PROGRAM BOOK

KEYS 2026a

Kitakyushu*

Sakura Science Program**

Feb. 1st-6th, 2026 at The University of Kitakyushu (Hibikino Campus) and Science and Research Park (KSRP), Kitakyushu

*__KEYS2026a Kitakyushu, Knowledge Exchange by Young Scholars 2026a: Knowledge Exchange by Young Scholars: Global Disaster Controls and Technological Challenges.__ Organized by International Photosynthesis Industrialization Research Center, The University of Kitakyushu as the host, with (1) Peat Fire Carbon Credit Commercialization Study Group at Kitakyushu Foundation for the Advancement of Industry, Science and Technology (FAIS), (2) Shabondama Soap Co., Ltd., and (3) LINV @ Kitakyushu, the Kitakyushu branch of the International Laboratory of Plant Neurobiology at the University of Florence as co-hosts. Sponsored by Kitakyushu City and Kitakyushu Convention & Visitors Association (公益財団法人 北九州観光コンベンション協会)

**SAKURA Science Exchange Program Hosted by The University of Kitakyushu.

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TIME TABLE

KEYS2026a Kitakyushu

(along with Sakura Science Exchange Program)

Feb. 1st-6th, 2026 at The University of Kitakyushu (Hibikino Campus)
and Science and Research Park (KSRP), Kitakyushu

Date and time	Programs/Events	Location
February 1st (Sun)	13:00 Arrival of Sakura Science participants With Prof. Uezu, Ms. Chida, Ms. Motomura → Lunch 14:40 Arrival of the Palangkalaya University delegation 15:00 Move to Kitakyushu 17:00 Reception of Indonesian students and faculty members 17:30 BUS (via Hatagoya →Orio Station → to AZ Hotel, with Ms. Chida) 17:30 Check-in Campus accommodation (Guest house) (with Prof. Kawano) 17:30 Check-in Hatagoya (with Ms. Motomura) **18:30 Reception & dinner**	@Fukuoka airport Univ. Kitakyushu Hibikino Campus Room S402 (16:30-18:00) Restaurant SANZOKUYA

	Students	**Prof. & administrative staffs**	
February 2nd (Mon) **a.m.**	8:45 Taxi from **Hatagoya** 8:45 Pick up by Prof. Uezu at **Campus Guest house**	8:45 Taxi from **AZ Hotel** 8:45 Pick up by Prof. Uezu at **Campus Guest house**	
	a.m. 9:30-12 : 00 **Opening address by the Rector, Prof. Salampak** **Lecture 1 "Peat Fire Extinguishing Technology" by Prof. Kazuya Uezu** **Lecture 2 "Environmental impacts of Fire-Fighting Agents" by Prof. Tomonori Kawano** **Lecture 3 "Sharing Disaster Experience" by Prof. Takaaki Kato**		Univ. Kitakyushu Room S402 (9:30-12:00) During lectures Discussion Room available for Profs. & admin. staffs at 2nd floor (Special Guest Room)
February 2nd (Mon) **p.m.**	12:00-13:30 Lunch at University Cafeteria With Japanese students	12:00-13:30 **Official Lunch Meeting at Café Sorairo**	
	13:30-17 : 00 Experiments and Practical Demonstrations* **(1) Set-up for Fish Toxicity Assay for Fire**		Univ. Kitakyushu Room (1) (3) S136 (2) S220 *Discussion room

