

Bio technology Area

For the world's most advanced bio-economy society

The Bio-Strategy, which defined four social visions and nine market sectors, was adopted in 2019, to realize the world's most advanced bio-economy society by 2030. Based on this bio-strategy, we are screening, adopting, and implementing the measures applied by ministries, and accelerating their realization.



Director of Bio technology Area

KOBAYASHI
Noriaki

Director of the Board, Senior Executive Officer
Kirin Holdings Company, Limited.
Member of the Bio-Strategy Experts Committee

Profile

Graduated from the Faculty of Engineering, Mie University in 1983. Joined Kirin Brewery Company, Limited in 1983, 1998: International Beer Division (in charge of China and Southeast Asia), 2004: Deputy General Manager of Corporate Planning Department, 2010: General Manager of Kirin Beverage Company, Limited Logistics Division Production Department, 2014: Kirin Holdings Company, Limited Executive Officer R&D General Manager of Technology Management Department, 2017: Director and Managing Executive Officer of Kirin Holdings Company, Limited and Managing Executive Officer of Kirin Holdings Company, Limited 2018: SIP Smart Bio-Industry/Agricultural Infrastructure Technology Program Director, 2019: PRISM Area Supervisor (Bio technology), Director and Managing Executive Officer, Kirin Holdings Company, Limited, Member of the Bio-Strategy Experts Committee.

Area Overview

Realization of a bio-economy society by promoting R&D in private sectors

In FY2020, based on the bio technology strategy, we are working to contribute to realization of our bio-strategy with measures for each market sector below: specifically six measures (1-6) include construction and demonstration of a microbiome database and a cross-search system for healthy persons, diabetes, and dementia; development of data platform for functional modules of the genome editing enzymes; construction of a genetic resource data platform; development of generalizable design examples for large-scale timber constructions: five schemes (7-11) include remoteization and automation of research facilities.

Social visions/market sectors set by bio-strategy

<Social visions>			
Sound material-cycle society in which all industries are linked	Society in which primary production that meets diversifying needs is continuously carried out	Society in which raw materials and components are bio-generated by sustainable manufacturing methods	Society where medical and health cares are linked, and people can participate in it for a long time
<Market sectors>			
① High-performance biomaterials (lightweight, durable, safe) Ministry in charge: METI	Smart cell		
② Bio-based plastics (alternative to general-purpose plastics) Ministry in charge: METI	Smart cell		
③ Sustainable primary production system Ministry/agency in charge: MAFF	Genome editing	Genetic resources	
④ Organic waste/organic wastewater treatment Ministry/agency in charge: METI			
⑤ Healthcare for lifestyle improvement, functional foods, digital health Ministry/agency in charge: METI	Diabetes	Next-generation biotechnology	Dementia
⑥ Biopharmacy, regenerative medicine, cell therapy, and gene therapy-related industries Ministry/agency in charge: Headquarters for Healthcare Policy			
⑦ Bio-production system <Industrial/food production-related (production using biological functions)> Ministry/agency in charge: METI	Smart cell		
⑧ Bio-related analysis/measurement/experimental systems Ministry/agency in charge: METI	Substance/material	Pesticide development/Veterinary medicines	Spring-8
⑨ Large-scale construction utilizing timber, smart forestry Ministry/agency in charge: Forestry Agency	Demand for timber	Utilization of timber	

[Implemented in FY2020]

- "Diabetes (5)": Development of AI for microbiome analysis to accelerate personalized prevention of diabetes
- "Next-generation bio (5)": Proof of concept for data linkage to establish next-generation infrastructure for biomedical data
- "Dementia (5)": Microbiome and biomarker analysis related to dementia
- "Genome editing (3)": Development of data platform for functional modules of the genome editing enzymes
- "Genetic resources (3)": Acceleration of breeding in private company by the construction of GR genome database
- "Timber demand (9)": Research and development (R&D) project for implementation of large-scale timber construction contributing to expand wood demand
- "Substances/Materials (8)": Remoteization and automation of the use of fundamental shared research facilities in materials science
- "SPRING-8 (8)": Development of automation and remote control system for SPRING-8
- "Creation of pesticide/veterinary drug (8)": Development of remote access to shared and automated scientific instrumentation for innovation in agricultural chemicals and animal drug discovery research
- "Smart cell (1, 2, 7)": Remoteization and full automation of biofoundry facility to accelerate construction of smart cells
- "Timber utilization (9)": Remote-controllable and automatic research facilities contributing to promote large-scale buildings using wood

Introduction of the steering committee members

KOBAYASHI Noriaki	Area Director/Chair
IGARASHI Kiyohiko	Professor, The University of Tokyo Graduate School of Agricultural and Life Sciences Department of Biomaterial Sciences
KAWAKAMI Takayoshi	Industrial Growth Platform, Inc. Partner
YOSHIZAWA Nao	GRIIT Partners Law Offices Managing Partner (Observer)

Interview with the Area Director

With “fusion of bio- and digital technologies”, realize the world’s most advanced bio-economy society



Q1 What kind of problems triggered initiatives in the bio technology area? And could you tell us the importance of R&D?

