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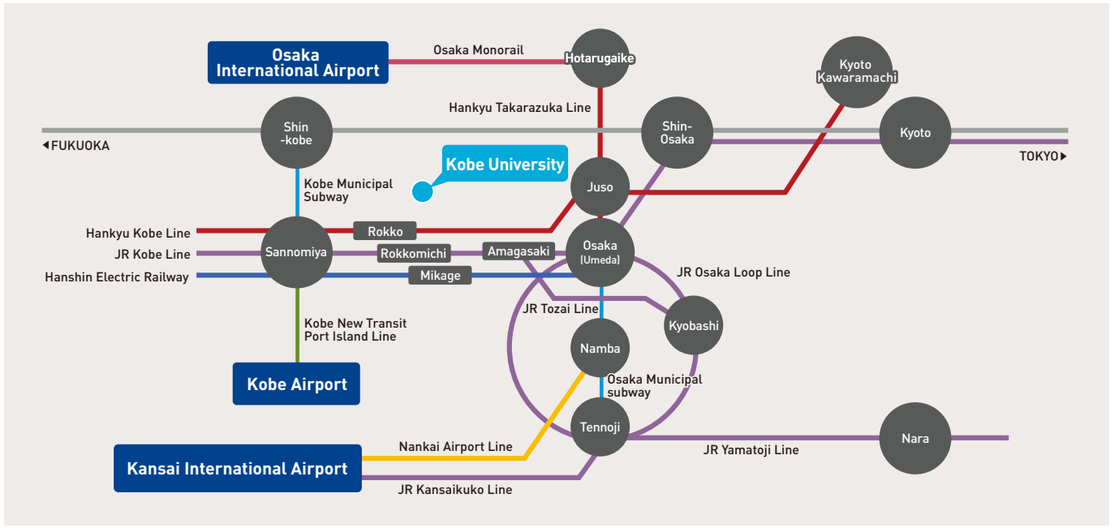
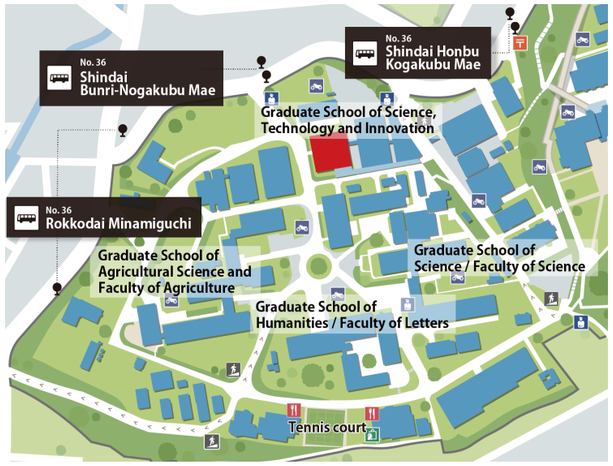
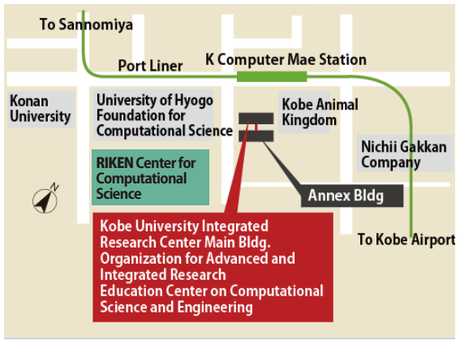


[Rokkodai 2nd Campus]



[Integrated Research Center]



From the nearest stations to Rokkodai 2nd Campus

On Foot : 15-20 minutes from the Hankyu “Rokko” station

By Bus : From the Hanshin “Mikage” station, the JR “Rokkomichi” station, or the Hankyu “Rokko” station, take Kobe City Bus No. 36 bound for Tsurukabuto Danchi or Tsurukabuto 2-chome Domari to Shindai Bunri-Nogakubu Mae

By Taxi : 15-20 minutes from the Hanshin “Mikage” station
10-15 minutes from the JR “Rokkomichi” station
5-10 minutes from the Hankyu “Rokko” station

