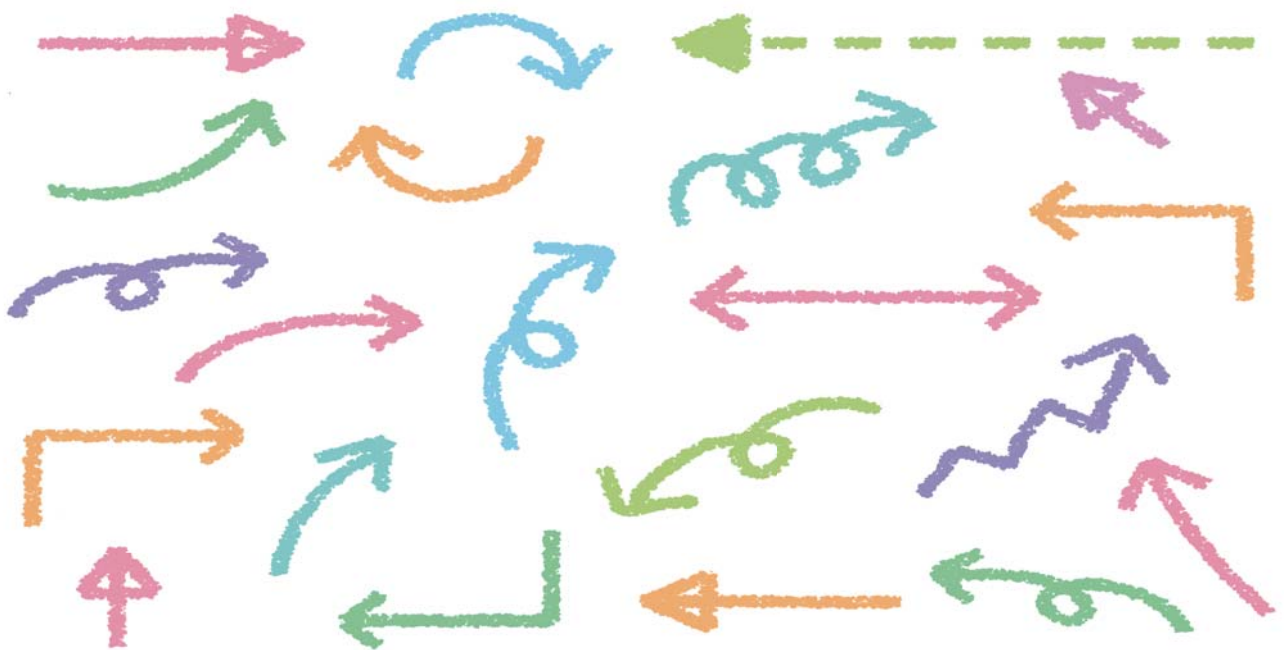


# Institute of Global Innovation Research

*Challenge to the global Problems of “food” and “Energy”*



AY2020



Tokyo University of Agriculture and Technology




## Message



President  
Prof. Kazuhiro

Tokyo University of Agriculture and Technology is a university specialized in science and technology conducting creative and free thought based academic research in agriculture, engineering and integrated fields that support the fundamentals of human society: agriculture and industry.

Under our third mid-term objectives/plan, “to be a world recognized research university” as our vision statement, we are actively engaged in “enhancing and strengthening advanced research competence capable of global competition, as a university that leads Japan to the world. We believe our distinctive strengths will enable us to create unique and new forms of knowledge. We are constantly striving to deepen the relationship and networks between international research institutions and TUAT, as well as driving globalization of our cutting-edge research in the both fields of agriculture and technology.



GIR Dean  
Prof. Masaharu Kameda

TUAT is promoting the globalization of our educational research in the advanced fields of Agriculture and Engineering. In 2016, to strengthen our role to “achieve competitive research capabilities on a global level” , TUAT established the Institute of Global Innovation Research (GIR) as a special research institution.

At GIR, we facilitate international collaborative research in the three priority areas of “Food” , “Energy” and “Life Science” and endeavor to train talented younger researchers who will play an important role on a global scale. We invite world's leading researchers from abroad to GIR, and at the same time, we dispatch TUAT researchers and graduate students abroad. By doing so, we provide them the opportunities to conduct collaborative research. Through promoting international collaborative research, we aim to boost the number of internationally co-authored publications and foster global human resources in the field of natural science.

