



Towards a Carbon Neutral Green Society and Bright Future

-Higher Education and Leadership for Global Goals
: Sustainable Development and Beyond-



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President of Yamaguchi University
2 February 2023

YAMAGUCHI UNIVERSITY



- 1. Brief introduction of Yamaguchi University (YU)**
- 2. Kasetsart University and Yamaguchi University Research collaboration/Joint degree program**
- 3. YU Research Group for Promotion of Green Society/
YU Action to Green Society:High-temperature ethanol fermentation**
- 4. Brief introduction of YU research activities**



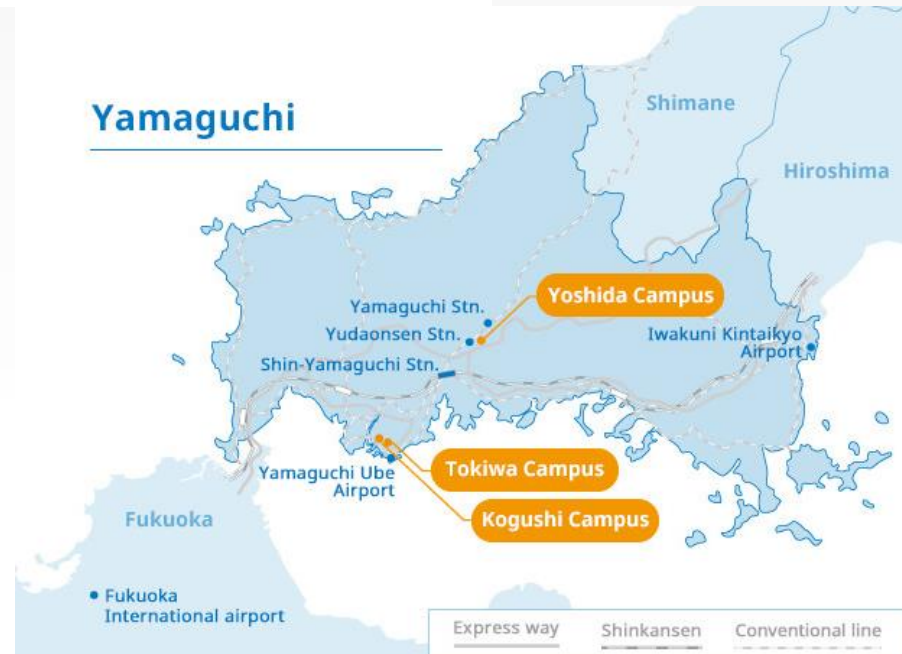
Yamaguchi University



Medical School and Hospital



Yamaguchi





Yoshida Campus

3

The 3rd oldest university in Japan
YU was established in 1815

YU has 3 campuses
with 9 faculties and 8 graduate
schools

8,546

Undergraduate students

1,473

Graduate students

961

Academic staff

430

International students
as of November 2022

174

Overseas partner institutes



9

Faculties

- Humanities
- Education
- Economics
- Science
- Medicine and Health Science
- Engineering
- Agriculture
- Veterinary Medicine
(jointed with Kagoshima Univ.)
- Global and Science Studies

8

Graduate schools

- Humanities
- Education
- Economics
- Medicine
- Sciences and Technology for
Innovation
- East Asian Studies
- Innovation and Technology
Management
- Veterinary Medicine
(jointed with Kagoshima Univ.)



Philosophy of Yamaguchi University

Discover it. Nourish it. Realize it. A Place of Wisdom

Yamaguchi University Vision 2030

GOALS : Yamaguchi University creates wisdom and nurtures human resources with resilience and flexibility, and contribute internationally and regionally.