- From the “Sannomiya” station:
  Take the Port Liner bound for “Kobe Airport” to the “K Computer Mae” station (15 minutes) .
  (1 minute from the south exit)
- From the “Kobe Airport” station:
  Take the Port Liner bound for “Sannomiya” to the “K Computer Mae” station (4 minutes) .
  (1 minute from the south exit)

Inquiries / Contact

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General Affairs Section

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ENGINEERING BIOLOGY RESEARCH CENTER

Kobe University

KOBE UNIVERSITY

EGBRC Engineering Biology Research Center Kobe University

Creating an Innovation Hub for Engineering Biology Through Industry-University-Government Collaboration

HASUNUMA Tomohisa
Director
Engineering Biology Research Center,
Kobe University

Established on July 1, 2018, the Engineering Biology Research Center (EGBRC) at Kobe University is charged with the mission of exploring the frontiers of engineering biology by leveraging Kobe University's unique features and strengths. The EGBRC is also the sole research center in Japan that aims to create innovation in this emerging interdisciplinary field.

Our goal is to make the EGBRC a hub for innovation that combines "hardware," or tangibles such as research space and equipment, and "software," or intangibles such as researchers and intellectual property. We will achieve this by building and expanding a research and development platform while simultaneously promoting advanced research and development through industry-university-government collaboration.

Building on our extensive track records of teaching/researching engineering biology and partnerships with outside institutions, we intend to shape the bioeconomy by creating the kinds of innovations that meet demand from the government and society at large, including bioproduction of a variety of useful substances.

I ask for your kind support and cooperation for our endeavors.

About EGBRC

1 Promotion of Interdisciplinary Research and Industry-University Collaborative Research

The EGBRC consists of six research units each aligned with Kobe University's core technologies—namely, the Bio-based Fuel and Chemical Research Unit, Biologics Research Unit, Functional Food Material and Agrobio Research Unit, Chemical and Process Research Unit, Advanced Platform Technology Development Unit, and Bioeconomy Research Unit. By extensively promoting inter-unit collaboration, the EGBRC facilitates interdisciplinary work for its researchers. The EGBRC also taps into the know-how it has gained from experience in government-subsidized projects and joint research, while at the same time designing a research framework that encompasses multiple fields. In this way, it is able to flexibly respond to the ever-diversifying needs of the industrial sector and to enhance opportunities for industry-university collaboration and open innovation.

2 Acceleration of Innovation Through Integration of Social Science and Natural Science

As a research center where social science is integrated with natural science, the Bioeconomy Research Unit serves as an avenue for collaboration between faculty members of two different disciplines. This results in support for innovation and the development of commercialization strategies with a focus on acquisition of intellectual property rights, development of production engineering, and discovery of new markets.

3 Partnerships with Outside Institutions

Partnerships with the Organization for Engineering Biology (OEB) and Biologics Center for Research and Training (BCRET) keep us updated on the latest developments in engineering biology and biologics fields around the world, making it possible for us to stay abreast of research and development as well as industrial trends and needs. This allows us to engage in exploratory research and development, which facilitates further advancement of research, industrial promotion, and human resource development.

4 Promotion of International Joint Research

Through membership in the Global Biofoundries Alliance (GBA), in which there are discussions of "biofoundries," a body of integrated platform technologies in advanced biotechnology, the EGBRC contributes to the development of the bioeconomy by disseminating research findings, sharing the latest research trends, and developing business models.

5 Availability of Research Space and Equipment

The EGBRC has made available a wealth of equipment and instruments that are necessary for research in engineering biology, a cutting-edge field that straddles multiple disciplines. By putting in place a system for shared use by researchers from both Kobe University and elsewhere, we support interdisciplinary research and industry-university collaborative research.

Science and Technology Entrepreneurship Co., Ltd.
(STE Co., Ltd.)

→ **University-launched Venture Companies**

Capital subscription, financing support, etc.

Collaboration and cooperation

Commercialization of platform technologies, etc.

