INDUSTRY-UNIVERSITY COLLABORATION, UNIVERSITY OF TSUKUBA

Research & Development Centers

R&D Center for Precision Medicine
With the aim of the first 1000 dollar genome analysis base in Japan

R&D Center for Frontiers of MIRAI in Policy and Technology
Center for sustainable social infrastructure of future community

R&D Center for Sport Innovation
Japan's first social experiment base of the national university Athletic Department

R&D Center for Health Services
Japan's first center of specializing in the discipline of services that bring health & happiness

R&D Center for Tailor-Made QOL
Development of 'Tailor-Made QOL programs' aimed at promoting health

R&D Center for Working Persons' Psychological Support
Research activities and building social contribution infrastructure related to psychological support for working persons

R&D Center for Innovative Material Characterization
Toward innovative measurement and evaluation technologies

R&D Center for Innovative Drug Discovery
100 years of vitality with new drugs and new technologies

R&D Center for Digital Nature
Investigating new relationships between computers and nature

R&D Center for Wellness Innovation
Aiming to Realize a Wellness Society Creating Mental and Physical Health

R&D Center for Smart Wellness City Policies
Evidence-based Policy Making for the realization of Smart Wellness & Long-lived Society

R&D Center for Lifestyle Innovation
With the aim of the first 1000 dollar genome analysis base in Japan

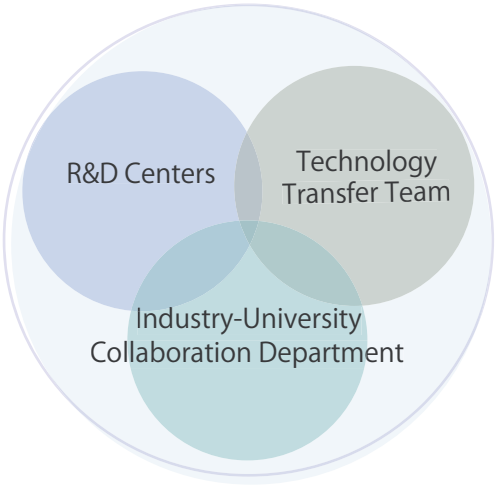
R&D Center for Zero CO_2 Emission with Functional Materials
Toward carbon neutrality and hydrogen economy

Headquarters for International Industry-University Collaboration, University of Tsukuba

筑波大学
University of Tsukuba

IMAGINE THE FUTURE.

Organization
of
Headquarters for International Industry-University Collaboration

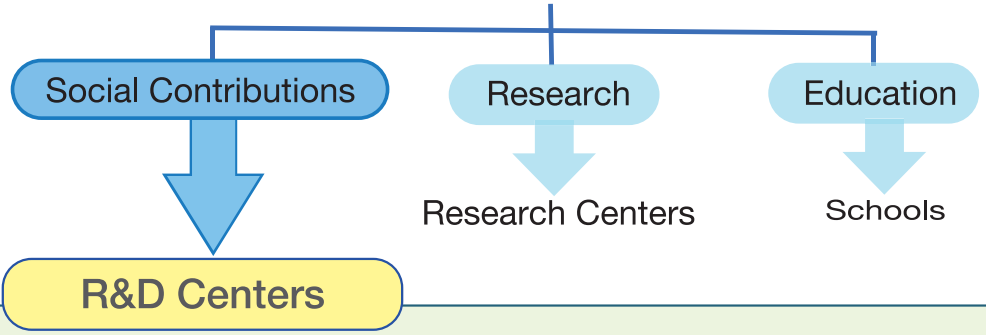


About the R&D Centers

Since July 1, 2015, the R&D centers have sequentially found under the Headquarters for International Industry-University Collaboration. They are founded for promoting joint research and development in academic fields of high social demands, and organizing a cooperative research system. Their operation cost only comes from an external fund such as a collaborative or sponsored research with private sectors.
As the mission of a national university, we are responsible for education, research and social contribution. And the R&D centers are the new body which undertakes a role of social contribution.
We are continuously supporting their centers and developing more R&D center of other fields In the future.

Yasunori Kanaho
Director General of Headquarters for International Industry-University Collaboration
and Vice President (Industry-University Collaboration),
University of Tsukiuba

Mission of University of Tsukuba



Innovative Organization operated by external funds

Objectives	Management
• Create innovation • Participation of industry personnel • Speed up research • Cultivate industry-directed culture & entrepreneurial talents	• Promote industry-university collaboration in research areas with high social demands • 5 years duration (with a possibility to extend) • Will be abolished when external funding is no longer available

PMC
Research and Development Center for Precision Medicine

R&D Center for Precision Medicine

Since January 1st , 2017

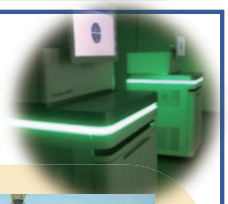
Aiming for Social Implementation of Precision Medicine

The Research and Development Center for Precision Medicine (PMC) was established as Japan's first omics analysis center aiming to develop a $1000 genome sequencing technology. Using state-of-the-art technologies in genome sequencing and mass spectrometry, the Center aims to provide analytic and translational approaches to provide precise diagnosis of cancers and various diseases in a data-driven/evidence-based approach.
The Center has been working with the Tsukuba Preventive Medicine Research Center, which offers a comprehensive medical examination utilizing the function of initiative prevention of medical research. In order to promote collaborations with leading domestic and international research institutions, the PMC is also active in cross-border multidisciplinary networking.
The Center aims to establish a research infrastructure for the implementation and realization of Precision Medicine, to improve/determine the best course of treatment for each individual.

Taka-Aki Sato, Ph.D.
Director, R&D Center for Precision Medicine

Mission

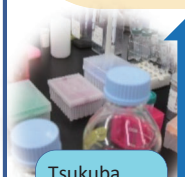
Introduce the next-generation ultra-high-throughput human whole genome sequencing system in the University of Tsukuba.
Form a platform for Precision Medicine by building partnerships across industry, academia, and government.