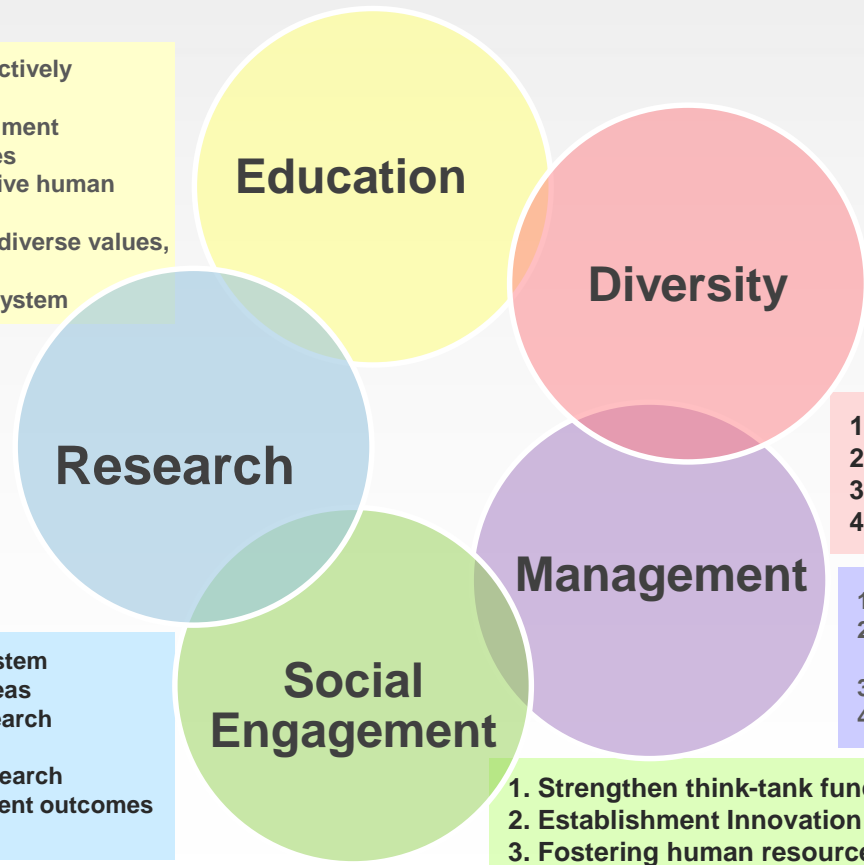
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GOALS of Yamaguchi University Vision 2030 : Yamaguchi University creates wisdom and nurtures human resources with resilience and flexibility, and contribute internationally and regionally.

1. Fostering Human resources with actively in the region or across the world
2. Developing an educational environment that responds to the changing times
3. Graduate education to foster creative human resources
4. Accepting excellent students with diverse values, Experiences, and abilities
5. Enhancement of student support system



1. Support for YU members' diverse needs
2. Promoting diversity among faculty and staff
3. Promotion of student collaboration
4. Strengthen international expansion

1. Building a Trusted University
2. Promotion of DX to enhance education and research support, and regional contributions
3. Creating an attractive work environment
4. Establishment of sound financial structure

1. Building a regional innovation eco-system
2. Creation of world-leading research areas
3. Promoting interdisciplinary basic research as a source of value creation
4. Improvement and enhancement of research infrastructure to produce many excellent outcomes
5. Contribution to a sustainable society

1. Strengthen think-tank functions
2. Establishment Innovation Commons
3. Fostering human resources that contribute to the sustainable development of the region
4. Contribution to education, research and cultural promotion as a research platform for regional studies
5. Realization of safe and secure regional society