EGBRC Engineering Biology Research Center Kobe University

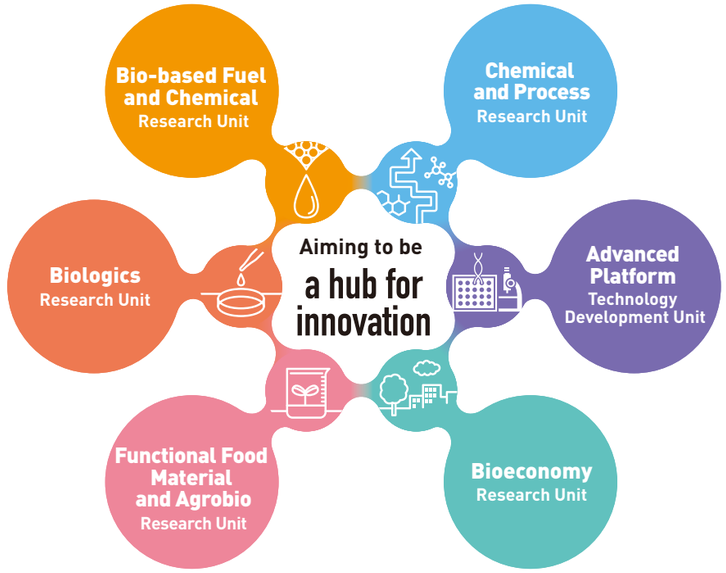
Promotion of Advanced Interdisciplinary Innovation Research

Endorsed by Multiple Graduate Schools

- Graduate School of Engineering
- Graduate School of Science
- Graduate School of Science, Technology and Innovation
- Graduate School of Agricultural Science

- Formation of open innovation opportunities through multiple-industry/university collaboration
- Development of experts in engineering biology

Creation of a platform for advanced research and development into bioproduction of a variety of useful substances that will lead the bioeconomy



Provision of research space and equipment

Bridging joint research endeavors / Acquisition of large-scale research projects

OEB Organization for Engineering Biology

General Incorporated Association Organization for Engineering Biology (OEB)

BCRET BIOLOGICS CENTER FOR RESEARCH AND TRAINING

General Incorporated Association Biologics Center for Research and Training (BCRET)

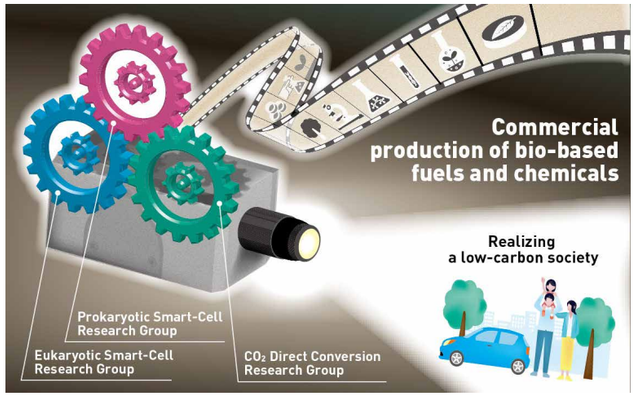
Bio-based Fuel and Chemical Research Unit

Development of Smart Cells and Other Foundational Technologies for Realizing a Low-Carbon Society

This research unit is involved in a variety of advancements regarding the production of bio-based fuels and chemicals with the ultimate goal of realizing a sustainable low-carbon society. It also works on producing biologically active functional substances.
In Japan, efforts are underway to create a "smart-cell industry" . This is a next-generation industry based on "smart cells" , which are defined as "finely designed, expression-controlled biologically functional cells." This research unit consists of three research groups, which attend to their work, day in and day out, in a bid to bring about through their research the breakthroughs needed for the society-wide implementation of innovative technologies.