	Fighting Agents (Prof. Kawano) **(2) Peat Fire Extinguishing Technology (Prof. Uezu)** **(3) Fish Toxicity Assay for Fire Fighting Agents (Prof. Kawano)** 17:30 Dismiss 17:30 Onward: Free /No Official Schedule.		available for Profs. & admin. staffs at 2nd floor (Special Guest Room)
	Students	**Profs & administrative staffs**	
Tuesday, February 3rd **a.m.**	8:45 Taxi from **Hatagoya** 8:45 From **Guest House**, Move to the Campus roadside on foot	8:45 From **Guest House**, Move to the Campus roadside on foot 9:30 BUS pick-up at AZ Hotel	
	9:00 The bus arrives at Campus roadside 9:10 Bus departure from Campus roadside 9:30 Departure from AZ Hotel 9:40 arrival at Shabondama Soap Company (R&D Division) Excursion inside the Factory **10:00-13:30 Lecture on Soap Production** **10:30-11:20 Tour inside the Factory and Q&A** 11:30-12:30 Lunch in the conference room (Bento box)		Shabondama Soap Company
Tuesday, February 3rd **p.m.**	12:30 Bus departure 12:45 Viewing whole Kitakyushu city, the Great Wakato Bridge, and the offshore wind power turbines. 13:10 Depart from Takatoyama Hill 13:20 Arrival at Wakamatsu Fire Station 13:30-14:30 **Lecture on (1) Introduction of Kitakyushu City Fire Department, (2) Wildland and Forest fires, and (3) Handling of Fire-Fighting Agents. By Mr. Taniyama** (Kitakyushu city Fire Department) 14:30-15:00 **Technical tour and Demonstration of Fire-Fighting Agents Sprays** 15:40 Departure from Wakamatsu Fire Station		Takatoyama Hill (an observatory spot) Wakamatsu Fire Station
	Evening Excursion to Kokura 16:00 Arrival at Orio Station 16:00 Move to Kokura with Ms. Chida and Ms. Indriyani (Visits to Kokura city center, Kokura Castle, Murasaki River, and dinner) ↓ 21:00 Back to Orio Sta. Taxi to accommodations	16:30 Arrival at University 17:00 Coffee/Discussion 18:00 Move by a chartered bus **18:30 Official Dinner Meeting at Restaurant Kaneyasu (Banquet)** *On the way back, the chartered bus is available (route: Campus→ AZ Hotel → Orio Station→ Asakawa)	

	Students	Profs & administrative staffs	
February 4th (Wed) **a.m.**	8:45 Taxi from **Hatagoya** 8:45 From **Guest House**, Move to Campus on foot	8:45 From **Guest House**, Move to Campus on foot **9:00** Taxi from **AZ Hotel**	Move to Conference room I (Building N)
	10:00-11:00 **Official Ceremonial Event for University Collaboration** **(1) Presidential addresses by both sides (President Prof. Yanai and Rector Prof. Salampak)** **(2) Research concept presentation (Prof. Kawano)** **(3) souvenir exchange + photo shoot**		Conference room I (Building N)
	Lunch at Campus cafeteria	11:30 6 delegates chiefly Rector Prof. Salampak move to Airport by a chartered vehicle	
February 4th (Wed) **p.m.**	13:30-16:00 Symposium **(1) Keynote Lecture "Responsible Peatland Management" by Prof. by Adi Jaya** (Center for International Cooperation in Sustainable Management of Tropical Peatland (CIMTROP), University of Palangka Raya) **(2) Keynote Lecture "Peatland Forest Fires, Impact and Solutions" by Prof. Kitso Kuhas Kusin** (Center for International Cooperation in Sustainable Management of Tropical Peatland (CIMTROP), University of Palangka Raya) (3) Coffee break **(4) Poster session by Japanese students and discussion between Japanese and Indonesian students** 16:30 Dismiss 16:30 Onward: Free /No Official Schedule.		KSRP Academic Information Center
	Students	**Professors**	
February 5th (Thu) **a.m.**	No Official Schedule in the morning**.** Move to campus on foot (from both **Hatagoya** and **Guest House**)	9:00 Arrival at Campus on foot Discussion on future research collaborations	Presentation Room (9:00-12:00)
February 5th	12:00-13:30 Lunch		

<table>
<tr><td>(Thu)
p.m.</td><td colspan="2">13:30-16:00
Symposium
(1) Invited Lecture by Dr. Mai Ngoc Chau
“Assessing the Status of Disaster Risk Reduction Education and Course Performance: A Case Study in Hue, Vietnam”

(2) Invited Lecture by Mr. Kensuke Nakao
“Novel Fire-Fighting Foam for PV fires”

(3) Coffee break
(4) Poster (Sakura Science Exchange Program session) by Indonesian students and local enterprises followed by discussion between Japanese and Indonesian participants.

