

## Fuchu Campus

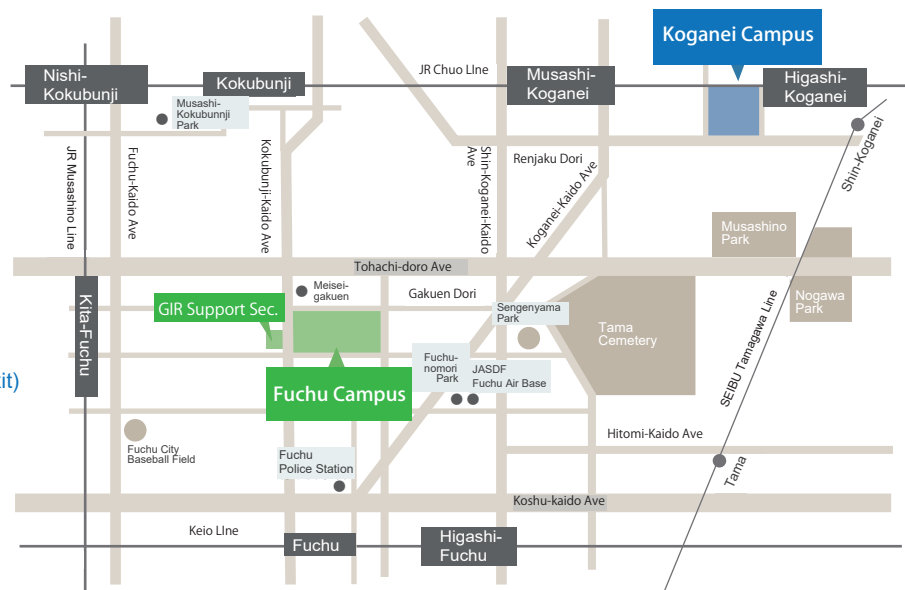
3-5-8 Saiwai-cho, Fuchu-shi, Tokyo 183-8509

- **JR Chuo Line "Kokubunji Station" (South Exit)**  
Keio Bus (Bus Stop #2)  
Bus # 91 bound for "Fuchu Station via Meisei Gakuen,"  
Get off at "Harumi-cho" bus stop  
About 10 minutes
- **Keio Line "Fuchu Station" (North Exit)**  
Keio Bus (Bus Stop #3)  
Bus # 91 bound for "Kokubunji Station via Meisei Gakuen,"  
Get off at "Harumi-cho" bus stop  
About 7 minutes
- **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)

# Institute of Global Innovation Research

*Challenge to the global Problems of "food" and "energy"*

## Message



President  
Prof. Kazuhiro

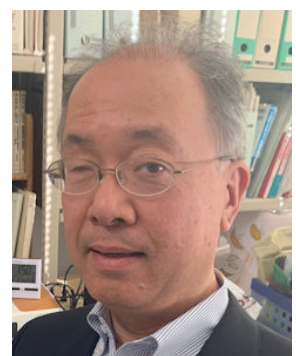
Tokyo University of Agriculture and Technology is a university specialized in science and technology conducting creative and free thought based academic research in agriculture, engineering and integrated fields that support the fundamentals of human society: agriculture and industry.

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.

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.