7 Core Laboratories

- Medical Genomics
- Cancer Genomics and Epigenomics
- Congenital Metabolic Diseases
- Precision Psychiatry
- Morpho-infomatics and Muliti-omics
- Food and Healthcare
- Large-Scale Data Analysis

Next Generation High-Throughput Human Whole-Genome Sequencing



Tsukuba International Strategic Zone

Research for Technological Seeds Discovery/Creation

◉Special Collaboration
◉Human Resource Development and Communication

University of Tsukuba Venture Company
iLAC Co., Ltd.
http://www.i-lac.co.jp/

National and International Project

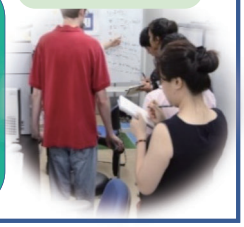
Research Institutions
- National universities
- National research institutions
- Public interest incorporated foundations

Private Corporations
- Pharmaceutical companies
- Diagnostic companies
- Precision device industry
- Clinical trial industry
- IT industry

National Medical Agencies
- National Research and Development Agency
- Public Interest Incorporated Foundations
- General Incorporated Foundations
- Private medical corporations

Collaboration with other countries
- Privately owned bio-venture companies
- University research institutions in Europe and the US
- National research Institutions in Europe and the US
- Privately owned medical institutions in Europe and the US

Human Resource Developement and Communication



IMAGINE THE FUTURE.

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address: University of Tsukuba Innovative Medical Research Institute 1-2 Kasuga,Tsukuba,Ibaraki 305-8550, Japan
e-mail pmc-info@ilc.tsukuba.ac.jp URL https://rdcpm.tsukuba.ac.jp

R&D Center for Frontiers of MIRAI in Policy and Technology

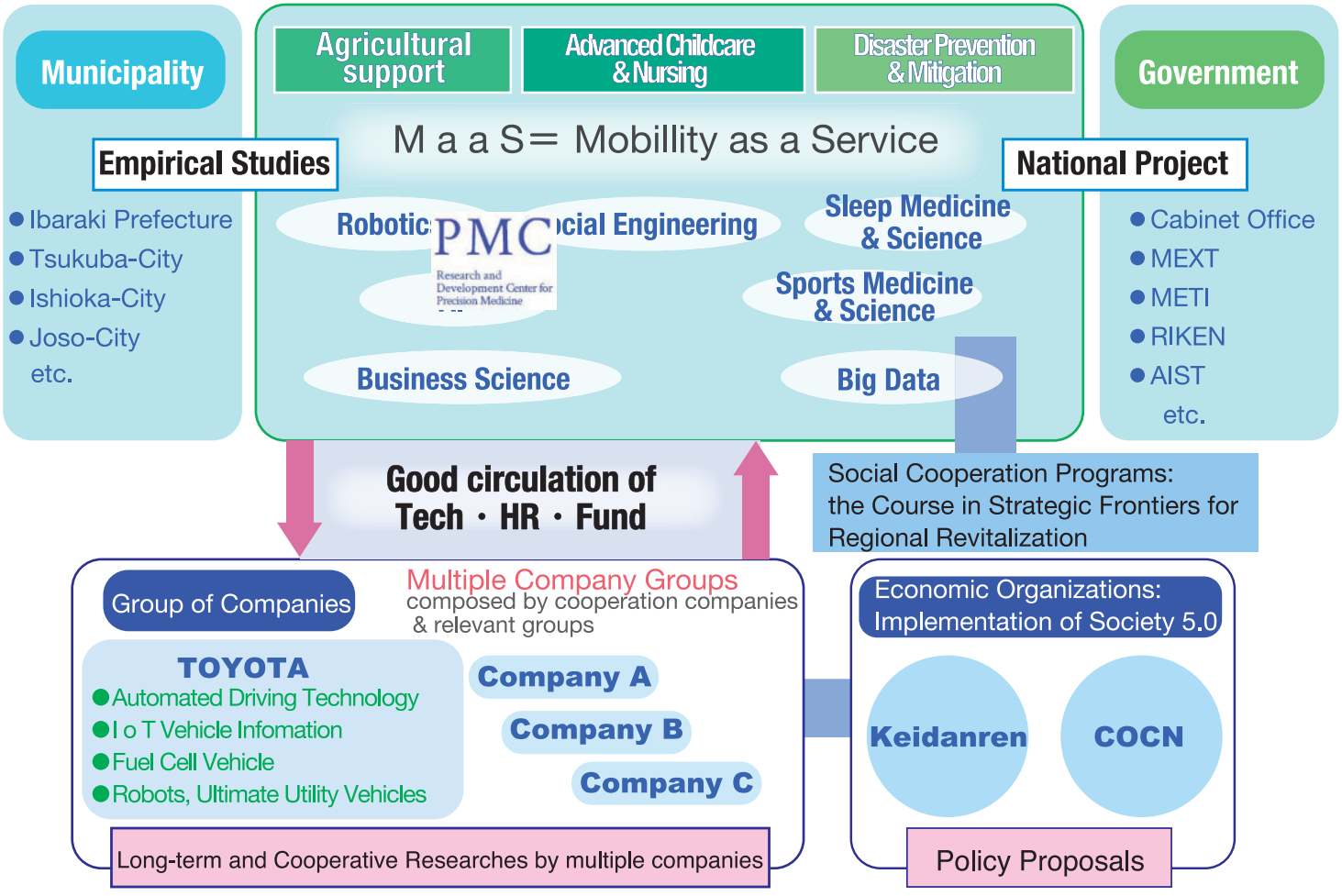
Since April 1st, 2017

Creating sustainable social infrastructure of regional future

R&D Center for Strategic Frontiers Social Planning (as known as F-MIRAI) is a base for research and development into social infrastructure for communities of the future, and organizes open laboratory system with industry-University collaboration. Based on social engineering, academic ability of the University of Tsukuba and adbanced technology by multiple companies and local governments. We will promote theoretical policy recommendations and social implementation to solve regional economic and social problems through demonstration experiments. One such experiment explores the social image og the regional future, where symbiosis of people, society and nature coexist and all regions shares different strategic methodologies. The most pivotal research to be undertaken analyses next-generation vehicle development and its service platform that allows people to move without implications to individual differences and realize a lively life. As a center for research, we are convinced that a proactively advance cooperation among Industry-University and several local governments will produce groundbreaking efforts in the area of social engineering.