This year as well, we will search for further ways to utilize GIR, as the home of the University's special research institutions and university reform, to contribute to the realization of the University's potential.

# Approaches

Tokyo University of Agriculture and Technology (TUAT) was selected by the Japanese government as one of the 12 national universities rapidly promoting global research in 2014. In exploiting our advantages in the agriculture and engineering fields, and as an initiative to enhance our research capabilities, we established the Global Innovation Research Organization in June 2014 to further our goals as a research university. In 2016, it was reorganized as the Institute of Global Innovation Research (GIR), a new research institution at the graduate school. In 2018, for further enhancement, the GIR has formed a research group in each three key areas and Strategic Research Initiative for Interdisciplinary Fields consisting of researchers who has 3-year experience in strategic research teams.

At the GIR, we prioritize research in three key areas: "food," "energy," and "life science" which constitute an interdisciplinary area between agriculture and engineering fields. We aim to boost the number of international joint research efforts and internationally co-authored papers, creating advanced innovative results for themes with a high social demand in the key areas.

## Priority Field 1 Food

|  |   |                          |
|--|---|--------------------------|
| <b>Biomass Production</b>                    | <b>Environmental Stress Resistance of Plant</b> | <b>Plastic Pollution</b> |
| <b>Conservation of Regional Biodiversity</b> | <b>Green Infrastructure</b>                     |                          |



Production of Food  
Environmental Science

Tokyo University of Agriculture and Technology  
Institute of Global Innovation Research

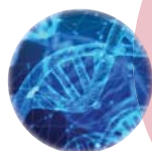
**Field Group & Strategic research teams in the Three Fields  
Strategic Research Initiative for Interdisciplinary Field**

- Employment of World' s leading researchers as core Professors-

“Carrier challenge” (Tenure Track system) etc.



**Advancement of International collaboration  
Development of young researchers**



Protein Science  
Life and Medical Science

|                       |
|-----------------------|
| <b>Disease</b>        |
| <b>Drug Discovery</b> |
| <b>Health</b>         |
| <b>Microorganism</b>  |
| <b>Cell Biology</b>   |

## Priority Field 3 Life Science



Energy Control  
Energy Efficiency

|  |
|--|
| <b>LED</b>   |
| <b>Green Manufacturing</b>   |
| <b>Li-Ion Battery</b>  |
| <b>Resource /Energy Recovery</b>   |
| <b>Environmental-friendly Process of the Product of Useful Compounds</b> |

## Priority Field 2 Energy

## Ohtsu Team

Research of cultivation techniques using biological interaction to ensure maximum yield under nutrient deficiency and environmental stress caused by global change



**Dr. Naoko Ohtsu**  
Institute of Global Innovation Research

**Dr. Gary Stacey** 

University of Missouri (USA)



**Dr. Rowan F. Sage**

University of Toronto (Canada)



**Dr. Sonoko D. Bellingrath-Kimura**

Leibniz Centre for Agricultural Landscape Research (ZALF) (Germany)



**Dr. Matthew Reynolds**

International Maize and Wheat Improvement Center (CIMMYT) (Mexico)



**Dr. Knut Schmidtke**

Research Institute of Organic Agriculture FiBL (Switzerland)



## Toyoda Team

Development of soil evaluation systems for environmentally friendly sustainable crop production



**Dr. Koki Toyoda**  
Institute of Agriculture  
Division of Sciences for Biological System

**Dr. Karl Ritz** 

University of Nottingham (U.K.)



**Dr. Roland Perry**

University of Hertfordshire (U.K.)



## Watanabe Team

Investigation of wildlife to evaluate effects of microplastics contamination on global ecosystem



**Dr. Gen Watanabe**  
Institute of Agriculture Division of Animal Life Science

**Dr. David Crews** 

The University of Texas (U.S.A.)



**Dr. John Godwin**

North Carolina State University (U.S.A.)



**Dr. Andrea C. Gore**

The University of Texas (U.S.A.)



# FOOD



Green Infrastructure for Resilient Watershed Resource Management



**Dr. Marcel G. Schaap**  
The University of Arizona (U.S.A.)



The complete evaluation of lignin biosynthetic system in plant cell walls and generation of novel lignocelluloses



**Dr. Peter Kitin**  
University of Wisconsin (U.S.A.)



**Dr. Hyeun-Jong Bae**  
Chonnam National University (Korea)

Food is one of the critical challenges that the international community is currently facing. Particularly, food shortages afflict many people living mainly in the Asia-Pacific region. Because these problems relate closely with global environmental concerns, "Food" as a priority theme encompasses both food production and environmental science to solve these issues.