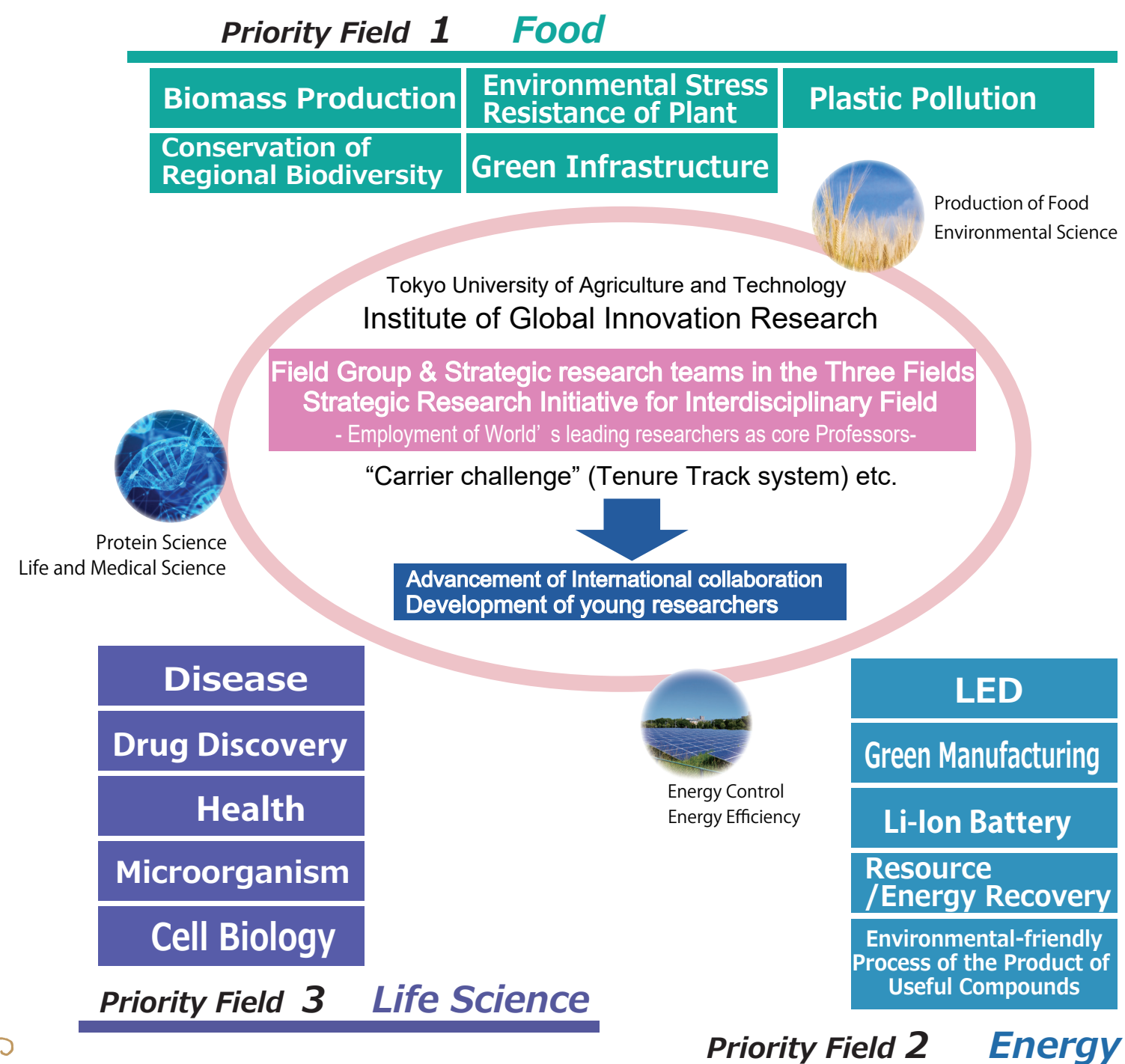


GIR Dean  
Prof. Masaharu Kameda

## 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.





# FOOD



## Kajita Unit

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



**Dr. Shinya Kajita**

Division of Sciences for Biological System, Institute of Agriculture



**Dr. John Ralph**

University of Wisconsin (U.S.A.)



**Dr. Wout Boerjan**

Universiteit Gent (Belgium)



**Dr. Edouard Pesquet**

Stockholm University (Sweden)



## Gomi Unit

Green Infrastructure for Resilient Watershed Resource Management



**Dr. Takashi Gomi**

Division of International Environmental and Agricultural Science, Institute of Agriculture



**Dr. Roy C. Sidle**

University of Central Asia (Kyrgyzstan)



**Dr. Lee H MacDonald**

Colorado State University (U.S.A.)



## Saito Unit

Predicting spatio-temporal dynamics of soil water using mathematical model



**Dr. Hirotaka Saito**

Division of Environmental and Agricultural Engineering, Institute of Agriculture



**Dr. Jirka Šimůnek**

University of California, Riverside (U.S.A.)

## 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**

Division of Sciences for Biological System, Institute of Agriculture

**Dr. Karl Ritz**



University of Nottingham (U.K.)



**Dr. Roland Perry**

University of Hertfordshire (U.K.)