Mission

Aim for creating sustainable social infrastructure of regional future, construct technology services for next generation vehicles.



e-mail：info@f-mirai.tsukuba.ac.jp URL：https://www.f-mirai.tsukuba.ac.jp/

R&D Center for Sports Innovation

Since April 1st, 2017

Aim for establishment of AD (Athletic Department)

R&D Center for Sport Innovation aims to establish and promote Athletic Department (AD) within the University of Tsukuba. To accomplish our mission, it is essential for us to designate the philosophy of Athletic Department, clarify the roles and the job descriptions between athletic director and sports administrator, and cultivate human resources that is still uncommon in Japan.
Furthermore, we need to have a discussion in order to strengthen the relationship between university and community. Meanwhile, we will prepare for the establishment of the Japanese version of NCAA in cooperation with other universities. Therefore, we are sure it leads to fulfill student support, enhance collaboration with the community and improve the value of the University.

Hideki Takagi, Ph.D.

Director, R&D Center for Sports Innovation

AD: Department of the governance of students' sports activities under the direct supervision of the President

Mission

Research
Study the achievements and improvements of AD establishment and lead the college sports in Japan

HR development
Training world-class sports administrators

International Interaction
Provide various educational research opportunities through collaborative research and education with American universities

Cooperation with business enterprises
Promote reforms on the sports industry in collaboration with companies with a common philosophy

- Sports as an entrance to the Univ.
- "Watch" "Play" "Support" College Sports
- Sales for goods and tickets

University Branding
- Increasing a royalty towards the University
- Promote positive impressions to donators and prospective students

Promotion of Sports
- Strengthen facilities, sports trainers, and PR
- Better performance and enjoyable community
- Customer Experience

Commercialization of College Sports
- Strong bonds of royalities and pride towards Univ.
- More research funds, and securing talented athletes

Activation and Growth of the University

Community Development
- University Sports as an entertainment
- Contribute to community
- Strengthen collaboration between university and community

Address: 4th floor of Global Sports Innovation Building, University of Tsukuba, 1-1-1 Tennodai, Tsukuba, Ibaraki, 305-8574, Japan

Tel 029-853-5779

R&D Center for Health Services

Since July 1st, 2017

Towards health services in harmony with life

Health Services Research & Development Center was established on July 1, 2017. The center is specialized in a health services research (HSR) which is Japan's first academic research field. Through the data analysis of nationwide or district region, we investigate and research considering"how to effectively deliver care services that bring the health and well-being to people who need them". By focusing on its continuity of the services from preventive care to nursing care, the outcome improves the quality of the sequence of the healthcare services at each stage in our society. We hope this newly created center would follow the openness to society that our university, the University of Tsukuba, represents, so that we could imagine the future together.

Nanako Tamiya, Ph.D.
Director, R&D Center for Health Services

Mission

To research how we can effectively contribute to provide services that bring good health & happiness to people in the declining birthrate and aging of the population society.

Cooperation with Government

Policy proposal

Clinical Evidence

Gov't

Public Fund

R&D Ctr. For Health Services

Promote academic research and social contribution by making effective use of 2D data.

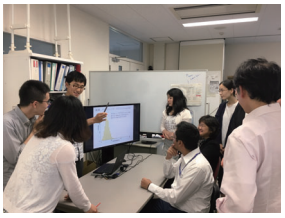
University of Tsukuba

Medicine

Hospital

Health and Sport Sciences

Human Sciencies



- Dept. of Secondary Data Infrastructure
- Dept. of Regional inclusive care research/implementation
- Dept. of Local Preventive Medicine
- Dept. of Clinical Medicine
- Dept. of Global Aging
- Dept. of Comprehensive Family Policy

Academic Cooperation

International Cooperation

Without using taxes,we support an aging society!

Cooperation with Industries

Medical Providers

Sompo Holdings, Inc.

Japan Medical Data Center Co., Ltd.

Institute of Global Medical and Sports Science, Ltd.

SMS Co., LTD.

Care Service Providers

Acute Care Hospital

Nursing Home Health Ctr. for elderly

Convalescent Hospital

Home care Services

Cooperation with community

Municipals

- Senior Club
- Resident's Association
- Volunteers
- N P O, etc.

Life Support

Nursing Prevention

Address: Room 861 Institute of Medicine, University of Tsukuba, 1-1-1 Tennodai, Tsukuba, Ibaraki, 305-8575, Japan