**HEAD Dr. Shinya Kajita**

Institute of Agriculture  
Division of Sciences for Biological System



**Dr. Roy C. Sidle**  
University of Central Asia  
(Kyrgyzstan)



**Dr. Lee H MacDonald**  
Colorado State  
University (U.S.A.)

Predicting spatio-temporal dynamics of soil water using mathematical model



**Dr. Edouard Pesquet**  
Stockholm University  
(Sweden)

Analysis of molecular structure of plant cell wall

**Fukuhara Team**

Study on mechanisms against abiotic and biotic stress responses in plants and its application



**Dr. Toshiyuki Fukuhara**  
Institute of Agriculture  
Division of Bioregulation and Biointeraction

**Dr. Antonio Di Pietro**  
University of Cordoba (Spain)




**Dr. Hisashi Koiva**  
Texas A&M university  
(U.S.A)



**Dr. Jefferey Anderson**  
Oregon State  
University (U.S.A.)



**Dr. Hannes Kollist**  
University of Tartu  
(Estonia)



**Dr. Vojislava Grbic**  
University of Western  
Ontario (Canada)



**Koike Team**

Researches on biodiversity-friendly and sustainable natural resource management in terrestrial ecosystems



**Dr. Shinsuke Koike**  
Institute of Agriculture Division of Environment Conservation


**Dr. Tatsuya Amano**  
The University of Queensland (Australia)



**Dr. Andreas Zedrosser**  
University of South-Eastern  
Norway (Norway)



**Dr. Sam M. J. G. Steyaert**  
Nord University (Norway)



**Umebayashi Team**

Development of reliable and secure information and communications infrastructure for Network Robot



**Dr. Kenta Umebayashi**  
Institute of Engineering  
Division of Advanced Electrical and Electronics Engineering

**Dr. Giulio Sandini**  
Istituto Italiano di Tecnologia (Italy)  
University of Genova (Italy)



**Dr. Antti Tölli**  
University of Oulu (Finland)




**Dr. Janne Lehtomäki**  
University of Oulu (Finland)




# ENERGY


Genome based analysis of the metabolism, ecology, and evolution of oil-producing microalgae.



**Dr. Chiara Zurzolo**   
Pasteur Institute  
(France)




**Dr. James Grant Burgess**   
Newcastle University  
(UK)

**Dr. Chris Bowler**   
Institut de Biologie de l' Ecole  
Normale Supérieure (IBENS)  
(France)



Growth of wide-bandgap semiconductor crystals for realization of high-efficiency power devices



**Dr. Michał Boćkowski**   
Polish Academy of Sciences (PAS)  
(Poland)

Elucidating the human motion control



**Dr. Dana Kulic**   
Monash University  
(Australia)

## ■ Ogasawara Team



Development of next generation ultra-light mobility



**Dr. Toshio Ogasawara**  
Advanced Mechanical Systems Engineering  
Institute of Engineering



**Dr. Frédéric Barlat**   
Pohang University of Science and  
Technology  
(Korea)



**Dr. Yannis Korkolis**  
The Ohio State University  
(U.S.A.)



**Dr. Sam Coppieters**  
KU Leuven  
(Belgium)



**Dr. Kwak-Tze Tan**  
The University of Akron  
(U.S.A.)



**Dr. Ian Davies**  
Curtin University  
(Australia)



**Dr. Sanjay Dhakate**  
National Physical Laboratory  
(India)



**Dr. Erween Abd Rahim**  
Universiti of Tun Hussein Onn Malaysia  
(Malaysia)



**Dr. Oltmann Riemer**  
University of Bremen  
(Germany)



**Dr. Mathias Lidberg**  
Chalmers University of Technology  
(Sweden)



**Dr. Roman Henze**  
Technical University of Braunschweig  
(Germany)

# INTERDISCIPLINARY FIELDS

## ■ Akisawa Team



Harmony between environment and energy: Energy facilitator leading to the future



**Dr. Atsushi Akisawa**  
Division of Advanced  
Mechanical Systems Engineering  
Institute of Engineering



**Dr. Patrice Simon**  
Paul Sabatier University  
(France) 


The rising energy consumption on a global scale in recent years is expected to continue, and energy issues should therefore be considered to be a great challenge facing humanity. "Energy" as a priority theme addresses energy problems according to the application of capacitors, LED, and ionic liquids, while adding a new dimension to these research areas.