Diversity Campus



**Vitality springs up from Diversity.
 Diversity is a core/source of vitality.**

Human Diversity

Gender

Age

Ethnicity

Nationality

Disability

Gender identity

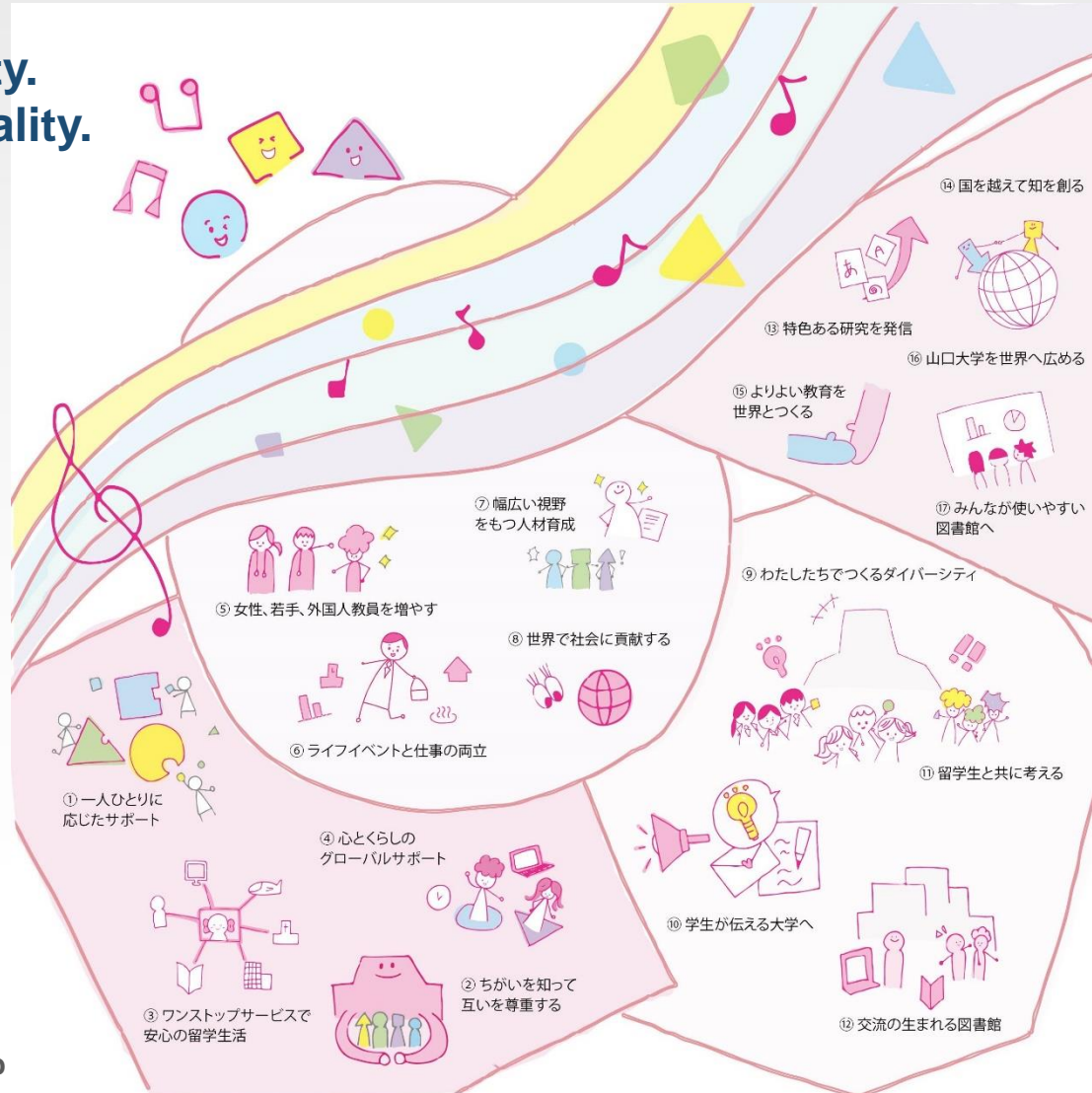
Each and every personality is accepted and respected.

All members can demonstrate their individuality and abilities.

Academic Diversity is also Important.

New ideas will come up through the diversity, open discussion and activities.