Unit Head
Professor
KONDO Akihiko

For details, please see



Research Groups

- Prokaryotic Smart-Cell Research Group
- Eukaryotic Smart-Cell Research Group
- CO_2 Direct Conversion Research Group

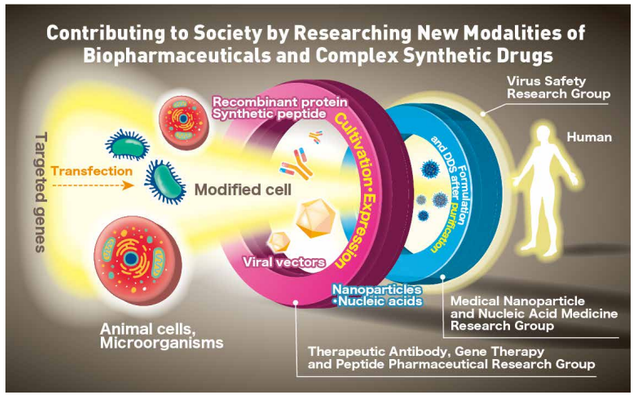
Biologics Research Unit

Application of Biopharmaceutical Research Findings to the Development of New Modalities, Complex Peptide Drugs and Nucleic Acid Medicines, and Nanoparticles

Biologics is a pharmaceuticals produced using animal cells, etc., and is characterized by its complicated structure compared to small molecules. In recent years, Biopharmaceuticals represented by antibody drugs has been in the limelight.
Recently, the main research subject is shifting to "next-generation antibody drugs," "gene therapy drugs," and "cell drugs" for cell therapy, which are developed under the same ICH guidelines. And this department is conducting research focusing on these manufacturing process.
Furthermore, we are also approaching peptide drugs and nanotechnology + nucleic acid drugs to which research methods similar to biopharmaceutical production can be applied.

Unit Head
Professor
UCHIDA Kazuhisa

For details, please see



Research Groups

- Therapeutic Antibody, Gene Therapy and Peptide Pharmaceutical Research Group
- Virus Safety Research Group
- Medical Nanoparticle and Nucleic Acid Medicine Research Group

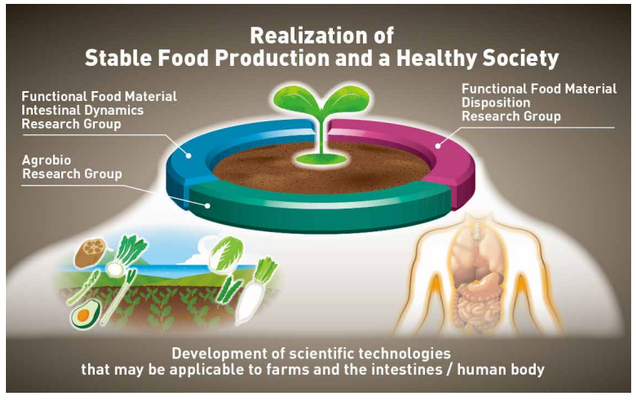
Functional Food Material and Agrobio Research Unit

Creation of Food Safety and Security Science for Farms and Human Health

Considering the rise in the social issues stemming from decreases in crop productivity due to extreme weather and increases in lifestyle diseases, this research unit engages in a variety of research projects concerning "functionality" of "functional foods," which are expected to ameliorate and prevent such issues. Fully taking into account the wide-ranging dynamic phases—from micro to macro—of agricultural, livestock, and marine products and their processed food materials, the following three research groups have been established with a view toward developing ground-breaking crop production engineering and functional foods that truly work on humans.

Unit Head
Professor
SHIRAI Yasuhito

For details, please see



Research Groups

- Agrobio Research Group
- Functional Food Material Intestinal Dynamics Research Group
- Functional Food Material Disposition Research Group

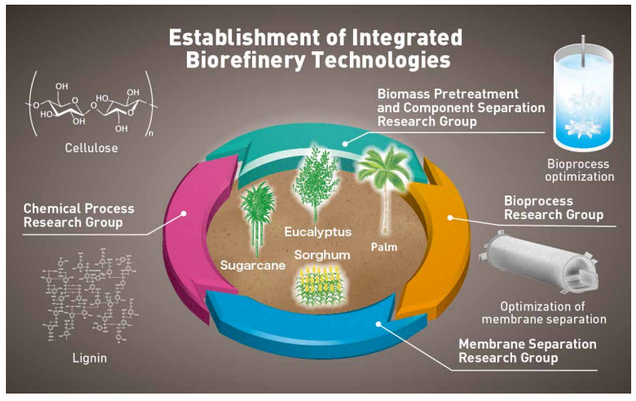
Chemical and Process Research Unit

Establishment of Novel Bioprocesses Through the Integration of Chemical Processes and Bioprocesses