## ■ Tominaga Team Development of Functional Organic and Polymeric Materials for Novel Green Energy Devices



**Dr. Yoichi Tominaga**  
Division of Applied Chemistry  
Institute of Engineering



**Dr. Jusef Hassoun**   
University of Ferrara  
(Italy)



**Dr. Xiangbing Zeng**  
The University of Sheffield  
(U.K.)



**Dr. Suwabun Chirachanchai**  
Chulalongkorn University  
(Thailand)



**Dr. Michel Armand**  
CIC energigune  
(Spain)



**Dr. Sandra E. Kentish**  
The University of Melbourne  
(Australia)



**Dr. Colin A. Scholes**  
The University of Melbourne  
(Australia)



**Daniel Brandell**  
Uppsala University  
(Sweden)



**Dr. Mathias Ulbricht**  
University of Duisburg-Essen  
(Germany)



**Dr. Dan Li**  
The University of Melbourne  
(Australia)

## ■ Terada Team A new nitrogen management system in water/wastewater treatment



**Dr. Akihiko Terada**  
(Head)  
Division of Applied Chemistry  
Institute of Engineering



**Dr. Barth F. Smets**   
Technical University of Denmark  
(Denmark)



**Dr. Susanne Lackner**  
Technical University Darmstadt  
(Germany)



**Dr. Sukhwan Yoon**  
Korea Advanced Institute of  
Science and Technology (KAIST)  
(Korea)



**Kartik Chandran**  
Columbia University  
(U.S.A.)



**Dr. Shan-Li Wang**  
National Taiwan University  
(Taiwan)

## ■ Arakaki Team Understanding and application of regulation mechanisms of hardness and toughness of biological hard materials



**Dr. Atsushi Arakaki**  
Division of Biotechnology and Life Science  
Institute of Engineering



**Dr. David Kisailus**   
University of California, Irvine  
(U.S.A.)



**Dr. Yasuo Yoshikuni**  
Lawrence Berkeley National Laboratory  
(U.S.A.)

Without being confined to a single field, TUAT's excellent researchers from different fields of research are gathered here to propose and to promote new and innovative research with unprecedented ideas by fusing areas of expertise that go beyond academic majors.

uture society

**Dr. Patrick Rozier**  
Paul Sabatier University  
(France) 

**Dr. Bruce Dunn**  
University of California, Los Angeles  
(U.S.A.) 

**Dr. Yury Gogotsi**  
Drexel University  
(U.S.A.) 



# Life Science



Basic reseraches for development of novel anti-viral medicine



Head: Dr. Tetsuya Mizutani

Research and Education Center for Prevention of Global Infectious Diseases of Animals



Dr. Shinji Makino

The University of Texas Medical Branch (U.S.A.)



Development of a novel method for detection and removal of amyloid oligomer



Dr. Stefan Ståhl

KTH Royal Institute of Technology (Sweden)



Elucidation of olfactory mechanism and development of olfactory sensor



Dr. Hiroaki Matsunami

Duke University School of Medicine (U.S.A.)



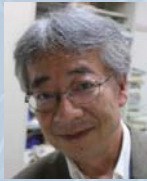
Effects of hypergravity and microgravity on bone and muscle mass in mice



Dr. Yoshifumi Itoh

University of Oxford (U.K.)

## Ogino Team



Development of functional nano-capsules and materials for drug delivery systems and other applications

Dr. Kenji Ogino

Institute of Engineering Division of Applied Chemistry

Dr. Aibing Yu

Monash University (Australia)

Dr. Wolfgang Peukert

Friedrich Alexander University (Germany)

Dr. Sanjay Mathur

University of Cologne (Germany)

Dr. Naoko Ellis

The University of British Columbia (Canada)



Dr. Guanghui Ma

Chinese Academy of Sciences (China)

## Tanaka Team



Development of AI Technologies for Biomedical Informatics and Its Applications

Dr. Toshihisa Tanaka

Institute of Global Innovation Research

Dr. Antonio Ortega

University of Southern California (U.S.A.)