Designed by
SIGNAL, YU student group





History of Research on Thermotolerant Microbial Resources

Part1

1993-1995 International Collaborative Research on Thermotolerant Acetic Acid Bacteria
MEXT (Ministry of Education, Culture, Sports, Science and Technology, Japan)

1998-2007 Core University Program

JSPS (Japan Society for the Promotion of Science)

-NRCT (The National Research Council of Thailand)

Microbial resources · development of thermotolerant microbial resources and their application

2008-2012 Asian Core Program JSPS-NRCT

Capacity building and development of microbial potential and fermentation technology towards New Era

2014-2018 New Core to Core Program A. Advanced Research Networks JSPS-NRCT

Establishment of an international research core for new bio-research fields with microbes from tropical areas

2010-2012 International Collaborative Research Program MEXT

Energy-saving High-temperature Fermentation Technology by Tropical Environmental Microorganisms

2014-2018 JST-JICA SATREPS

2017-2019 e-ASIA Joint Research Project JST

Development of new processes with thermotolerant microbes for bio-refinery including biofuels



History of Research on Thermotolerant Microbial Resources Part2

2013- **Priority University Program ***
Phase 3 started in 2022

*The Priority University Program is an original program of Yamaguchi University to promote international research. Yamaguchi University has selected several universities and has been supporting them with emphasis on collaborative research.

2009- **Research Center of Thermotolerant Microbial Resources, Yamaguchi University**



Biodiversity Center, Kasetsart University

PR outreach for industrialization

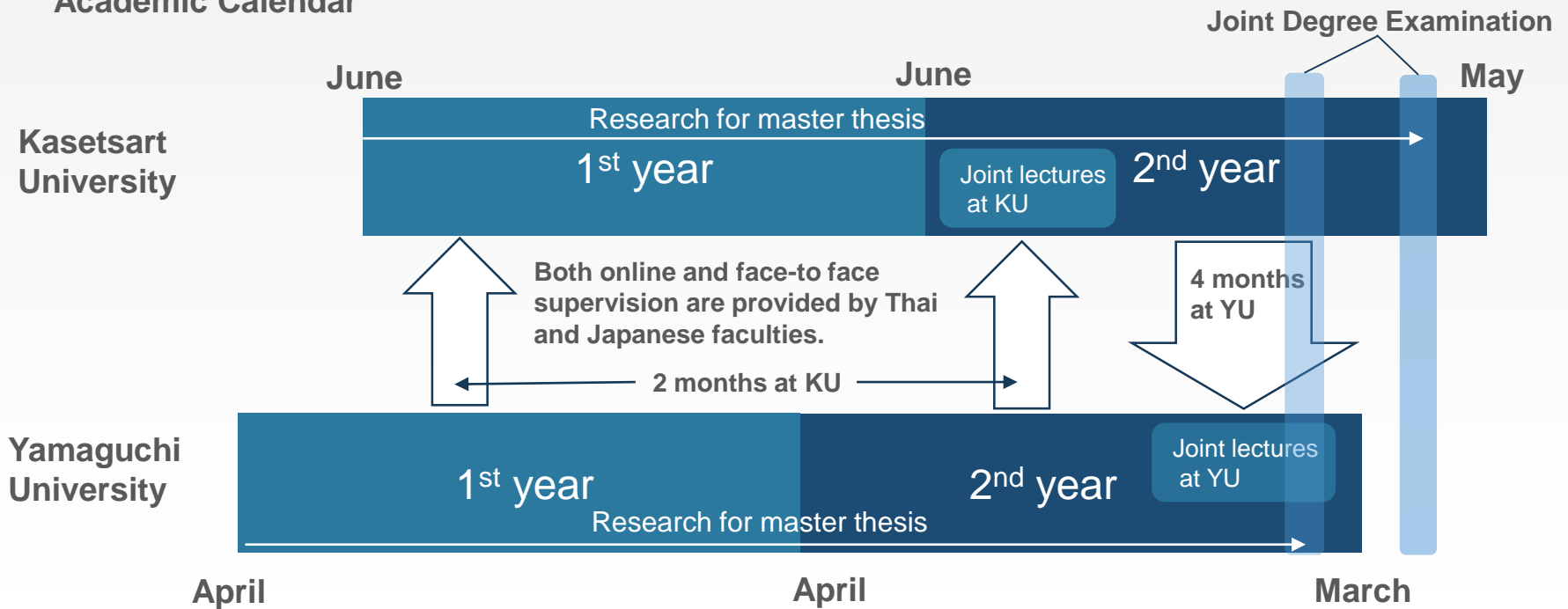
- Thailand Research EXPO by NRCT (2012-2019)
- Seminars for Thai and Japanese companies at Japan embassy in Thailand