E-mail hsr@md.tsukuba.ac.jp Tel 029-853-3482

R&D Center for Tailor-Made QOL

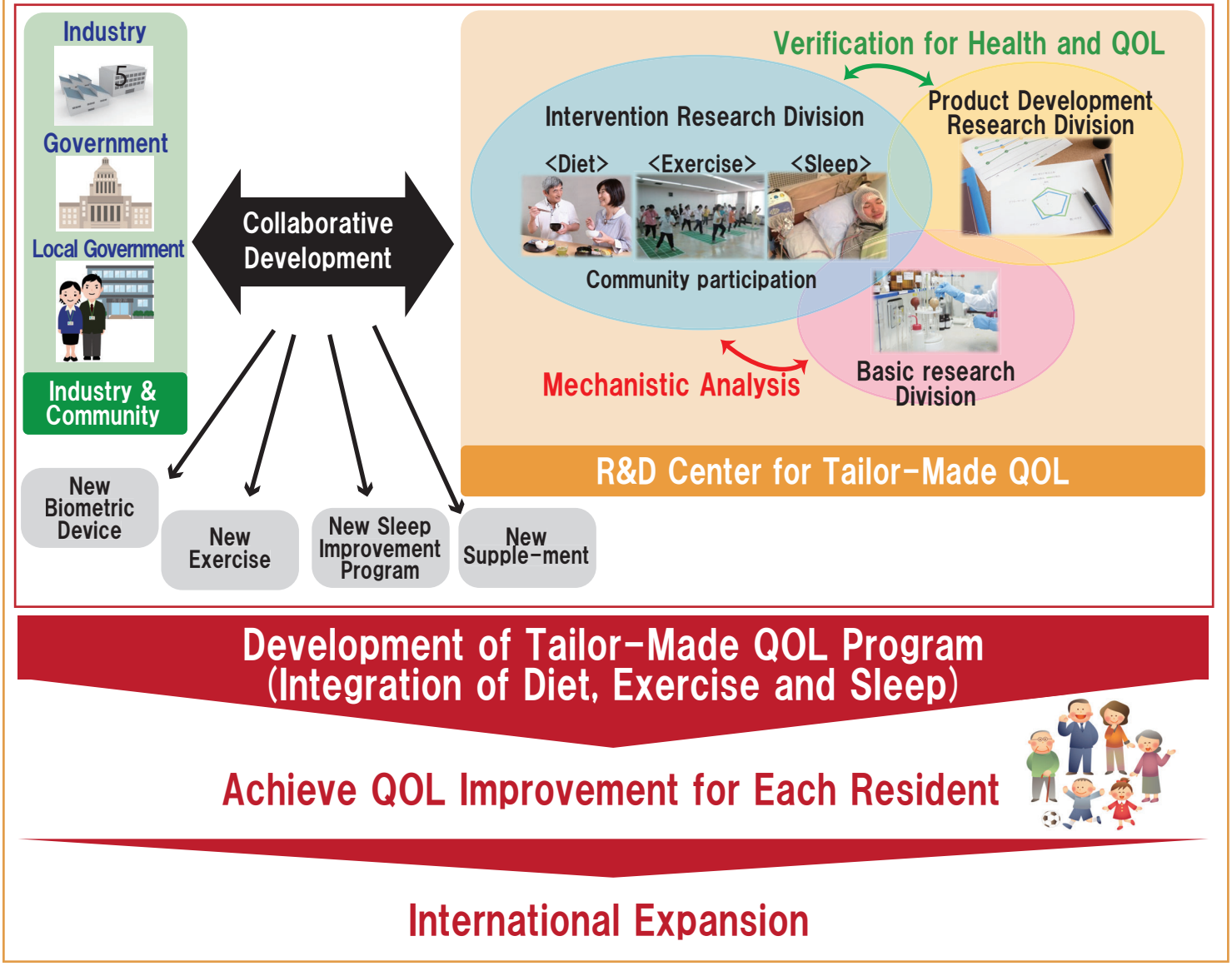
Since February 1st, 2019

Development of 'Tailor-Made QOL programs' aimed at promoting health

R&D Center for Tailor-Made QOL has been established to disseminate an innovative 'Tailor-Made QOL Program' aimed at promoting health and preventing functional decline to people all over Japan and the world. Reducing the burden of health care cost has become an urgent issue; therefore, the national policy is shifting focus from 'treatment/care' to 'prevention and improvement'. It has become necessary to develop effective programs to improve the QOL and extend healthy life span that enable people to age with dignity, thereby overcoming the current situation where people remain bedridden for long periods of time at the end of their life. Not only will this lead to a significant reduction in medical expenses, but this will also change the image of the elderly people and contribute to the accumulation and utilization of human and intellectual capital in the society.

Hiroko Isoda, Ph.D.
Director, R&D Center for Tailor-Made QOL

Mission



Development of Tailor-Made QOL Program (Integration of Diet, Exercise and Sleep)

Achieve QOL Improvement for Each Resident

International Expansion

Address : Innovation Medical Research Institute, University of Tsukuba, 1-2 Kasuga, Tsukuba, Ibaraki, 305-8550, Japan

Tel 029-859-1593

R&D Center for Working Persons' Psychological Support

Since April 1st, 2019

Research activities and building social contribution infrastructure related to psychological support for working persons

Research & Development Center for Working Persons' Psychological Support was established on April 1, 2019. The purpose is to provide a one-stop service for psychological support to working persons from both research and social contribution. We promote our activities based on the principle that "Pursuit lifelong development, with us." to support working persons, families and organizations that support those working persons.
The center covers various areas of life-long development perspectives (transitions from school to work, middle-aged, elderly people, pregnant women, childbirth, childcare, nursing care, etc.), various areas of target (family, welfare, school, education, industry, society, etc.),and various areas of research (psycho-clinical, social behaviors, career development, mental health, disaster stress, addictions, etc.),and is characterized by it.
We will promote practical research in line with social needs and will provide high quality psychological support services to working persons. In addition, it contributes to the qualitative improvement of psychological practitioners and human resources, and the training of leaders.

Masaki Okada, Ph.D.
Director, R&D Center for Working Persons' Psychological Support

Mission

「Pursuit lifelong development, with us.」

Now that working places are facing various environmental changes, the need for " psychologically understanding people" is rapidly increasing. We believe that human can develop regardless ages and would like to support both life and work. Here highly skilled practitioners who are also researchers eager to support them and gathered.

Research dept.

Promote and expand research on psychological support for working persons

Social contribution dept.

- [Academic instructions]
  Consulting, survey & analysis using psychological statistics, tools development, etc.
- [Human resources development]
  Development and implementation of training programs, education effectiveness evaluations,
  Providing a training places
- [Psychological support for working persons]
  Counseling room, Supervision, Supervisor training

T-One Lab

*T-One Lab
Center nickname. Bringing together the wisdom of the University of Tsukuba, we will be one team and provide one-stop services.

