

Photocatalysis International Research Center, Tokyo University of Science

## Application Guide for Collaborative Research in 2019 for Researchers at Foreign Organizations

### 1. Objectives

The Joint Usage/Research Center at the Photocatalysis International Research Center (PIRC) started in 2015 under a program by Japan's Ministry of Education, Culture, Sports, Science and Technology (MEXT). The purpose is to open photocatalysis facilities, to collaborate with PIRC researchers, and to provide encouragement to the world of photocatalysis.

The tremendous amount of research that has been carried out in two closely related fields, semiconductor photoelectrochemistry and photocatalysis, during the past thirty years continues to provide fundamental insights and practical applications. The principles and measurements obtained with regard to  $\text{TiO}_2$  in photoelectrochemical studies have led to research on heterogeneous photocatalysis, with regard to which the powerful photooxidative activity of  $\text{TiO}_2$  has been applied in environmental clean-ups.

Through collaborative research in the Joint Usage/Research Center program, we expect to find breakthroughs leading to the next generation photocatalysis and to promote both fundamental and applied photocatalysis research.

### 2. Category of collaborative research projects

For this fiscal year, applications for collaborative research will be accepted in the International Collaborative Research Category.

### 3. Number of projects to be adopted

International Collaborative Research: within two themes

### 4. Collaborative research period

The research period is between the date of selection and March 20, 2020.

## 5. Applicants

Research Leaders should be faculty at domestic and international universities, researchers and directors of centers at other research institutions, or individuals with equivalent research potential who are pursuing research into photocatalyst science and technology (preferably researchers holding a degree equivalent to a PhD or higher). Collaborative Researchers may include technicians, graduate students, and others with relevant qualifications. Each Research Leader may submit only one application.

## 6 Expenses

Expenses including funds for the supplies necessary for collaborative research, a round trip to the Center, and university accommodation for each Collaborative Researcher will be covered by the Center within an estimated budget based on the application. As a rough guide, the budget for one application should be up to 1,000,000 yen for an International Collaborative Research.

## 7 Accommodation

Researchers involved in the collaborative research program may utilize the accommodation facilities at Tokyo University of Science (3,000 yen/single room/night). Please submit your application to the organizer at the Research Center.

Note: Accommodation expenses will not be covered in cases where researchers make separate arrangements for a hotel or any other form of accommodation.

## 8 Adopted Standards

The research topics that may be chosen are limited to the scope of research that can be conducted using the facilities at Photocatalysis International Research Center. Research topics that cannot be implemented with the technology available will not be approved.

Note that the following points form the basis for the accepting and rejecting of applications.

- Accuracy of the application form
- Clarity of research content and objectives, relevance of the research plan and methods, appropriateness of the application budget, and expectations and development perspectives regarding research outcomes

- If another application is filed in parallel for competitive external funding, please explain why such external funding is necessary
- Discussion of the achievements in ongoing research topics (including reports about the results)

9. Application results

End of March 2019

Research Leaders will be notified of the final results by e-mail.

10. Application deadline

Applications must arrive no later than February 25, 2019

11. Application procedure

Download the Collaborative Research Application from the Center's homepage (<http://www.pirc.tus.ac.jp/en/>). Fill in the necessary information and submit it by e-mail or post (to the addresses provided below).

Address and e-mail for applications:

Katsunori Tsunoda

Photocatalysis International Research Center,

Research Strategy and Promotion Division,

Tokyo University of Science

2641 Yamazaki, Noda-shi, Chiba 278-8510 Japan

E-mail: [tsunoda\\_katsunori@admin.tus.ac.jp](mailto:tsunoda_katsunori@admin.tus.ac.jp)

## 12. Publication of results

Research results will be published on our website and elsewhere.

An "Outline of Research Achievements" must be submitted at the end of the year, and a "Report on Research Achievements" must be submitted at the end of the research period.

When publishing research achievements that have been obtained as a result of a Joint Usage/Research Program, researchers should always be sure to indicate that the research was supported by a Joint Usage/Research Program. Furthermore, we ask that researchers always indicate that these research achievements were obtained as a result of Joint Usage/Research Program in the Acknowledgment section of the paper.

<EXAMPLE>

This study was partly supported by the Joint Usage/Research Program of the Photocatalysis International Research Center, Research Institute for Science and Technology, Tokyo University of Science.