## Koike Team



Research on biodiversity and ecosystem conservation taking into account synergies and trade-offs of ecosystem services



**Dr. Shinsuke Koike**

Institute of Global Innovation Research

**Dr. Tatsuya Amano**



The University of Queensland (Australia)



**Dr. Richard Fuller**

The University of Queensland (Australia)



**Dr. Sam M. J. G. Steyaert**

Nord University (Norway)



**Dr. Maximilian L. Allen**

University of Illinois (U.S.A.)



**Dr. Chun Sheng Goh**

Sunway University (Malaysia)



**Dr. Christian Lauk**

University of Natural Resources and Life Sciences (Austria)



## Umebayashi Team



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



**Dr. Kenta Umebayashi**

Division of Advanced Electrical and Electronics Engineering, Institute of 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)



## Watanabe Team



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



**Dr. Gen Watanabe**

Division of Animal Life Science, Institute of Agriculture

**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.)



## Fukuhara Team



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



**Dr. Toshiyuki Fukuhara**

Division of Bioregulation and Biointeraction, Institute of Agriculture

**Dr. Antonio Di Pietro**



University of Cordoba (Spain)



**Dr. Hisashi Koiwa**

Texas A&M University (U.S.A.)



**Dr. Jeffrey Anderson**

Oregon State University (U.S.A.)



**Dr. Hannes Kollist**

University of Tartu (Estonia)



**Dr. Vojislava Grbic**

University of Western Ontario (Canada)



## Nakaba Team



Development of new characterization methods of woody biomass for a plastic-free society



**Dr. Satoshi Nakaba**

Division of Natural Resources and Ecomaterials, Institute of Agriculture

**Dr. Peter Kitin**



University of Washington (U.S.A.)



**Dr. Widyanto Dwi Nugroho**

Universitas Gadjah Mada (Indonesia)



**Dr. Jong Sik Kim**

Chonnam National University (Republic of 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.



# ENERGY

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.

## Energy Unit

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

**Dr. Tsuyoshi Tanaka**  
Division of Biotechnology and Life Science  
Institute of Engineering



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



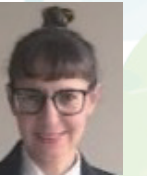
Growth of wide-bandgap semiconductor crystals for realization of high-efficiency power devices

**Dr. Yoshinao Kumagai**  
Division of Applied Chemistry  
Institute of Engineering



Elucidating the human motion

**Dr. Gentiane Venture**  
Institute of Global Innovation Research



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



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



### Tanaka Unit

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



### Kumagai Unit

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



### Venture Unit

## ■ Ogasawara Team Development of next generation ultra-light mobility



**Dr. Toshio Ogasawara**  
Division of 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. Kwek-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 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)



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



**Dr. Akihiko Terada**  
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.

# INTERDISCIPLINARY FIELDS

## ■ Akisawa Team Harmony between environment and energy: Energy facilitator leading to the future society



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



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



**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



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.