Dr. Fabien Lotte

Institut National de Recherche en Informatique et en Automatique (France)

Dr. Anh-Huy Phan

Skolkovo Institute of Science and Technology (Russia)



Dr. Andrzej Cichocki

Skolkovo Institute of Science and Technology (Russia)

## Ikebukuro Team



Development of analytical method for CpG methylation of genomic DNA based on its structural change

Dr. Kazunori Ikebukuro

Institute of Engineering Division of Biotechnology and Life Science

Dr. Koji Sode

University of North Carolina at Chapel Hill (U.S.A.)

Dr. Man Bock Gu

Korea University (Korea)



Dr. Richard J. Simpson

La Trobe University (Australia)





Life science has a significant impact on our health and well-being and is an important science area that directs us to find a solution for food and energy issues as a fundamental technology. "Life Science" as a priority theme pushes and precedes the edge of technical possibility, mainly in protein synthesis and life science itself.



**Effects of natural compounds on osteoclast differentiation and bone resorption**

**Development of new antibiotics, antibacterial agents, and target-selective cancer therapeutics**



**Dr. Florian Grundler**  
University of Bonn (Germany)



**Dr. Tsung-Shing Andrew Wang**  
National Taiwan University (Taiwan)

### Tagawa Team



**International Research Center for Dynamic Interfacial Mechanics**  
-development of the biomaterial 3D printing technology-

**Dr. Yoshiyuki Tagawa**  
Institute of Engineering  
Division of Advanced Mechanical Systems Engineering



**Dr. John W.M. Bush**  
Massachusetts Institute of Technology (U.S.A.)

**Dr. Anne De Wit**  
Universite Libre de Bruxelles (Belgium)

**Dr. Claus-Dieter Ohl**  
Otto-von-Guericke University (Germany)

**Dr. Jose M. Gordillo**  
University of Seville (Spain)

**Dr. Xuehua Zhang**  
University of Alberta (Canada)

**Dr. Manoranjan Mishra**  
Indian Institute of Technology Ropar (India)

### Nagaoka Team



**Implication of breast milk and gut microbiota on maternal-infant communication for growing up healthy**

**Dr. Kentaro Nagaoka**  
Institute of Global Innovation Research



**Dr. Leif Andersson**  
Uppsala University (Sweden)

**Dr. Hirohito Yamaguchi**  
Hamad Bin Khalifa University (Qatar)

**Dr. Akira Yoshimura**  
Tomsk Polytechnic University (Russia)

**Dr. Wanzhu Jin**  
Chinese Academy of Sciences (China)

### Shinohara Team



**Development of organelle targeting system for solving biomedical issues: From phase separated proteins to small chemical compounds**

**Dr. Kyosuke Shinohara**  
Institute of Global Innovation Research



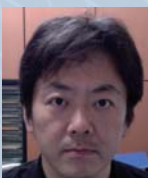
**Dr. Takanari Inoue**  
Johns Hopkins University (U.S.A.)

**Dr. Micha Fridman**  
Tel Aviv University (Israel)

**Dr. Naoki Yamanaka**  
University of California, Riverside (U.S.A.)

**Dr. Ryan J. White**  
University of Cincinnati (U.S.A.)

### Sasaki Team



**Research on molecular mechanisms of host manipulation by parasitic microbes**

**Dr. Nobumitsu Sasaki**  
Research Center for Science and Technology



**Dr. Richard S. Nelson**  
Oklahoma State University (U.S.A.)

**Dr. Seth Barribeau**  
University of Liverpool (U.K.)

# International Collaborative Research

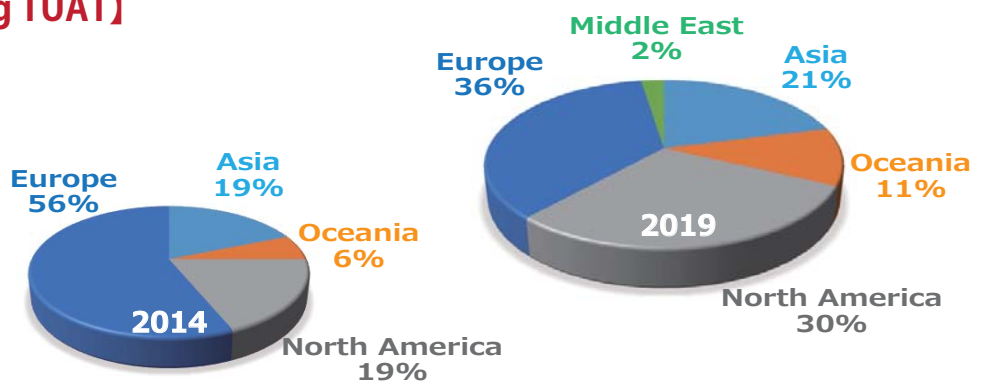
## [International Collaboration]