16:30 Dismiss
16:30 Onward: Free /No Official Schedule.</td><td>KSRP Academic Information Center</td></tr>
<tr><td></td><td>Students</td><td>Professors</td><td></td></tr>
<tr><td>February 6th (Friday)
a.m.</td><td>9:30 Taxi from Hatagoya
9:30 From Guest House, Move to Campus on foot</td><td>9:30 From Guest House, Move to Campus on foot</td><td></td></tr>
<tr><td rowspan="3"></td><td colspan="2">10:00-12:00
Lecture 4 “Physicochemical properties of peat soil (The Last Lecture)”
by Prof. Akira Haraguchi.*

12:00-13:30 Lunch</td><td>Conference Room 2

*Discussion room available for Profs. at 2nd floor (Special Guest Room)</td></tr>
<tr><td>February 6th (Friday)
p.m.</td><td colspan="2">13:30-15:30
Group work and presentations of results by SAKURA participants</td></tr>
<tr><td>16:00 Dismiss
16:30 Onward: Free /No Official Schedule.</td><td>17:00-18:00
Move by a city bus to Kokura
18:30-20:30
Industry-Academia collaboratory dinner meeting (at Restaurant INAKAAN)
20:30-21:30
Move back to Campus by train and taxi.</td><td></td></tr>
<tr><td>February 7th (Sat)</td><td colspan="2">8:45 Taxi from Hatagoya
8:45 from Guest house, Move to Campus on foot
9:00 Departure of Bus from Campus to Airport (with Prof. Kawano and Ms. Chida)
On the way in the bus, small branch with sandwiches
11:00 Arrival at Fukuoka Airport
Photographs and Check-In</td><td></td></tr>
</table>

SAKURA SCIENCE PROGRAM LECTURES:

1. **Peat Fire Extinguishing Technology**
   Kazuya Uezu (Professor: University of Kitakyushu)
2. **Environmental impacts of Fire-Fighting Agents**
   Tomonori Kawano (Professor: University of Kitakyushu)
3. **Sharing Disaster Experience**
   Takaaki Kato (Professor: University of Kitakyushu)
4. **Physicochemical properties of peat soil (The Last Lecture)**
   Akira Haraguchi (Professor: University of Kitakyushu)

SAKURA/KEYS JOINT LECTURES:

LIST OF KEYNOTE LECTURES:

1. **Responsible Peatland Management**
   Adi Jaya (Professor: University of Palangka Raya)
2. **Peatland Forest Fires, Impact and Solutions**
   Kitso Kuhas Kusin (Professor: Center for International Cooperation in Sustainable Management of Tropical Peatland (CIMTROP), University of Palangka Raya)

LIST OF INVITED TALKS:

1. **Assessing the Status of Disaster Risk Reduction Education and Course Performance: A Case Study in Hue, Vietnam**
   Dr. Mai Ngoc Chau (University of Sciences, Hue University)
2. **Novel Fire-Fighting Foam for PV fires**
   Kensuke Nakao (Horse Sheep Monkey Inc.)