## Mizutani Unit



**Dr. Tetsuya Mizutani**  
Center for Infectious Disease  
Epidemiology and Prevention Research



**Basic reseraches for development of novel anti-viral medicine**



**Dr. Shinji Makino**  
The University of Texas Medical Branch (U.S.A.)

## Yohda Unit



**Dr. Masafumi Yohda**  
Division of Biotechnology and Life  
Science, Institute of Engineering



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



**Dr. Stefan Ståhl**  
KTH Royal Institute of Technology  
(Sweden)

**Dr. Hiroaki Matsunami**  
Duke University School of Medicine  
(U.S.A.)



**Elucidation of olfactory mechanism and development of olfactory sensor**

## Kuroda Unit



**Dr. Yutaka Kuroda**  
Division of Biotechnology and Life  
Science, Institute of Engineering



**Development of new antibiotics and antiviral agents**



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



**Dr. Monirul Md Islam**  
University of Chittagong  
(Bangladesh)

## Inada Unit



**Dr. Masaki Inada**  
Division of Biotechnology and  
Life Science, Institute of  
Engineering



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



**Dr. Yoshifumi Itoh**  
University of Oxford  
(U.K.)



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



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

## Ogino Team



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



**Dr. Kenji Ogino**  
Division of Applied Chemistry,  
Institute of Engineering



**Dr. Guanghui Ma**  
Chinese Academy  
of Sciences (China)

**Dr. Aibing Yu**  
Monash University  
(Australia)

**Dr. Sanjay Mathur**  
University of Cologne  
(Germany)

**Dr. Wolfgang Peukert**  
Friedrich Alexander University  
(Germany)

**Dr. Naoko Ellis**  
The University of British Columbia  
(Canada)

## Ikebukuro Team



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



**Dr. Kazunori Ikebukuro**  
Division of Biotechnology  
and Life Science,  
Institute of Engineering



**Dr. Richard J. Simpson**  
La Trobe University  
(Australia)

**Dr. Koji Sode**  
University of North Carolina  
at Chapel Hill (U.S.A.)

**Dr. Man Bock Gu**  
Korea University (Korea)

## Yuichi Tanaka Team



**Mathematical Modeling and Deep Learning for Small-Data AI**



**Dr. Yuichi Tanaka**  
Division of Advanced Information  
Technology & Computer Science,  
Institute of Engineering



**Dr. Andrzej Cichocki**  
Skolkovo Institute of Science  
and Technology (Russia)

**Dr. Antonio Ortega**  
University of Southern  
California (U.S.A.)

**Dr. Gene Cheung**  
York University  
(Canada)

**Dr. Fabien Lotte**  
Institut National de  
Recherche en  
Informatique et  
en Automatique (France)

## Tagawa Team



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



**Dr. Yoshiyuki Tagawa**  
Institute of Global Innovation Research



**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**  
China Medical University  
(Taiwan)

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

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

**Dr. Zeki Yilmaz**  
Uludag University (Turkey)

## Shinohara Team



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



**Dr. Kyosuke Shinohara**  
Division of Biotechnology  
and Life Science,  
Institute of Engineering



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

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

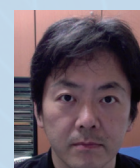
**Dr. Naoki Yamanaka**  
University of California,  
Riverside (U.S.A.)

**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**  
Division of Applied Biological Chemistry,  
Institute of Agriculture



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

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

## Usui Team



**Establishment of a research base using organoids from non-model organisms**



**Dr. Tatsuya Usui**  
Division of Animal Life Science,  
Institute of Agriculture



**Dr. Wael Mohamed El-Deeb**  
King Faisal University  
(Saudi Arabia)

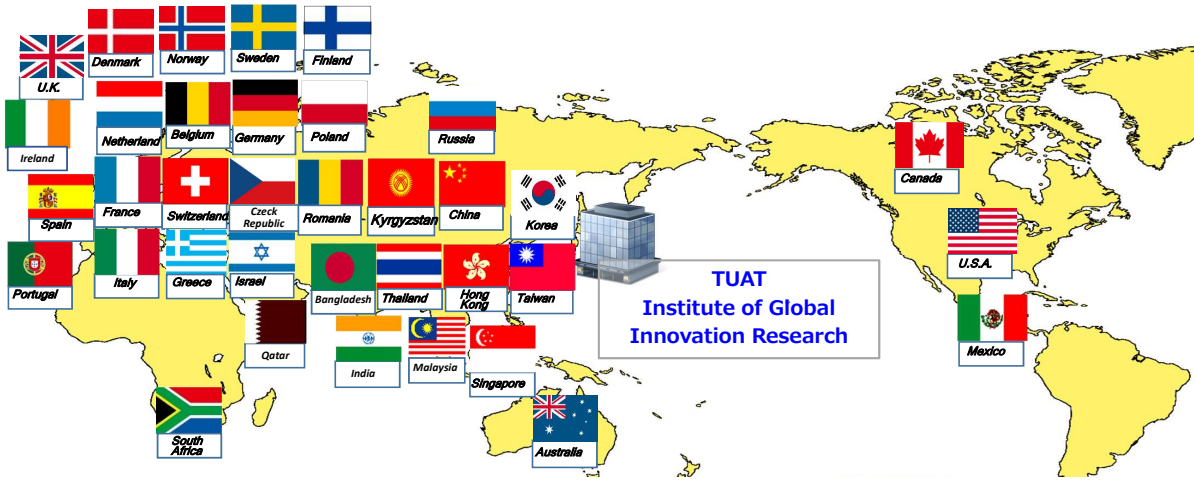
**Dr. Mohammed Elsayed Elasrag**  
University of Manchester  
(U.K.)