This research unit is working on chemical processes that optimize substance production and bioprocess optimization.
For chemical processes, we are aiming at the selective conversion of high-value-added components by way of thermal/chemical conversion of biomass.
For bioprocesses, we are taking dual approaches (experiments and theories) to the analysis of mixing characteristics and mass transfer—elemental technologies in chemical engineering needed for microbial fermentation.
We are also studying membrane separation technology, which is necessary to refine fermented products. Our ultimate goal is to integrate these elemental technologies to build a seamless biorefinery process.

Unit Head
Professor
OGINO Chiaki

For details, please see



Research Groups

- Biomass Pretreatment and Component Separation Research Group
- Chemical Process Research Group
- Bioprocess Research Group
- Membrane Separation Research Group

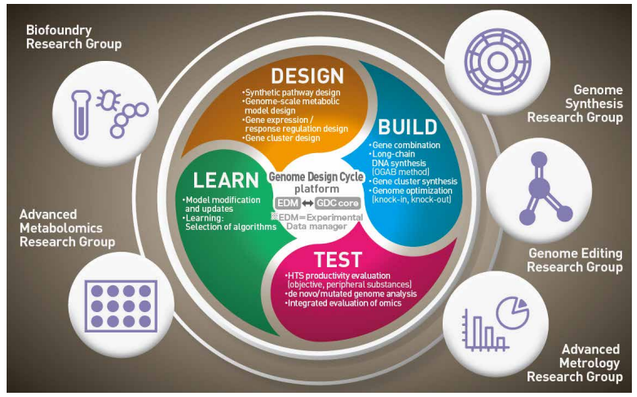
Advanced Platform Technology Development Unit

Development and Provision of Platform Technologies That Give Rise to Breakthroughs

This development unit seeks to develop fundamental technologies that have the potential to serve as a collective life science platform for the future.
We are working to establish and provide diverse cutting-edge technology platforms, including genome editing and synthesis technologies for rewriting bio-designs, metabolome analysis for investigating the metabolites of living organisms all at once, measurement of the dynamic response of interfaces by frequency modulation atomic force microscopy (FM-AFM), which boasts the world's highest force resolution in a submerged environment, and biofoundries, which realize high-throughput life design by integrating computational technology and automation in addition to these technologies.

Unit Head
Professor
NISHIDA Keiji

For details, please see



Research Groups

- Advanced Metrology Research Group
- Genome Editing Research Group
- Genome Synthesis Research Group
- Biofoundry Research Group
- Advanced Metabolomics Research Group

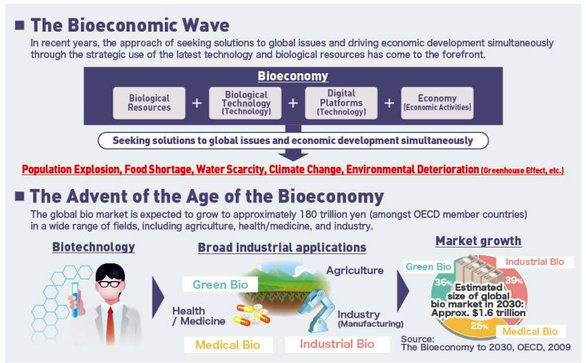
Bioeconomy Research Unit

Contributing to the Realization of the Bioeconomy Through Investigation and Research on Innovation