LIST OF POSTERS (Sakura Science Exchange Program Session):

1. **Protect Nature, Protect Mental Health**
   Aginta Aprillia
2. **Forest Fires**
   Daffa Imanda Patria
3. **Earthquake and Mitigation Efforts**
   Novesa Merilya Weroy
4. **Flood Awareness**
   Edward Jonathan Dohong
5. **Amphibious Med-Hub**
   Leonard Axel Timothy
   (Best Poster selected by Horse Sheep Monkey CEO Kensuke Nakao)
6. **Save Nature, Save Life**
   Ristasya Melbi Amelia
7. **Household Health and Economic Impacts of Peatland Forest Fires**
   Twiko Erlian Agus
8. **Forest Fire Kalteng**
   Santi
9. **Nature in Crisis: Human-Caused Disasters in Central Kalimantan**
   Andrau Boston Togatorop
10. **Forest and Peatland Fires in Indonesia**
    Forni Lisbet Mendrofa
    (Best Poster selected by Dr. Mai Ngoc Chau)

LIST OF POSTERS (Research Posters by Students of Host University)

1. **Evaluation of Penetration Characteristics of Soap Foam Fire Extinguishing Agents for Peat Fires Using Capillary Rise Experiments**
   Haruka Fukui,[1] Kazuya Uezu,[1] Takayoshi Kawahata [2] and Akihiro Masunaga [2]
   ([1] University of Kitakyushu, [2] Shabondama Soap Co., Ltd.)

2. **Calculation of Surface Free Energy of Peat and Its Application to Soap-Based Fire Extinguishing Agent for Peat Fires**
   Saki Motomura,[1] Kasuya Uezu,[1] Takayoshi Kawahara,[2] Takahide Kanyama,[2] and Akihiro Masunaga [2]
   ([1] University of Kitakyushu, [2] Shabondama Soap Co., Ltd.)
   (Best Poster selected by Prof. Kitso Kusin)

3. **The Self-assemblies and Solution Properties of Potassium Oleate-Arginine Complexes in Aqueous Solution**
   Tomoki Endo, Isamu Akiba, and Kazuya Uezu (University of Kitakyushu)

4. **Identification of environments highly enriched in the ecologically important ultra-small microorganisms Omnitrophota**
   Haku Itatani and Katsunori Yanagawa (University of Kitakyushu)

5. **Effects of Hydrogen Supply on Microbial Community Structure in Natural Water Systems**
   Masayuki Hanada and Katsunori Yanagawa (University of Kitakyushu)

6. **Primitive photosynthetic bacteria in iron-rich Archaean analogue cultures**
   Hiroto Sonoda and Katsunori Yanagawa (University of Kitakyushu)

7. **Temporal dynamics of microbial methane production mediated by indigenous methanogenic archaea in hot spring ecosystems**
   Yuto Suga and Katsunori Yanagawa (University of Kitakyushu)

8. **Development of a Compact Banana Cultivation System in Kitakyushu City, Japan**
   Ryosuke Obata,[1] Takuya Yamaguchi,[1] Kazuo Ishii,[2] Nakako Kawano[1] and Tomonori Kawano[1] ([1] University of Kitakyushu, [2] Kyushu Institute of Technology)
   (Best Poster selected by Prof. Adi Jaya)

9. **Search for stomatal regulatory substances through digital microscope observation of leaf epidermis from *Tradescantia ohiensis***
   Keigo Takayanagi,[1] Hirotoshi Sakai,[1] Nobuyuki Uozumi,[2] and Tomonori Kawano,[1] ([1] The University of Kitakyushu, [2] Tohoku University)

10. **Time-Series Analysis of Environmental Measures by Government Ministry Using Text Mining**
    Ryotaro Kobayashi and Tomonori Kawano (University of Kitakyushu)

11. **Relationship between Mantle Color and Photosynthetic Rate in Giant Clams (*Tridacna crocea*) under LED Illumination**
    Kenshin Takahashi, Ryosuke Obata, Aika Yamada, Nakako Kawano, and Tomonori Kawano (University of Kitakyushu)

12. **Optical model for the light collecting role for water droplets on the plant leaf surface and induced water physiology**

Hirotoshi Sakai and Tomonori Kawano (University of Kitakyushu)

13. **Analysis of the growth of zooxanthellae isolated from *Tridacna crocea* under artificial seawater conditions**
Aika Yamada and Tomonori Kawano (University of Kitakyushu)