People all over the world have been affected by the COVID-19 pandemic and are living under various restrictions, including economic ones. I believe that the day will come back when people will be able to return to their normal lives thanks to progress of vaccinations and efforts of each country and person, but even after COVID-19, there are many issues related to "sustainability" that we must address, such as global warming and future population growth.

Especially, bio technology is one of the most important technologies to deal with global issues, such as petroleum consumption issues represented by energy and manufacturing, prevention of infectious diseases following COVID-19, and water and food shortages due to population growth.

With adoption of the SDGs and the Paris Agreement, promotion of bio-economy has been positioned as a national strategy in major regions and countries such as Europe, the United States, and China to contribute to both "sustainable economic growth" and "solving social issues" including climate change and stable food supply even before COVID-19. In the stock market as well, institutional investors are expanding their ESG investments in line with this global trend.

Japan is also aiming to become carbon neutral by 2050, which means reducing greenhouse gas emissions to practically zero, and is making utmost efforts to realize a green society. Thus, in the 6th Science, Technology and Innovation Basic Plan approved by the Cabinet in March 2021, addressing global issues including climate change has been placed as one of the major pillars.

Under these circumstances, expectations are increasing for the bio-economy, which aims to create a sustainable, regenerative, and recycling-oriented economy and society by using bio-technology and renewable biological resources (biomass) that do not depend on fossil resources, and for creation of intangible value through these resources. However, it must be admitted that Japan's presence in the global bio technology industry has been declining, despite the success of its Nobel Prize-level basic research.

In addition, the COVID-19 pandemic revealed the weaknesses of the global economy, and the impact on society of cessation of global movement of products and people was particularly significant. The role of the bio technology area in domestic procurement, such as development of vaccines and therapeutic agents and re-growth of primary industry in food security, is becoming more important due to the COVID-19 pandemic.

Therefore, PRISM's R&D in the bio technology Area, together with the Cross-ministerial Strategic Innovation Promotion Program (SIP) and initiatives of each ministry and agency, will work on nine priority areas as an executor of the Bio Strategy 2019 and 2020, and contribute to the creation of value that will both overcome social issues and achieve sustainable economic growth in the global bio technology market, which is expected to grow to approximately \$1.6 trillion (approximately 170 trillion yen) by 2030.

Q2 Could you tell us what you consider important in the initiatives of the area?

As the executor of the Bio-Strategy 2019 and 2020, considering PRISM's objective "to guide government ministries and agencies' initiatives in areas that are highly effective in inducing private R&D investment or that contribute to the efficiency of fiscal expenditures, we place great importance on theme selection and project

operation."

Also, in global efforts in the bio technology area, the shift to big science, open science, centralization, and networking is rapidly progressing, and "data collaboration" is extremely important. However, in Japan, the research style is still decentralized in individual laboratories, and we do not have a sufficient system for creating high added value through digital transformation (DX) of research activities in response to digitization of society as a whole and the global shift to open science. Therefore, we are emphasizing "promotion of data linkage to achieve market acquisition" in all our efforts.

Q3 Could you tell us about the significance of the PRISM system?

While The Cross-ministerial Strategic Innovation Promotion Program (SIP) sets five years as one term that covers attempts from fundamental study to commercialization, PRISM is implemented on an annual basis, accelerating the basic measures of each ministry and agency and adding measures that are considered attractive from the perspective of private investment by adjusting the size of the investment. Thus, I think the significances are in the agility of the required resource allocation and the flexibility of investment size.

In addition, it is important that the project is conducted on an annual basis, so that related research institutes and researchers are strongly aware of the perspective of private investment, especially the feasibility of supply chain and value-added strategies in the value chain, from the time of planning.

Q4 Could you tell us about the achievements and challenges of the bio technology area so far and expectations in the future?

Focusing on sustainability, sound material-cycle society, and health (wellness), which are the keywords for overcoming social issues, in FY2020, we had the following achievements in the nine market sectors targeted because of the bio technology strategy: (1) developed infrastructures to revitalize the health industry by analyzing the gut microbiome, diabetes, and dementia and building a database to utilize these findings, (2) accelerated breeding in a private company by building functional modules for genome editing enzymes and a GR genome database, and (3) developed technologies to implement large-scale timber construction contributing to timber demand.

In addition, in light of the changes in the research environment because of the COVID-19 pandemic and after COVID-19, and improvement of efficiency through digitalization, (4) we promoted remoteization and automation of the use of fundamental shared research facilities, including fundamental shared research facilities in materials science, SPring-8, shared facilities for development of agricultural chemicals and animal drugs, biofoundry facilities for accelerating creation of smart cells, and research facilities contributing to promote large-scale buildings using timbers. As a result, the range of methods for utilizing private research facilities will be expanded, and private research is expected to advance in the future.

In particular, a database of the gut microbiome in healthy persons built through (1) and a reference database of genomes in breeding built through (2) are used in the private sector and expected to become infrastructures that contribute to the promotion of collaboration between industry and academia, and to the expansion of "collaborative areas" in "competition" and "collaboration".