Joint Degree Program of Kasetsart University and Yamaguchi University



2020 established Yamaguchi University and Kasetsart University Joint Master's Degree Program in Agriculture and Life Sciences

Academic Calendar



We educate highly skilled professionals who can utilize microorganisms and plants that inhabit tropical environments under this Joint degree program.



“Green Society”

Achievement both zero CO2 emissions and economic growth

October 2020

Japanese Prime Minister Suga declared to aim towards carbon neutrality by 2050 and showed the idea of “Green Society” in his policy statement in the Diet.

Fight against global warming does not restrain economic growth. Positive action against global warming will lead to a transformation of industrial structure and economic society. This mind change is needed.



We established
Yamaguchi University Research Group for Promotion of Green Society
in March 2022

Purpose

- **Contributing to make a green society through "comprehensive knowledge" ranging from humanities and social sciences to natural sciences.**
- **Creating scientific knowledge as basis for a green society**



8 specialized groups are set up under the Research Group for the Promotion of Green Society.



100 outside members and 76 university members are engaging in these groups as of November 2022.

Towards a Green Society industrialize high-temperature ethanol fermentation



High-temperature
ethanol fermentation

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Membrane separation



Electricity
Production



YU Research Center for
Thermotolerant Microbial
Resources



YU Graduate School of
Sciences and Technology
for Innovation



with minimal
CO₂ emission

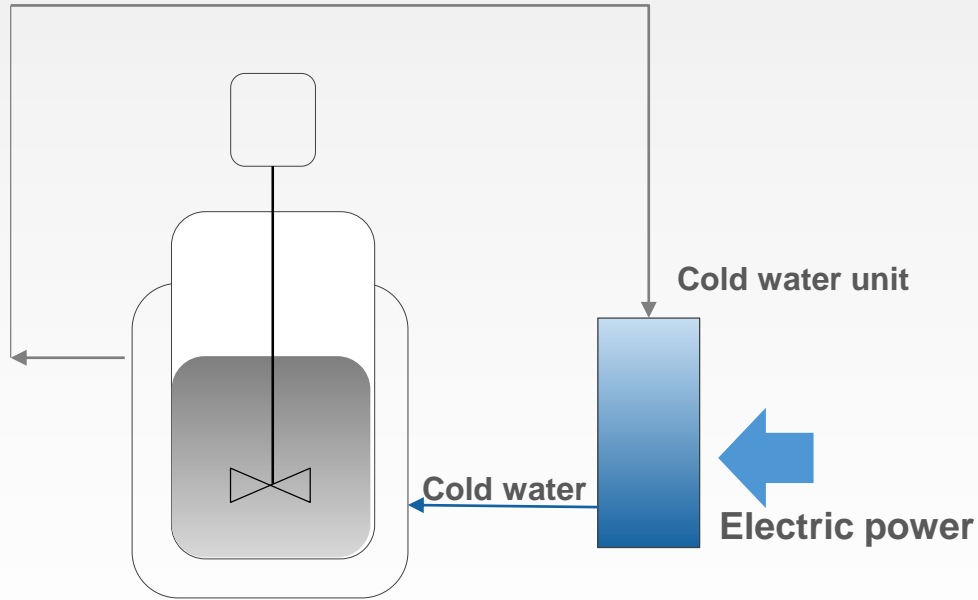
Key point

Implementation through the combination of multiple
field technology and knowledge