The concept of "bioeconomy" is gaining traction.
Today, we are said to be in the middle of the fourth industrial revolution, a time during which the Internet of Things (IoT), artificial intelligence (AI), and big data are reshaping industrial structures.
One of the drawbacks of economic growth is the deterioration of the global environment due to the mass consumption of fossil resources. A serious challenge in modern society is finding a way to achieve economic growth in a sustainable manner, and it has recently become more of a real possibility that biological resources will be the solution to this challenge.
The idea of balancing economic growth with measures to protect the global environment through the integrated use of biological resources, biotechnology, and digital platforms encompasses a wide variety of research and development projects, industrial policies, and economic activities, all designed to achieve a "bioeconomy." (See the figure below)
Behind this balancing act are striking technological innovations in the field of synthetic biology, such as genome editing and DNA synthesis, and those in the field of digital technology, such as the advent of a next-generation sequencer, which has dramatically increased the efficiency of genomic analysis, and rapid progress in AI and automation.
The fusion of digital technology and biotechnology, both of which have made rapid progress in recent years, is ushering in what could be called the fifth industrial revolution, as it has elucidated the phenomenon of life and made it possible to apply biological functions to industrial applications.
Nevertheless, it takes more than the combination of these cutting-edge technologies to make bioeconomy a reality. What is essential here are entrepreneurs who will lead technological breakthroughs to innovations that will create both economic and social value and a strategy conceived from economic and management points of view. This research unit aims to contribute to the creation of bioeconomy through research and investigation focused on the creation of innovation in the advanced bioengineering field.

Unit Head
Professor
YAMAMOTO Kazuhiko

For details, please see



Research Activities

EGBRC Engineering Biology Research Center Kobe University

【Large-Scale Research Projects】

NEDO Development of Bio-Derived Product Production Technology That Accelerates the Realization of Carbon Recycling
Creation of New Enzyme Resources from Database Space (2020–2026)
KONDO Akihiko, HASUNUMA Tomohisa

JST A-STEP
Development of Production Technology for Carotenoid Pigments from Microalgae (2016-2021)
HASUNUMA Tomohisa

NEDO Development of Production Techniques for Highly Functional Biomaterials Using Plant and Other Organism Smart Cells
Development of Information Analysis System That Contributes to The Creation of Highly Productive Microorganisms (2016-2020)
KONDO Akihiko, HASUNUMA Tomohisa, ISHII Jun, TSUGE Kenji, SAKAI Kanae

MEXT Creation of Innnovation Centers for Advanced Interdisciplinary Research Areas Program
Innovative BioProduction Kobe (iBioK) (2008-2018)
Dean：KONDO Akihiko, Vice Dean: YOSHIDA Ken-ichi

AMED Project Focused on Fundamental Technology Development for Industrialization of Regenerative Medicine and Gene Therapy
Development of Advanced Analytical Techniques in New Mass Production Technology for Gene and Cell Therapy Vectors (2018-2023)
UCHIDA Kazuhisa

AMED Project Focused on Developing Key Technology for Discovering and Manufacturing Drugs for Next-Generation Treatment and Diagnosis, Development of Advanced Manufacturing Technologies for Biologics (2018-2020)
KONDO Akihiko, ISHII Jun, TSUGE Kenji, NAKAMURA Yasuyuki, NISHIMURA Yuya, SASAKI Daisuke

JSPS Grant-in-Aid for Scientific Research (A)
Water Oxidation on Semiconductor Photocatalysts: How Completed under Dilute Photon Flux (2020-2022)
ONISHI Hiroshi

NEDO Development of Common Basic Technology for Plant Productivity Control
Establishment of a Domestic Technology Platform for Genome Editing (2016-2020)
NISHIDA Keiji, FUJIKURA Ushio, MITSUNOBU Hitoshi, KATAYAMA Kenta

【Articles】

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Schmetz, Q., Teramura, H., Morita, K., Oshima, T., Richel, A., Ogino, C., Kondo, A. (2019) Versatility of a dilute acid/butanol pretreatment investigated on various lignocellulosic biomasses to produce lignin, monosaccharides and cellulose in distinct phases. *ACS Sustainable Chemistry & Engineering*, 7(13), 11069-11079

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website http://www.egbrc.kobe-u.ac.jp/en/project/index.html

For details, please see