Address : Room458, Tokyo Compass Bunkyo School Building ,University of Tsukuba, 3-29-1 Otsuka, Bunkyo, Tokyo, 112-0012 Japan
Tel 03-3942-6573 e-mail t-onelab_info@un.tsukuba.ac.jp

R&D Center for Innovative Material Characterization

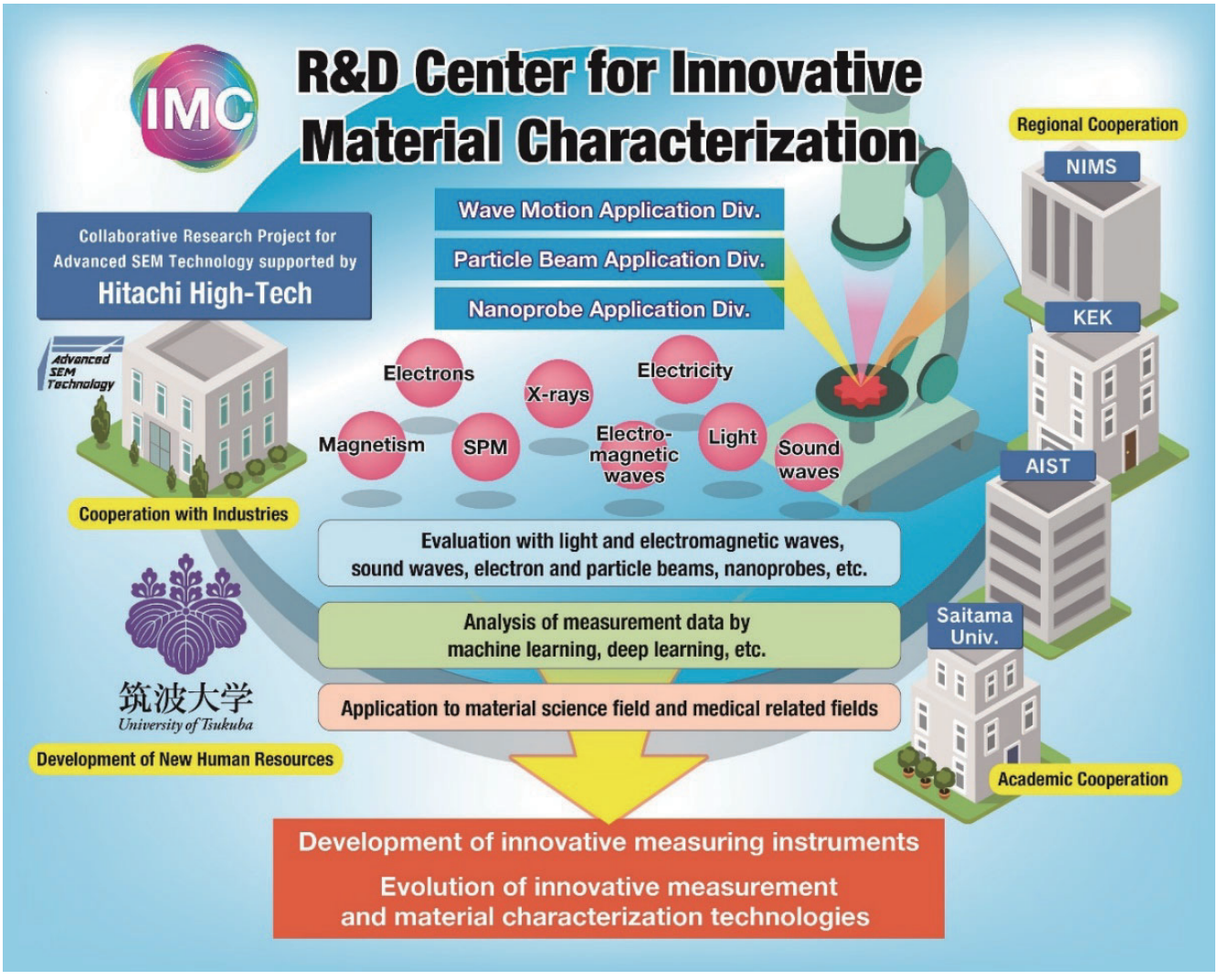
Since October 1st, 2019

— Toward innovative measurement and evaluation technologies —

The world is making rapid progress with the aim of creating a sustainable society utilizing IoT and AI. Measurement and evaluation techniques are becoming increasingly important. In this center, we promote the research and development of new measurement and evaluation technologies by making full use of evaluation methods with light and electromagnetic waves, sound waves, electron and particle beams, nanoprobes, etc. and applying the technologies such as machine learning, deep learning, etc to them. Their application fields are generally classified into two fields: the material science field such as nanotechnologies including semiconductors, functional devices, etc. and the medical related field such as pathological diagnosis, drug discovery, etc. Measurement and evaluation technologies are indispensable to them and form the core of Japan's industry. Further development of those technologies bears the future of Japan.
Taking advantage of the accumulated expertise in Tsukuba, we will continue to strive toward achieving innovative material characterization with high accuracy and quality.