## 13. Notes regarding the application procedure

- 1) Candidates for collaborative research should apply upon obtaining an informal consent from the institution they are affiliated with at the time of application and discussing in advance their research theme, schedule for using the facilities, associated expenses, and other relevant points with faculty members at the Center.
- 2) Research on one topic can be conducted for a maximum of two years. However, a relevant application must be submitted indicating that it is for an "Ongoing Research Topic."
- 3) After receiving a notification of approval, researchers must submit an "Implementation Notification."
- 4) When applying for the patent based on research result of collaborative research or that has become profitable due to a research outcome, please notify TUS thereof at once. Moreover, the handling of any right etc. involved with a research outcome shall be separately agreed upon by both parties hereto.
- 5) Any losses or incidents that occur during research by collaborative researchers affiliated with institutions other than Tokyo University of Science must be attended to by the institution with which the researcher is affiliated, and Tokyo University of Science shall

not to be held liable. If graduate students participate in collaborative research, they must take out personal accident insurance for students pursuing education and research.

#### 14. Contact information

Details on collaborative research can be obtained by using the following contact information. We also respond to inquiries from researchers who wish to propose new research topics, as well as to questions about how such research can be developed if, for example, you are not sure how it can be accomplished.

Prof. Chiaki TERASHIMA  
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Tokyo University of Science  
2641 Yamazaki, Noda-shi, Chiba 278-8510, Japan  
Tel.: +81-4-7124-1501 ext. 4561  
Fax: +81-4-7122-1742  
E-mail: [terashima@rs.tus.ac.jp](mailto:terashima@rs.tus.ac.jp)

## Attachment 1

## Charges for use of PIRC facilities

No.	Equipment	Charge
1	Field Emission Scanning Electron Microscopes (FE-SEM : JEOL, JSM-7600F)	¥2,000/1 hour
	Osmium Coater (VACUUM DEVICE, HPC-30W)	
2	X-ray Diffractometer (XRD : Rigaku, Ultima I V)	¥500/1 hour
3	Missing Number	
4	Matrix-assisted Laser Desorption/Ionization Mass Spectrometer (MALDI-TOFMS : Shimadzu, AXIMA-TOF <sup>2</sup> )	¥1,000/1 hour
5	Laser Raman Spectrometer (JASCO, NRS-5100)	¥500/1 hour
6	Xenon Weather Meter (Suga Test Instruments, NX-75)	¥500/1 hour
7	Automatic Contact Angle Meters (Kyowa Interface Science, DM-501)	¥500/1 hour
8	System Gas Chromatography (Shimadzu, GC-2014)	¥700/1 hour
9	High Precision Gas/Vapor Adsorption Measurement Instrument (MicrotracBEL, BELSORP-max)	¥2,000/1 sample
10	Catalyst Analyzer (MicrotracBEL, BELCAT-B)	¥2,000/1 sample
11	Nano-Layer Scratch Tester (RHESCA, CSR-2000)	¥500/1 hour
12	DNA Sequencer (Beckman Coulter, GeXP)	¥700/1 hour
13	3D Laser Scanning Microscope (KEYENCE, VK-X210)	¥700/1 hour
14	Anti-Fogging Analyzer (Kyowa Interface Science, AFA-1)	¥700/1 hour
15	Nitrogen Oxides Analyzer in accordance with JIS (Special order product)	¥700/1 hour
16	Benchtop Scanning Electron Microscopes (SEM : JEOL, JCM-6000)	¥700/1 hour
17	Antifouling Testing Apparatus (Special order product)	¥500/1 hour
18	Simultaneous Thermal Analysis (DSC/TGA : METTLER TOLEDO, TGA/DSC1)	¥500/1 hour
19	Evaluation Equipment for Photocatalytic Water Splitting (Special order product)	¥500/1 hour
20	Bead Mills - Wet Grinding and Dispersion (Ashizawa Finetech, LMZ015/DMS65/HFM02)	¥500/1 hour
21	RF Magnetron Sputtering System (ULVAC, VTR-150M/SRF (SCOTT-C3))	¥3,000/1 batch
22	Fourier Transform Infrared Spectrometer (JASCO, FT/IR-6600)	¥500/1 hour
23	Electron Spectroscopy for Chemical Analysis (ESCA : Shimadzu, ESCA-3400)	¥5,000/1 Day
24	Infrared Thermal Imaging Camera (Nippon Avionics, InfRec R500EX-Pro)	¥1,500/1 hour