# International Collaborative Research

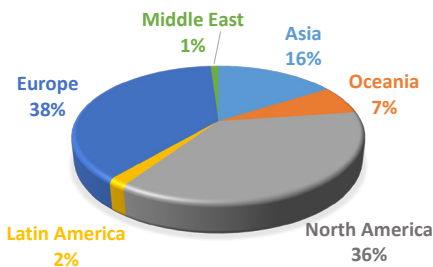
## 【International Collaboration】

36 Countries, 141 Universities / Institutes (2014.08~2021.03)



## 【Foreign Researchers Visiting TUAT】

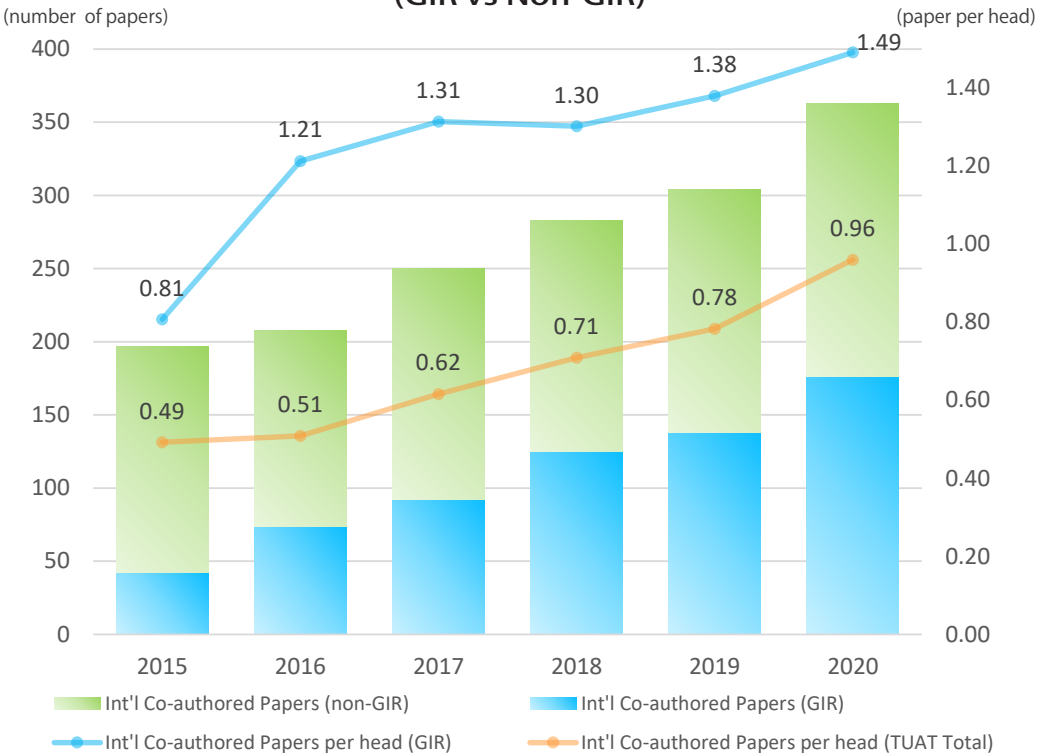
	2015	2016	2017	2018	2019	2020	G.Total
Asia	4	6	7	10	17	0	44
Oceania	3	2	3	2	9	0	19
North America	12	17	20	28	24	0	101
Latin America	0	2	1	2	0	0	5
Europe	15	14	20	24	29	2	104
Middle East	0	0	0	1	2	0	3



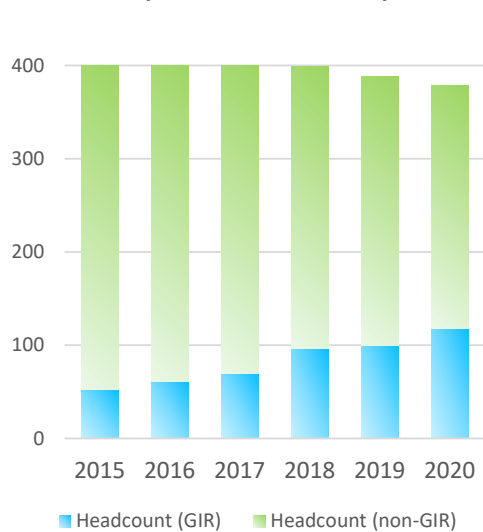
## 【WoS International Co-authored Papers】

