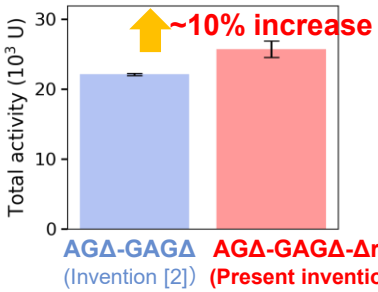
Potential Applications

- Industrial fermentation production (increased production) of enzymes and other functional proteins/peptides
- Industrial fermentation production (increased production) of bioactive low-molecular-weight compounds such as amino acids and antibiotics
- Utilization of increased fungal biomass (e.g., as ingredients for alternative meats)

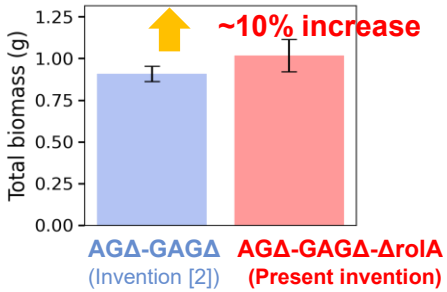
IP Data

IP No. : PCT/JP2025/022688
Inventors : ABE Keietsu, SUSUKIDA Shunya, MUTO Kiyoaki, MIYAZAWA Ken, YOSHIMI Akira
Reference No. : T23-061

Total enzyme activity



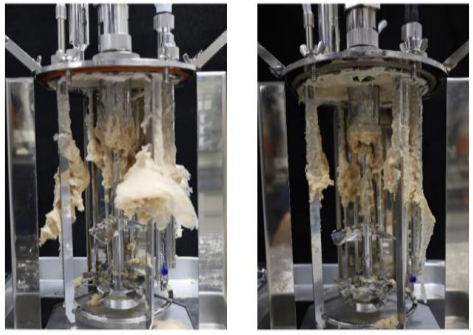
Total fungus body weight



・At the end of cultivation, total enzyme activity increased by 1.16× and total fungal biomass by 1.12×.
・ Reduced fungal adhesion to tank walls helps retain liquid components (effective volume)
・ Improved conidia hydrophilicity promotes earlier growth and reduces cultivation time

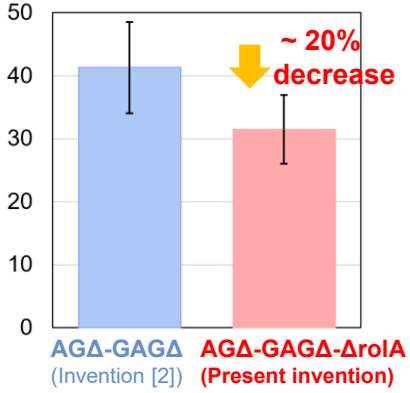
Features・Outstandings

Fungus body attached to the tank structure at the end of culture



AGΔ-GAGΔ (Invention [2])
AGΔ-GAGΔ-ΔrolA (Present invention)

Weight of wall-attached fungal cells



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 (2019) doi:10.3389/fmicb.2019.02090
[4] *Biotech. Bioeng.* **122**:2389 (2025) doi:10.1002/bit.70004
[5] *Microorganisms*, 2022 Jul 2510(8):1498.

Contact

Tohoku Techno Arch Co., Ltd.
Please visit CONTACT here