35 Countries, 140 Universities / Institutes (2014.08~2020.03)



## [Foreign Researchers Visiting TUAT]

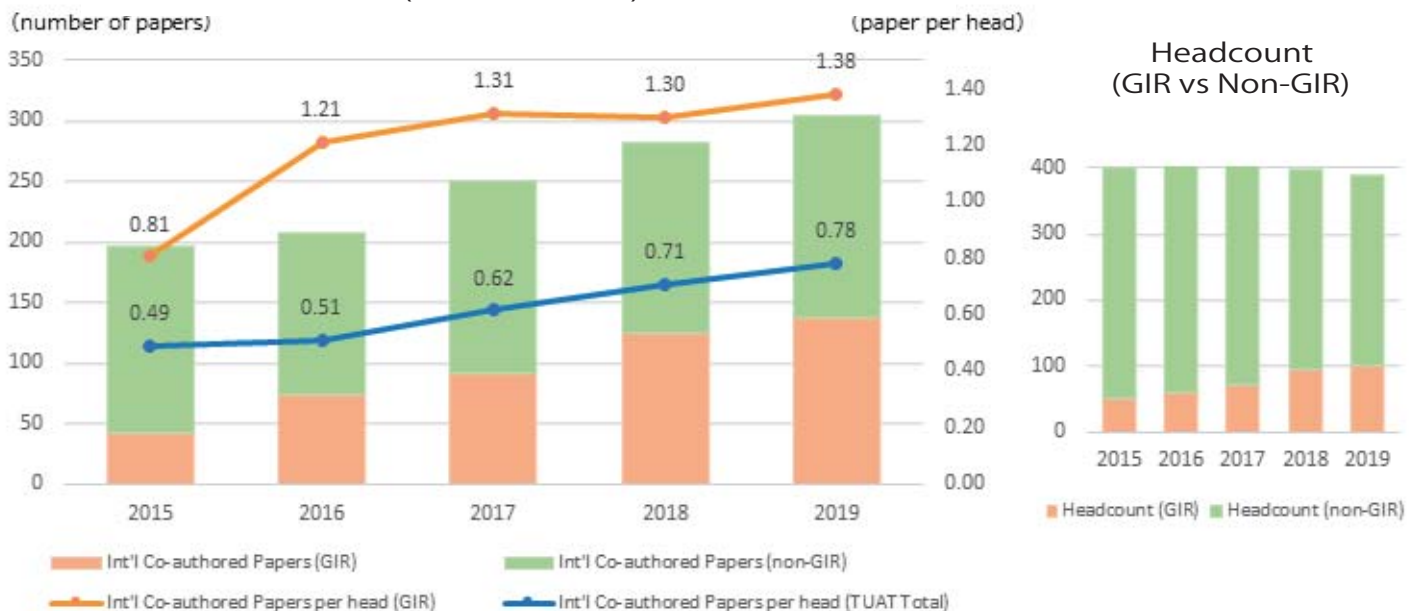
|               | 2014 | 2019 |
|---------------|------|------|
| Asia          | 3    | 17   |
| Oceania       | 1    | 9    |
| North America | 3    | 24   |
| Latin America | 0    | 0    |
| Europe        | 9    | 29   |
| Middle East   | 0    | 2    |



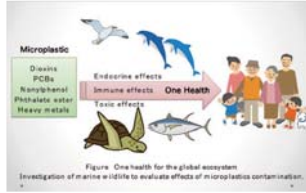
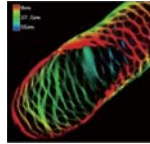
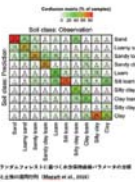
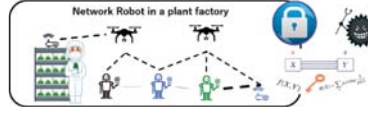
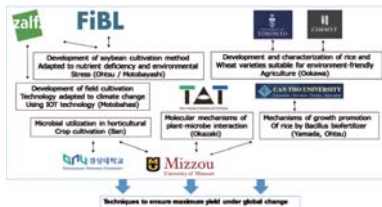
## [WoS International Co-authored Papers]