## Attachment 2

## List of members in PIRC

Department of Applied Chemistry, Faculty of Science Division I	Professor	KUDO, Akihiko	Artificial photosynthesis, Photocatalyst, Photoelectrochemistry, Water splitting, H <sub>2</sub> evolution, CO <sub>2</sub> reduction
Department of Applied Chemistry, Faculty of Science Division I	Professor	KOMABA Shinichi	New materials for advanced rechargeable batteries
Department of Applied Chemistry, Faculty of Science Division I	Professor	NEGISHI, Yuichi	Inorganic materials/Nano-material/Photocatalyst
Department of Pure and Applied Chemistry, Faculty of Science and Technology	Professor	ARIMITSU, Koji	Organic industrial material (Photopolymer, UV-Curing, Acid/Base Amplifier, Photoinitiator)
Department of Pure and Applied Chemistry, Faculty of Science and Technology	Professor	IDEMOTO, Yasushi	Highly functional oxide and battery material Crystal structure analysis by quantum beam
Department of Pure and Applied Chemistry, Faculty of Science and Technology	Professor	SAKAI, Hideki	Nano-structured photocatalyst (Nanoporous titania, Hollow particle, Core/shell particle) Nano materials/nano bioscience (Drug delivery system, Liposome, Cell Penetrating Peptide)
Department of Pure and Applied Chemistry, Faculty of Science and Technology	Professor	YUASA, Makoto	Physical chemistry (Electrochemistry, Colloid & interface chemistry) Functional material chemistry (Sensor, Electrocatalyst, Antioxidant & anti-cancer drug)
Department of Mechanical Engineering, Faculty of Science and Technology	Professor	HAYASE, Masanori	MEMS/NEMS, Micro Fuel Cell, Cell Sorting
Liberal Arts, Faculty of Science and Technology	Professor	SUZUKI, Tomonori	Microbial Ecology Applied Microbiology
Department of Applied Electronics, Faculty of Industrial Science and Technology	Professor	SATAKE, Shin-ichi	Thermal hydraulics, Flow visualization by hologram, Development of water purification reactor
Department of Materials Science and Technology, Faculty of Industrial Science and Technology	Professor	YASUMORI, Atsuo	glasses and glass-ceramics, Titania photocatalyst
Research Institute for Science and Technology	Professor	ABE, Masahiko	Colloid & Surface Chem/Filler for Polymer/Direct Glucose Fuel Cell
Research Institute for Science and Technology	Professor	TERASHIMA, Chiaki	Inorganic industrial material (Diamond Materials, Plasma Chemistry)
Department of Pharmacy, Faculty of Pharmaceutical Sciences	Associate Professor	WADA, Hiroshi	Studies on the Constituents of Plants

Department of Applied Biological Science, Faculty of Science and Technology	Associate Professor	NAKATA, Kazuya	Functional Materials, Photocatalysis, Biomaterials Science
Department of Pure and Applied Chemistry, Faculty of Science and Technology	Associate Professor	FUJIMOTO, Kenjiro	Inorganic materials chemistry, Combinatorial chemistry
Research Institute for Science and Technology	Associate Professor	KATSUMATA, Ken-ichi	Inorganic industrial material (Photocatalysis, Particle morphology control, Nanosheet)
Department of Applied Chemistry, Faculty of Science Division I	Junior Associate Professor	IWASE, Akihide	Photocatalyst, Photoelectrochemistry
Department of Pure and Applied Chemistry, Faculty of Science and Technology	Junior Associate Professor	ISHIDA, Naoya	Inorganic industrial materials (secondary battery, crystal chemistry, inorganic chemistry, electrochemistry)
Department of Pure and Applied Chemistry, Faculty of Science and Technology	Junior Associate Professor	KITAMURA, Naoto	Inorganic material/physical properties (Ion-conducting inorganic material)
Department of Pure and Applied Chemistry, Faculty of Science and Technology	Junior Associate Professor	KONDO, Takeshi	physical chemistry, electrochemistry, functional interface
Department of Pure and Applied Chemistry, Faculty of Science and Technology	Junior Associate Professor	SHITANDA, Isao	Biosensor, biofuel cell, electrochemical impedance spectroscopy, screen-printing device, electroplating