LIST OF POSTERS FROM LOCAL ENTERPRISES

1. **Where Do Fires Originate?**
Keiichiro Matsumura (Representative Director, Dot Noah Holdings Co., Ltd.; Director, .N M&A・PMI R&D Institute)

2. **Fire Risks and Preventive Measures in Industrial Waste Treatment Facilities**
Keisuke Nohara (President & CEO, Nohara Shokai Co., Ltd. ; Director, Nohara Energy Materials Laboratory)

3. **Novel Firefighting Foam for PV fires; Bubble Shade - PV fires can be extinguished safely**
Kensuke Nakao (CEO, Horse Sheep Monkey Inc.)

ABSTRACTS OF POSTERS:

Evaluation of Penetration Characteristics of Soap Foam Fire Extinguishing Agents for Peat Fires Using Capillary Rise Experiments

Haruka Fukui,[1] Kazuya Uezu,[1] Takayoshi Kawahata,[2] and Akihiro Masunaga [2]
([1] University of Kitakyushu, [2] Shabondama Soap Co., Ltd.)

Peat fires propagate as smoldering combustion and tend to persist for long periods because thermal decomposition and oxidation reactions allow the combustion zone to spread deep underground. Effective suppression of peat fires requires cooling of the combustion zone and wetting of dried peat, which often exhibits strong water repellency. Liquid penetration into dried peat is therefore critical and is governed by surface wettability and internal pore structure. The capillary rise experiment provides a suitable method for evaluating liquid infiltration driven solely by capillary forces arising from wettability and pore radius, without external pressure. This method enables assessment of spontaneous liquid penetration into dried peat under conditions relevant to peat fire suppression. In this study, infiltration characteristics of a soap-based foam extinguishing agent for peat fires were evaluated using capillary rise experiments. The results provide insight into wettability and pore-scale transport in enhancing extinguishing performance.

Calculation of Surface Free Energy of Peat and Its Application to Soap-Based Fire Extinguishing Agent for Peat Fires

(Best Poster selected by Prof. Kitso Kusin)

Saki Motomura,[1] Kasuya Uezu,[1] Takayoshi Kawahara,[2] Takahide Kanyama,[2] and Akihiro Masunaga [2] ([1] University of Kitakyushu, [2] Shabondama Soap Co., Ltd.)

Peat is an organic soil that is water repellent when dry. In extinguishing peat fires, it is important to allow water to penetrate deep into the ground. It has already been confirmed that peat fire can be efficiently extinguished by using a soap-based fire extinguishing agent for peat fires. To develop a better extinguishing agent, we estimated the surface free energy of the peat. As a result, the surface free energy of peat was found to be 19.9 mN m-1 for the dispersion component and 1.1 mN m-1 for the polar component. In the future, in order to search for an extinguishing agent with a similar surface free energy, it may be possible to evaluate the wettability by measuring the contact angle of the extinguishing agent with an alternative that has a value close to the surface free energy of the peat in the field.

The Self-assemblies and Solution Properties of Potassium Oleate-Arginine Complexes in Aqueous Solution

Tomoki Endo, Isamu Akiba, and Kazuya Uezu (University of Kitakyushu)

Higher fatty acids, which are anionic surfactants, generally form spherical micelles in water, resulting in weak concentration dependence of solution viscosity and limited controllability of flow properties. To overcome this limitation, we focused on complexation with basic amino acids. In this study, we investigated the self-assembled structures and flow properties of aqueous mixtures of potassium oleate (C18=1K) and basic amino acids, L-lysine (Lys) and L-arginine (Arg). The mixed solutions exhibited gel-like behavior and a drastic increase in viscosity. Zeta potential measurements, together with the acid dissociation constants and isoelectric points of the functional groups, indicated the formation of ionic complexes between potassium oleate and the amino acids. Furthermore, shear-rate-dependent viscosity measurements suggested that the C18=1K–Lys ionic complex formed string-like aggregates, leading to enhanced viscoelasticity.