Masahide Ito, Ph.D.
Director, R&D Center for Innovative Material Characterization

Mission



Address : #101, Project & Research Bldg., University of Tsukuba, 1-1-1 Tennodai, Tsukuba, Ibaraki, 305-8575 Japan
Tel 029-853-8802 e-mail rd-center-imc@un.tsukuba.ac.jp URL https://imc.bk.tsukuba.ac.jp

R&D Center for innovative Drug Discovry

Since October 1st, 2019

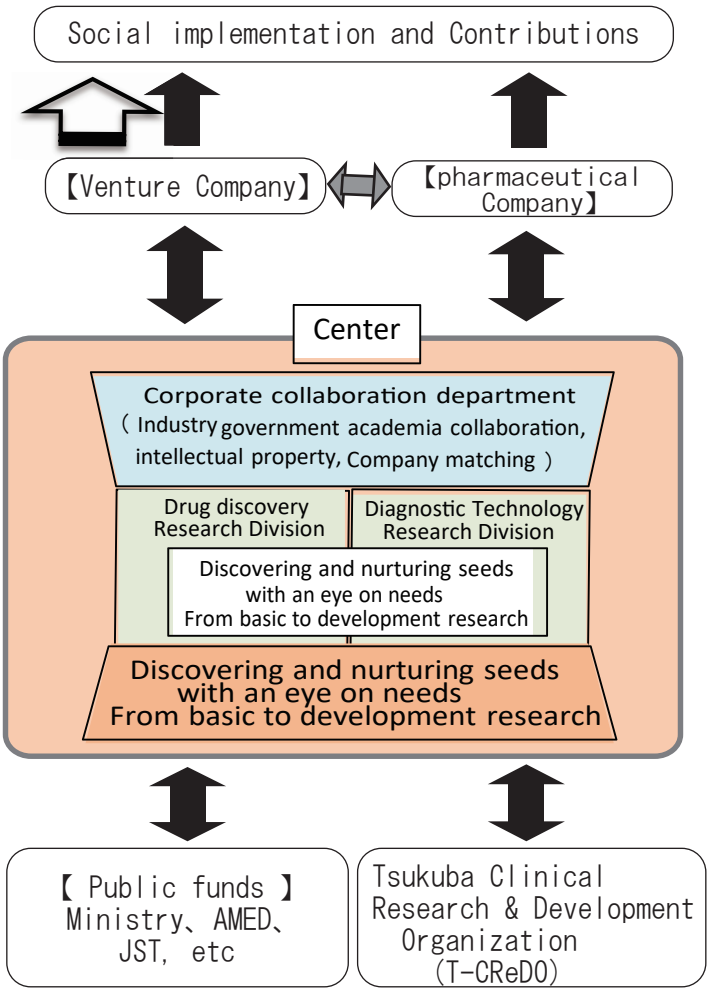
100 years of vitality with new drugs and new technologies

In Japan, a super-aging society with a declining birthrate is progressing and the disease structure is changing along with increasing lifestyle and aging-associated chronic intractable diseases such as cancer and circulatory, musculoskeletal, psychiatric and neurological, metabolic, and immune diseases. In such a situation, it is desired to create a society where all people can live alive with vitality, safety and peace mind at their respective life stages toward the era of 100 years of life. In recent years, there has been great interest and expectations for technological innovations that will support medicine, such as regenerative medicine, genomic medicine, artificial intelligence, and the use of big data. This center promotes basic and developmental researches for drug discovery / diagnostic technology to responds to medical needs in a society with a declining birthrate.

Akira Shibuya, Ph.D.
Director, R&D Center for Innovative Drug Discovery

Mission

Overview the Center



Expected results

- Creation of a lively and healthy society
- Revitalizing the medical industry
- Revitalizing young human resource development
- Promotion of industry-academia collaboration

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Tel 029-853-3281 e-mail ashibuya@md.tsukuba.ac.jp URL immuno-tsukuba.com/index.html

Research and Development Center for
Digital Nature

R&D Center for Digital Nature

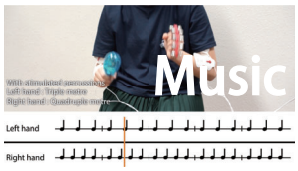
Since June 1st, 2020

Investigating new relationships between computers and nature

The recent developments in computational platforms for ubiquitous computing, Internet of Things (IoT), and cyber physical systems are enabling a 'new nature' – the generation of artificial objects that are indistinguishable from the natural objects. For example, sound and light can be computationally manipulated to render realistic graphics (such as a butterfly) in mid-air or manufacture realistic object (such as material) using a printer. We describe such environment where the environment is restructured through the interaction of natural and computationally generated artificial objects, as the digital nature. Digital nature can be achieved through various methods such as digital fabrication method using 3D printer or through augmented reality (AR) / virtual reality (VR). The interaction of artificial object with the natural environment feeds back as data and will be utilized in a feedback loop to further infuse the artificial object into the natural world.
This R&D center researches the information media devices and co-creation environment with humans in such a feedback loop and develop building blocks towards social implementation of digital nature through the promotion of researches associated with digital nature. In addition, we will endeavor to develop novel media devices and its services via multidisciplinary collaboration with cultural, art and sports sectors.

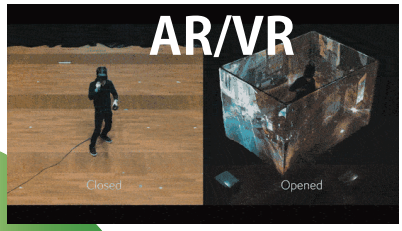
Yoichi Ochiai, Ph.D.
Director, R&D Center for Digital Nature

Mission



Multidisciplinary collaboration with cultural, art and sports sector

R&D Center for Digital Nature



Digital Environment

Feedback Loop

Analogue Environment

Structure a new connection between computer and nature

「Based on the vision towards 'digital nature', collaborate multidisciplinary with cultural, art, and sports sectors, and investigate the coexistence relationship between computers, nature, and humans.

Address: Kasuga Area 7B140 University of Tsukuba, 1-2 Kasuga, Tsukuba, Ibaraki 305-8550 Japan

Tel 029-853-5600（Extension 81417） e-mail：contact@digitalnature.slis.tsukuba.ac.jp

R&D Center for Wellness Innovation

Since July 1st, 2020

Aiming to Realize a Wellness Society Creating Mental and Physical Health

With the rapid increase of aging society and the rapid decline of the working population, the importance of methods, technologies, and specific services for extending health expectancy has been increasing.