High-temperature Ethanol Fermentation

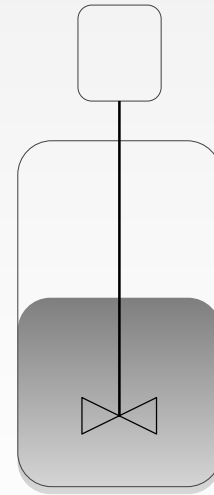


Normal fermentation equipment
20~30°C



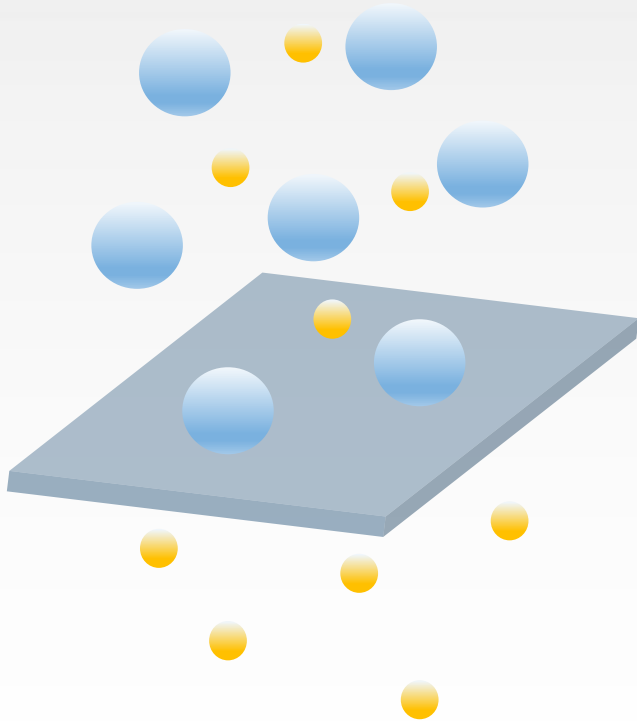
Fermentation container with jacket

High-temperature fermentation equipment
40~45°C



Fermentation container

Membrane Separation Technology



Comparing the energy required
for 10 wt% EtOH to 80 wt% EtOH

Distillation 1,803W/kg-EtOH

Membrane separation 1,199W/kg-EtOH

↑
 $\frac{2}{3}$

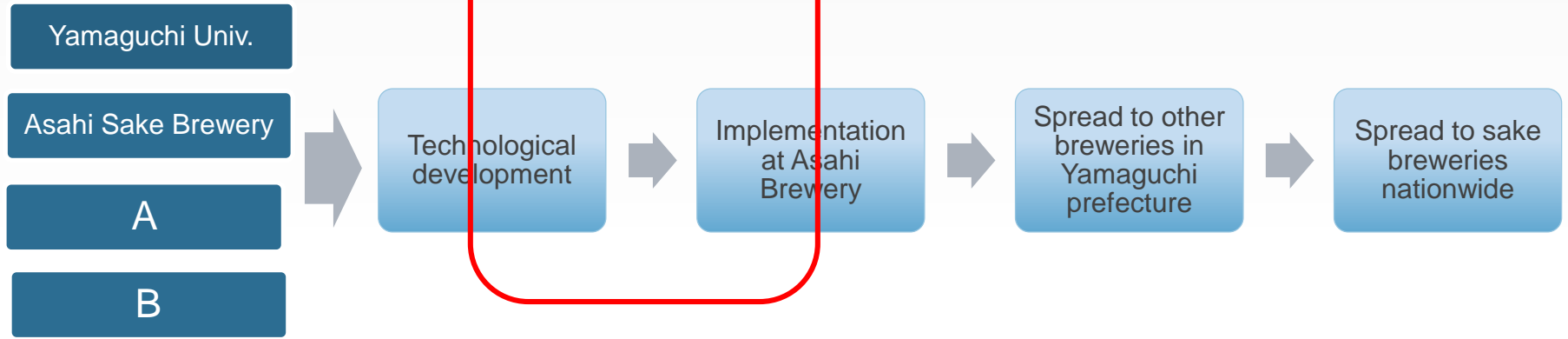
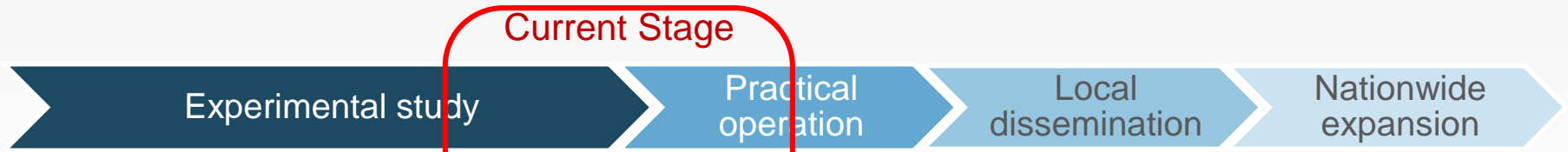
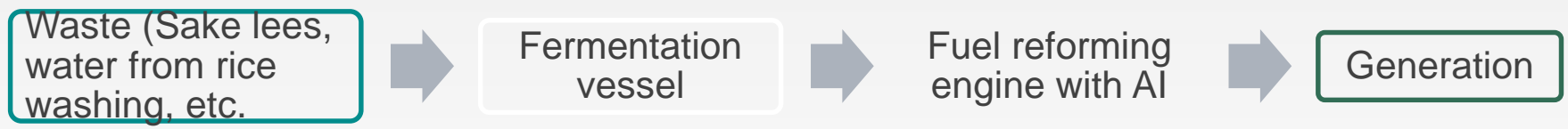
energy of distillation

Development of Ethanol Production from Brewing Residue and Wastewater and Green Power Conversion Technology



High-temperature fermentation with improved yeast

Ethanol concentration using membrane separation method



Securing electricity and reducing wastewater and industrial waste at breweries
10,000,000t CO2 / year reduction estimated if the system was installed in all of Japanese breweries.

Center for Research and Application of Satellite Remote Sensing



© NOIRLab / NSF / AURA / P. Marenfeld

Director : Prof NAGAI Masahiko

4 Missions

Mission 1

- To promote world-class research in satellite remote sensing

Mission 2

- To cultivate human resources capable of promoting a wide range of research in satellite remote sensing and space technology

Mission 3

- To contribute disaster information analysis and improve public safety and security

Mission 4

- To promote local industry and create new industry/business for space utilization technology

Collaborating Research Institutions (11)

Collaborating Educational Institutions (23)



Collaboration for Data Utilization



**Satellite Office of JAXA (The Japan Aerospace Exploration Agency) (at YU)
Opened Feb. 2017**

Next Generation Immuno-Therapy for Solid Cancers : PRIME CAR-T Cell Therapy ~From Yamaguchi to the World~ Professor Tamada, Graduate School of Medicine



Prevalence of Cancer (Japan)



