



PRESS RELEASE

June 1, 2023

JGC HD and Bacchus to Jointly Promote Integrated Biofoundry®

Business for the Growth Market of Biomanufacturing

– Establishment of a one-stop system from microbial development
and improvement to production process development –

JGC Holdings Corporation
Bacchus Bio Innovation Co., Ltd.

JGC Holdings Corporation (hereinafter JGC HD) and Bacchus Bio Innovation Co. Ltd. (hereinafter Bacchus) have announced that they will jointly pursue integrated biofoundry® business, which will support the growth market of biomanufacturing by providing one-stop service from microbial development and improvement to production process development.

1. Biomanufacturing

Biomanufacturing promotes a circular economy by producing a variety of substances through the creation of smart cells*¹. With applications likely to expand beyond medicine and healthcare to sectors including materials, energy, and food, the scale of this market is expected to grow to a level of 200 trillion yen by 2030 according to estimates of the Organisation for Economic Co-operation and Development.

2. Aims of the collaboration

As we work toward our long-term management vision (2040 Vision), JGC HD continues to promote commercialization of technologies relevant to the environment under the leadership of the Sustainability Co-Creation Unit. Biotechnology is a segment of focus. Group biomanufacturing resources include technologies for scaling up processes and for optimal culture tank design, with the former honed over many years of process development for the energy sector and the latter refined through life science projects. In particular, gas-handling techniques developed through oil and gas projects give the JGC Group a competitive edge in applications which CO₂ is used as a raw

material.

Bacchus is a biofoundry² that applies and subsequently refines fundamental technologies and expertise from advanced R&D on synthetic biology and other disciplines at Kobe University and elsewhere. The company's data-driven smart-cell development cycles of DBTL³ integrate robotics and AI/IT technologies. With this technology, a platform is being built to produce a variety of target substances through rapid microbial breeding, and ultimately, biomanufacturing will support a circular economy.

Integrated biofoundry[®] business combining this expertise of both companies would provide one-stop service from developing and improving microbes to scaling up bioreactors and developing production processes, which would reduce the decades-long biomanufacturing stage from microbial development to commercialization to less than 1/10 of the usual time, in turn significantly accelerating launches and cutting costs to encourage widespread adoption in society.

Bacchus will also expand operations through this collaboration, up to the stage of process implementation. The company's original microbial development platform, which enables production of an array of substances, will be expanded to a platform linked to process development by JGC HD. As Bacchus gains a broader business foundation, the company will be providing this technical innovation around the world.

JGC HD intends to establish these integrated biofoundry[®] operations through licensing, as a non-EPC business in line with business model transformation in the 2040 Vision and part of a diversified revenue structure.

3. Initiatives in a joint project of four companies

As announced previously, JGC HD and Bacchus have begun working with Kaneka Corporation and Shimadzu Corporation to develop microbial polymer synthesis using CO₂ as a direct raw material⁴. This work was selected as a NEDO Green Innovation Fund project in response to NEDO's public call for promotion of carbon recycling using CO₂ as a raw material in biomanufacturing.

In this joint project of the four companies, JGC HD and Bacchus are establishing and demonstrating the integrated biofoundry[®] – a one-stop service for breeding microbes that produce a variety of useful substances from CO₂, scaling up this technology, and developing production processes. The integrated biofoundry[®] is summarized below.

Bacchus

- Developing and improving the world's first IT/AI-driven rapid breeding platform for gas-fermenting microbes, through internal DBTL cycles.

- Developing and improving a high-speed, high-precision evaluation system for gas-fermenting microbes, linked to processes from breeding to production, in collaboration with Shimadzu Corp.

JGC HD

- Preparing a bench-scale facility for operation in FY2025 and pilot plant in FY2027.
- Preparing bioreactors at the bench-scale facility ranging from a few liters to several hundred liters.
- Preparing bioreactors at the pilot-scale facility with a capacity of several cubic meters (several thousand liters).
- Establishing safe and highly efficient gas fermentation measurement and evaluation systems at the bench and pilot-scale facility, in collaboration with Shimadzu Corp.

4. Future initiatives by JGC HD and Bacchus

As the four companies' joint project continues, JGC HD and Bacchus will also be developing a broader range of microbes capable of transforming various other raw materials besides CO₂ into a variety of substances needed in society, as the companies propose and implement the shortest paths to commercialization for customers. By establishing this integrated biofoundry[®] business, the two companies will lower the barriers for entry into biomanufacturing and encourage adoption in a wide range of applications in society. The companies aspire to show leadership in global biomanufacturing with domestically developed technologies.

*1: Cells that have been carefully modified for efficient mass-production of target substances.

*2: Microbial development platform for creating microbes with specific functions enabling efficient production of useful substances.

*3: Development cycle consisting of designing/synthesizing genes that express desired functions based on information about microbial genomes, metabolic pathways, and other details (Design), creating microbes that carry these genes (Build), testing whether the genes express the desired functions (Test), and analyzing/learning from the data obtained (Learn) to apply the knowledge in further design of metabolic pathways and so on. Bioinformatics, which combines life and information sciences, is employed in the cycles, along with robotics and digital technologies.

*4: Further details are available in the joint press release published on March 22, 2023.

<https://www.jgc.com/en/news/assets/pdf/20230322.pdf>

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