|                                      | 2015  | 2016   | 2017   | 2018   | 2019   |
|--------------------------------------|-------|--------|--------|--------|--------|
| Number of Researchers                | 400   | 409    | 406    | 399    | 388    |
| Number of Researchers (GIR)          | 52    | 61     | 70     | 96     | 100    |
| ① Number of Co-authored Papers       | 197   | 208    | 250    | 283    | 304    |
| ② Number of Co-authored Papers (GIR) | 42    | 74     | 92     | 125    | 138    |
| Growth Rate                          | -     | 176.1% | 219.0% | 297.6% | 328.5% |
| ② to ① ratio                         | 21.3% | 35.5%  | 36.8%  | 44.1%  | 45.3%  |

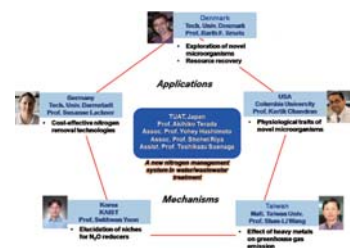
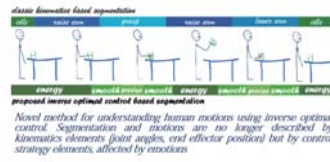
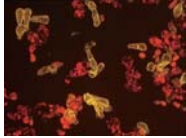
Number of WoS International Co-Authoring Papers (GIR vs Non-GIR)



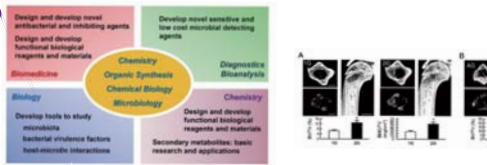
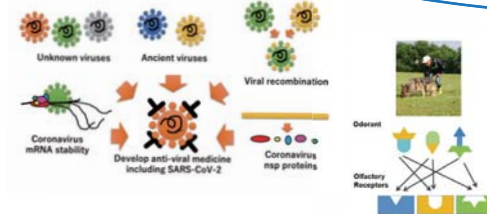
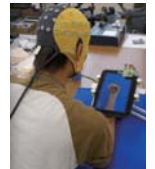
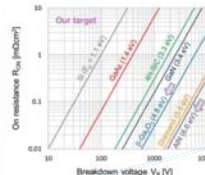
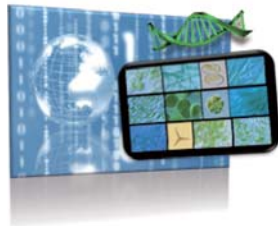
# Research Schematic Drawings



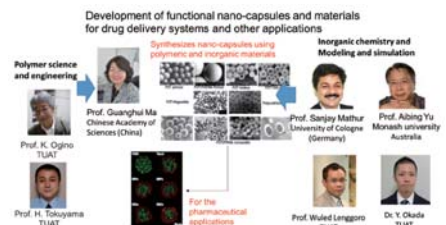
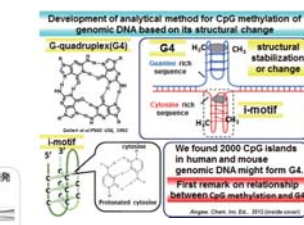
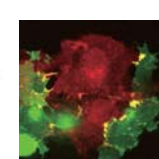
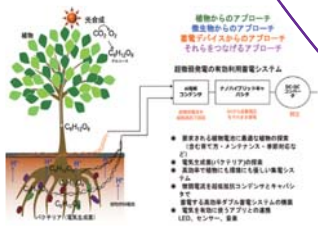
## FOOD



