Max-Planck-Innovation

Technology Offer

Chlamydomonas algae strains for molecular farming

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Background

The unicellular green alga *Chlamydomonas reinhardtii* is both an invaluable model organism for plant biology and an attractive biotechnological production system for biofuels and biopharmaceuticals. Despite the availability of efficient methods for introduction of foreign genes into the nuclear genome of the alga, transgene expression levels are usually very poor. This is a serious limitation that has severely hampered both post-genomics research in *Chlamydomonas* and use of the alga in molecular farming.

Technology

Scientists from the Max-Planck-Institute of Molecular Plant Physiology have generated new *Chlamydomonas* strains with reduced epigenetic silencing that efficiently express introduced transgenes to high levels. The strains can be used as inexpensive production hosts for biopharmaceuticals and other valuable compounds and will greatly facilitate post-genomics research in *Chlamydomonas*. Efficient transgene expression was demonstrated for secreted recombinant proteins, modified fatty acid and alkene contents, terpenes, polyamines and altered pigment composition. The strains have a higher transformation efficiency and faster growth rate compared to other commercially available algae strains. Further metabolic engineering of the strains allowed for high-cell density cultivation in phosphite- and nitrate-containing media to enable their broader implementation in non-sterile conditions and high-cell density concepts. These properties make the strains best-suited for engineered algal bio-processes and molecular farming approaches.

We are now looking for a licensing partner to further develop this project.

Publication

- Neupert et al., 2008. The Plant Journal. DOI: 10.1111/j.1365-313X.2008.03746.x
- Abdallah et al., 2022. Frontiers in Microbiology. DOI: 10.3389/fmicb.2022.885840

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