	2015	2016	2017	2018	2019	2020
Number of Researchers	400	409	406	399	388	378
Number of Researchers (GIR)	52	61	70	96	100	118
① Number of Co-authored Papers	197	208	250	283	304	363
② Number of Co-authored Papers (GIR)	42	74	92	125	138	176
Growth Rate	-	176.1%	219.0%	297.6%	328.5%	419.0%
② to ① ratio	21.3%	35.5%	36.8%	44.1%	45.3%	48.5%

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



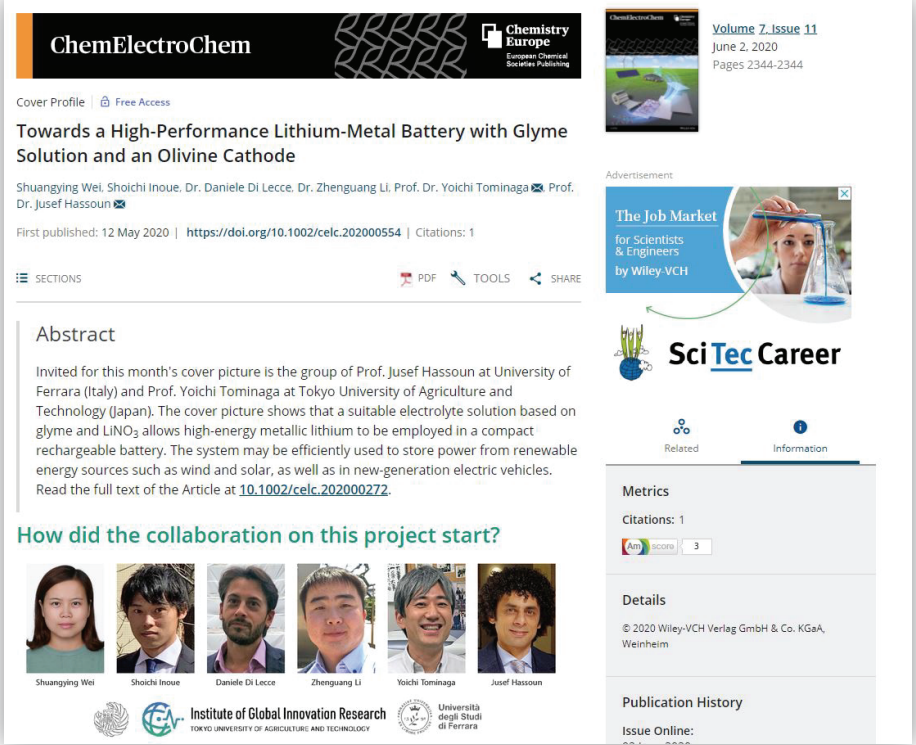
Headcount (GIR vs Non-GIR)



# International Collaborative Research

## 【Research Results】

Research result appeared on the Front Cover  
「ChemElectroChem (2020/6/2)」 - Tominaga Team, Energy



## Press Release

Number of Press Release GIR vs TUAT Total		
2014 (Aug.~)	5 / 15	33.3%
2015	6 / 14	42.8%
2016	9 / 21	42.8%
2017	13 / 25	52.0%
2018	13 / 27	48.1%
2019	32 / 52	61.5%
2020	26 / 47	55.3%

Research result published in  
「nature (2020/10/21)」 - Arakaki Team, Energy

## nature

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Article | Published: 21 October 2020

## Toughening mechanisms of the elytra of the diabolical ironclad beetle

Jesus Rivera, Maryam Sadat Hosseini, David Restrepo, Satoshi Murata, Drago Vasile, Dilworth Y. Parkinson, Harold S. Barnard, Atsushi Arakaki, Pablo Zavattieri & David Kisailus

Nature 586, 543–548 (2020) | Cite this article

## 【GIR Open Seminar】

Number of GIR Open Seminar : 343	
2014 (Aug~)	18
2015	44
2016	41
2017	58
2018	73
2019	88
2020	21