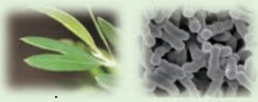
At Research & Development Center for Wellness Innovation, we evaluate the functionality of food and other materials, and the functionality of sensory stimuli such as scent and light using various model biological systems, and promote the development of materials and sensory stimulus environment involved in extending healthy life expectancy. Furthermore, we aim to realize a society that promotes physical and mental health and longevity by developing technologies and methods for social implementation and providing specific services (protocols for commercialization, consultants, information dissemination, etc.).

Based on this center, we aim to realize a healthy longevity (wellness) society in which both physical and mental health and happiness can be felt.

Kazuichi Sakamoto,Ph. D.
Director, R&D Center for Wellness Innovation

Mission

To provide society with developing methods, technologies, and specific services for health expectancy, we research and analyze the functionality of food and other materials.



Functionality of Food and other materials

Research Dept.

Promotion of basic research for wellness and healthcare in general

Public Relations Dept.

Promotion of information dissemination through symposia, open lectures, seminars, etc.

Functionality of Sensory Stimuli

HR Development

- Development of a comprehensive and cross-sectional research environment
- Developing international human resources

Social Contribution

- Promote integrated and efficient research
- Promote interdisciplinary cooperation and the creation of new industries

International Interaction

- Promotion of human resource exchange and joint research with foreign universities, research institutions, and companies

Provision of methods, technologies, and specific services

Realization of Wellness Society Creating Mental and Physical Health

Against Aging Population with Low Birthrate

To Increase Labor Force

To Reduce Medical Costs

Wellness

Feeling of Well-being

Address : Institutes of Biological and Agricultural Sciences Building B615, University of Tsukuba, Tennoudai 1-1-1, Tsukuba, Ibaraki 305-8572 Japan

Tel:029-853-4676 e-mail：sakamoto@biol.tsukuba.ac.jp http://kazlab-sirtuin.net/

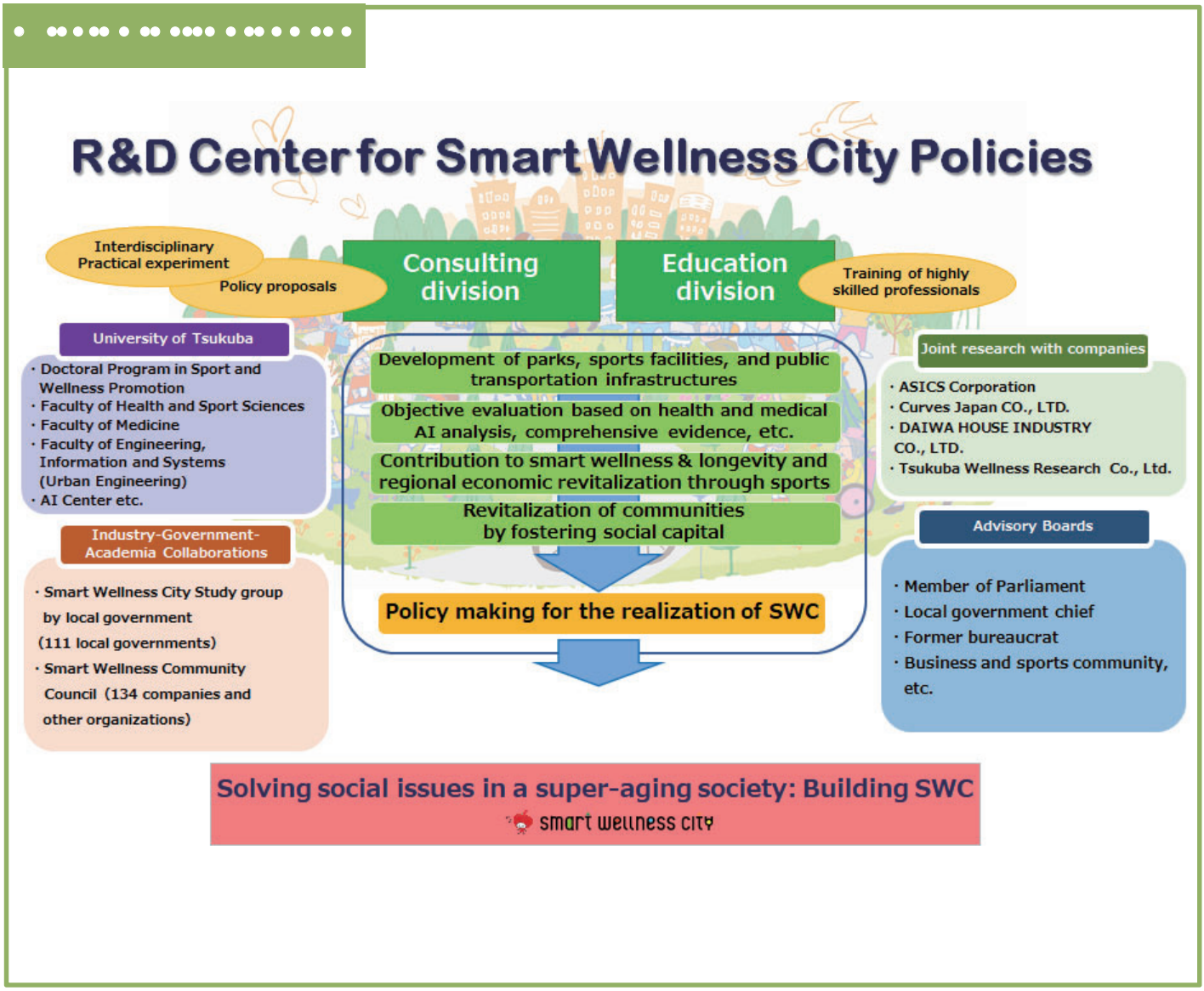
R&D Center for Smart Wellness City Policies

Inaugurated on November 1, 2020

Evidence-based Policy Making for the realization of Smart Wellness & Long-lived Society

To contribute to the creation of cities that enable the realization of a healthy and long-lived society, the SWC Center will aim to promote developmental research on various issues inherent to a super-aging society, to propose policies to society as products of such research, and to establish a function for training advanced professionals who can implement such policies. Accumulating evidence and formulating policies for creating SWC where residents can live safely and securely requires conducting large-scale, interdisciplinary demonstration experiments by organically integrating sports wellness studies, medicine, urban engineering, and AI. The SWC Center will contribute to policy proposals and human resource development based on the evidences accumulated in the field of sports wellness studies regarding the usefulness of sports for health and well-being and regarding the ideal urban environment, as well as promote joint research in the above-mentioned interdisciplinary research fields in collaboration with local governments and companies. We look forward to your participation.