## Energy

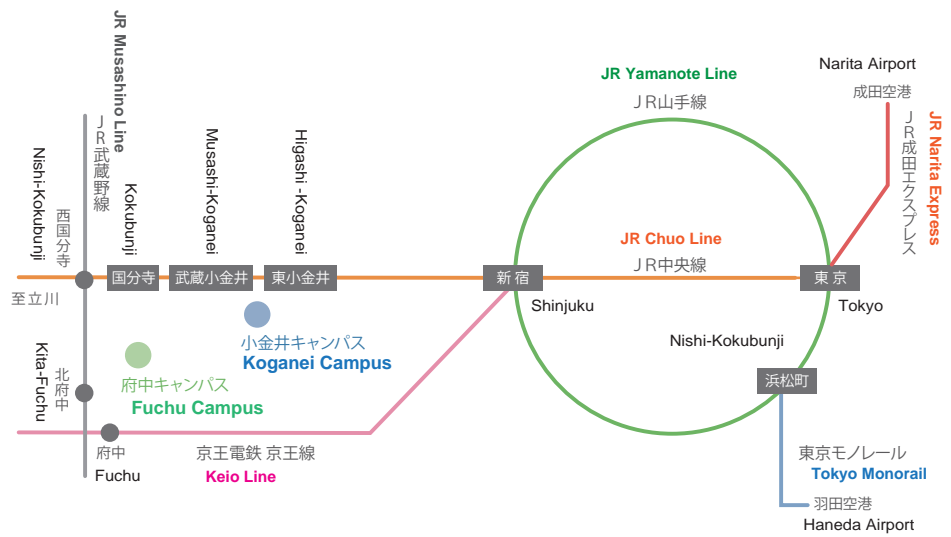


## Life Science



## Interdisciplinary Field





### Fuchu Campus

3-5-8 Saiwai-cho, Fuchu-shi, Tokyo 183-8509

- **JR Chuo Line “Kokubunji Station” (South Exit)**  
Keio Bus (Bus Stop #2)  
Bus # 寺 91 bound for “Fuchu Station via Meisei Gakuen,”  
Get off at “Harumi-cho” bus stop  
About 10 minutes bus ride.

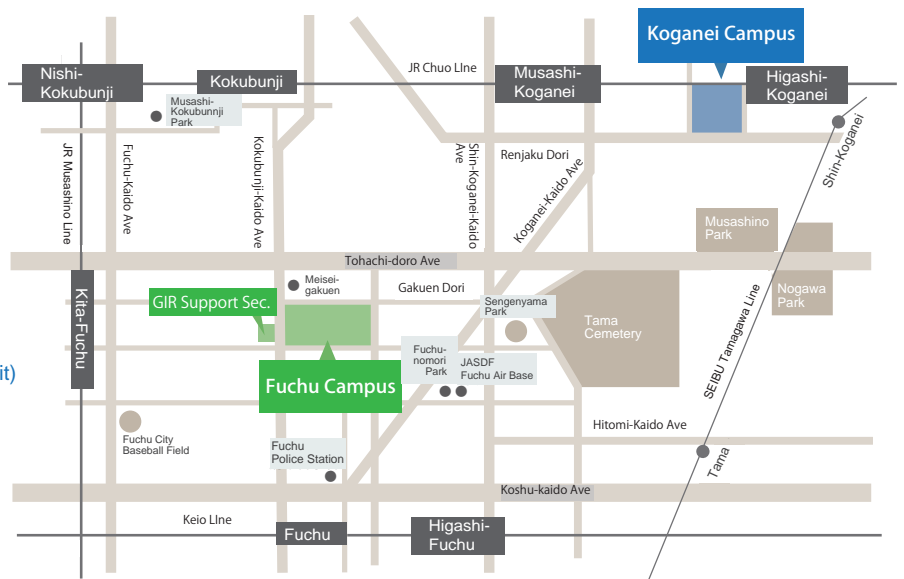
- **Keio Line “Fuchu Station” (North Exit)**  
Keio Bus (Bus Stop #3)  
Bus # 寺 91 bound for “Kokubunji Station via Meisei Gakuen,”  
Get off at “Harumi-cho” bus stop  
About 7 minutes bus ride.

- **JR Musashino Line “Kita-Fuchu Station”**  
About 12 minutes walk

### Koganei Campus

2-24-16 Naka-cho, Koganei-shi, Tokyo 184-8588

- **JR Chuo Line “Higashi-Koganei Station”**  
South Exit : About 8 minutes walk  
nonowa Exit: About 6 minutes walk
- **JR Chuo Line “Musashi-Koganei Station” (South Exit)**  
About 20 minutes walk



### Contact

**Institute of Global Innovation Research Support Section  
Research Promotion Office, Research Support Office**

3-8-1 Harumi-cho, Fuchu-shi, Tokyo 183-8538  
TEL: 042-367-5646  
E-mail: [giri@cc.tuat.ac.jp](mailto:giri@cc.tuat.ac.jp)