Half of the people suffers from cancer

Current major 3 Cancer therapy

Surgery Radiation Chemotherapy

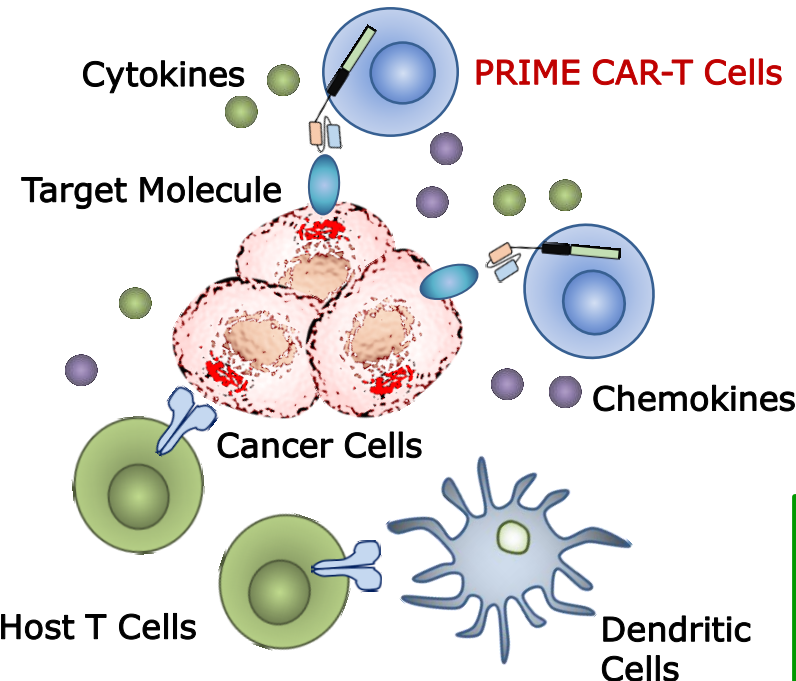
- Difficult to cure the disease
- Fear for Side effects and recurrence



Immuno-Therapy

Effective for patients resistant to the current therapies

PRIME CAR-T Cell Therapy

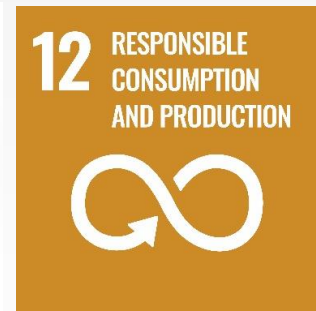
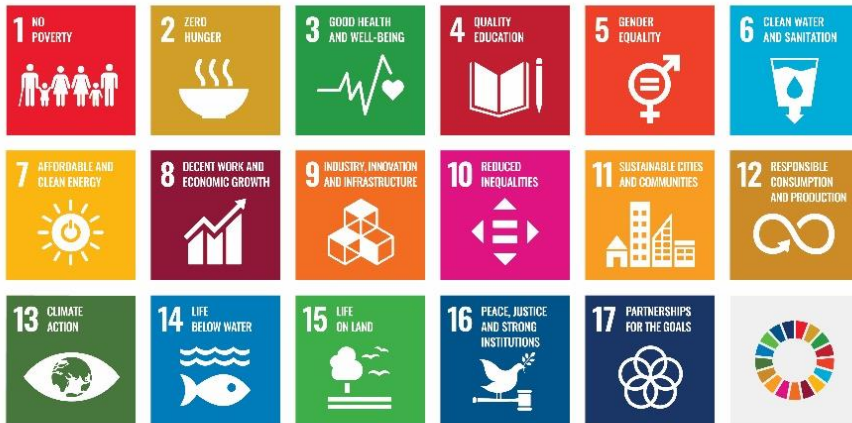


- ◆ CAR-T Cells kills cancer cells by genetically engineered patients' T-cells utilizing patients' own immune system to recognize cancer specific antigen.
- ◆ PRIME CAR-T cells produce both cytokine and chemokine to attract patient's T-cells in addition to the cancer antigen recognition.
- ◆ PRIME technology controls patients' own immune function, and achieve strong anti-cancer effects and prevents recurrence.
- ◆ Prof Tamada's PRIME CAR-T cell therapy is the first in class against intractable **solid** cancers.
- ◆ Currently 3 clinical trials are on-going.

PRIME CAR-T Therapy was Nation-wide broadcasted by NHK, 2022.9.11 !
(from NHK Web Site)

PRIME CAR-T cell therapy realizes patient-friendly and highly effective innovative cancer immunotherapy by strengthening immunity.

Yamaguchi University's contribution to SDGs: Sustainable Development Goals



Yamaguchi University welcomes every one at every season



Thank you for your special attention

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