Shinya Kuno
The director of the SWC Center



Address：Room #653, 3-29-1 Otsuka, Bunkyo-ku, Tokyo 112-0012, Japan

Tel:03-3942-5841 e-mail: kuno.shinya.gb@u.tsukuba.ac.jp URL: https://swc.taiiku.tsukuba.ac.jp/

Lifestyle Innovation TSUKUBA

R&D Center for Lifestyle Innovation

Since April 1st, 2022

Exploring lifestyle for health and well-being for the future

Yoshimoto Hisashi, Ph.D
Director, R&D Center for Lifestyle Innovation

In recent years, countries around the world have been experiencing a number of social structural changes, such as declining populations, aging societies with fewer children, social inequality, and globalization. Lifestyle changes are required for various reasons including environmental and energy issues, emerging and re-emerging infectious diseases, increasing health consciousness, and value changes.

The Sustainable Development Goals were adopted by the United Nations. For example, Goal 3: "Good Health and Well-being" includes measures against lifestyle-related diseases and proper alcohol consumption. Thus, while more lifestyle transformation is required, a sense of balance between health and well-being is also required in the context of diverse values.

This center will promote basic research on physical and mental health, including physical endurance and brain fatigue, as well as research on health disorders, quality of life, and drinking patterns. Based on the results of these studies, we will support the development of products and services that constitute healthy and happy lifestyles and create a new culture in the community.

Through these efforts, we aim to create better lifestyles based on scientific evidence. In addition to the interdisciplinary and international nature that is characteristic of the University of Tsukuba, where researchers from inside and outside the university gather from various fields, we will build a system of collaboration and cooperation among multiple companies that conduct joint research to create new value. We will regularly communicate the results of these efforts to society so that as many people as possible will become aware of them.

Mission of the Center

Creating better lifestyles for the future

Social implementation & realization of vision

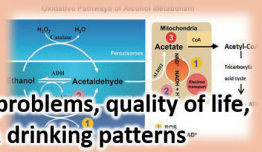
Government

Policy advocacy & gaining support

Creation of business alliances & information dissemination

Industry

R&D Center for Lifestyle innovation

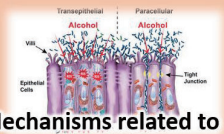


Health problems, quality of life, & drinking patterns

Creating a new culture in the community

Envisioning a new, futuristic lifestyle

Promotion of basic to applied research



Mechanisms related to physical endurance

Involvement of ALDH2 gene polymorphisms in intoxication patterns

Exploring factors associated with brain fatigue

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Tel 029-853-1019 (ext.81499) E-mail : rdc-lifestyle@md.tsukuba.ac.jp

R&D Center for Zero CO_2 Emission with Functional Materials

Since April 1st, 2022

–Toward carbon neutrality and hydrogen economy–

Currently, with global warming, carbon neutrality (zero carbon dioxide emission) is required on a global scale. Hydrogen can be produced from water, and fuel cells using hydrogen produce only water as a product without emitting carbon dioxide in the chemical reaction during power generation. So it now draws attention as one of main energy carrier of renewable energy. Hydrogen is thus a molecule capable to play an important role for the sustainable zero-carbon society. In this center, we will promote the research and development of basic important technologies related to hydrogen production, storage and transportation, and green innovation basic technologies that convert carbon dioxide into useful materials such as methanol and formic acid and fuels.

Dr. Takahiro Kondo
Director, R&D Center for Zero CO_2 Emission with Functional Materials

Mission

National project

Research Institute
- National university corporation
- National Research and Development Agency
- Public interest incorporated foundation

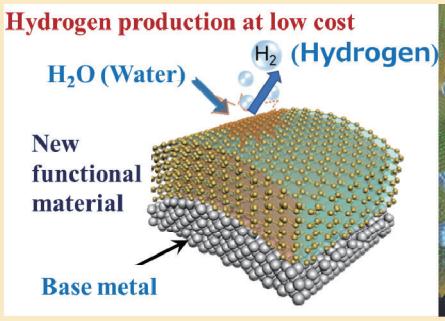
Pure and Applied Sciences

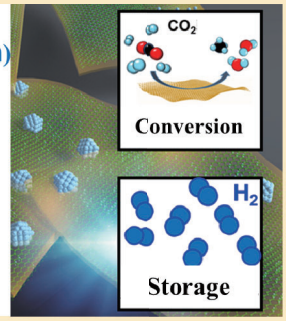
Private enterprises
- Heavy industry
- Automotive related
- Chemical manufacturer
- Oil related
- Energy related
- Manufacturing industry

R&D Center for Zero CO_2 Emission with Functional Materials

Energy carrier production and conversion technology

- Produce hydrogen at low cost without using precious metals
- Storage and transportation of large amounts of hydrogen safely at low cost
- Converting carbon dioxide into useful chemicals
- Utilization of biocatalytic functions of enzymes and microorganisms





Pure and Applied Sciences

Research Institute at Tsukuba
- NIMS
- KEK
- AIST

National project

Overseas organization
- University
- Research Institute
- Overseas companies

Collaboration

Tsukuba Innovation Arena for Nanotechnology (TIA)

Carbon neutrality
Sustainable hydrogen society
Human resources

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University of Tsukuba

〔2022.4〕