Identification of environments highly enriched in the ecologically important ultra-small microorganisms Omnitrophota

Haku Itatani and Katsunori Yanagawa (University of Kitakyushu)

Ultra-small and highly intriguing uncultivated microorganisms known as Omnitrophota are widely distributed across the Earth. In this study, we collected samples from diverse environments to identify environments in which Omnitrophota are present at high abundance. Samples were collected from lakes, acid mine drainage sites, hot springs, groundwater, and marine sediments in western Japan, and microbial community structures were analyzed using 16S rRNA gene amplicon sequencing analysis. Among the ten samples analyzed, Omnitrophota were detected at high relative abundances of 10.4% in a hot spring in Kitakyushu (Kokura Castle Town Hot Spring) and 17.9% in groundwater in Kitakyushu (Yutakamachi Groundwater). Therefore, these results suggest that Omnitrophota are highly abundant at these two sites.

Effects of Hydrogen Supply on Microbial Community Structure in Natural Water Systems

Masayuki Hanada and Katsunori Yanagawa (University of Kitakyushu)

Hydrogen supply has been suggested as a factor influencing microbial processes in natural water systems, yet its ecological effects remain unclear. This study examined how hydrogen replacement alters microbial communities in several natural water samples. Samples were incubated under untreated and hydrogen-supplied conditions, followed by DNA amplification and Nanopore sequencing. Genus-level composition differed markedly between the two conditions, with shifts in dominant taxa and their relative abundances. Classical hydrogen-metabolizing genera did not increase under hydrogen treatment, indicating that hydrogen was not directly used as a metabolic substrate. Instead, the observed community changes likely resulted from indirect environmental effects, such as increased anaerobic conditions. These findings suggest that hydrogen supply can reshape microbial communities through environmental modulation. Future work will refine the cultivation protocol, including adjustments to incubation period and hydrogen supply frequency, to better identify hydrogen-responsive taxa and clarify the mechanisms driving these shifts.

Primitive photosynthetic bacteria in iron-rich Archaean analogue cultures

Hiroto Sonoda and Katsunori Yanagawa (University of Kitakyushu)

This study used modern analogue environments of the pre-Great Oxidation Event to cultivate primitive photosynthetic bacteria and investigate microbial processes related to banded iron formation. Iron-rich spring sediments from Hiroshima were incubated under light and anaerobic conditions, and community succession was analyzed by 16S rRNA gene amplicon sequencing. Sericytochromatia, an ancestral lineage of Cyanobacteria, dominated in the early stage. In the mid-stage, anaerobic phototrophic *Chlorobium* closely related to *Chlorobium ferrooxidans*, capable of photoferrotrophy, became dominant. In the late stage, *Chlorobium* declined and Cyanobacteriota including Sericytochromatia re-emerged. The two groups did not coexist, suggesting niche competition. These results raise the possibility that Sericytochromatia may also possess photoferrotrophic capability similar to *C. ferrooxidans*.

Temporal dynamics of microbial methane production mediated by indigenous methanogenic archaea in hot spring ecosystems

Yuto Suga and Katsunori Yanagawa (University of Kitakyushu)

To support Japan's 2050 carbon-neutral goal, this study evaluated the potential of biological methanation in geothermal environments outside accretionary prism regions. Microbial communities from Yamaga hot springs in Kitsuki City, Oita, were analyzed, where methanogens accounted for 19-44% of the total community. After adding organic matter, temporal changes in gas composition, microbial abundance, community structure, and organic acids were monitored during cultivation. Methane production proceeded in three phases: (i) an initial phase with increased microbial abundance and production of hydrogen and acetate by Synergistales; (ii) a middle phase dominated by hydrogenotrophic methanogenesis by Methanomicobiales and Methanobacteriales; and (iii) a final phase characterized by acetoclastic methanogenesis by Methanosaetaceae. These results demonstrate that efficient bio-methane production can occur in geothermal systems far from accretionary prisms, suggesting broader geological applicability of biological methanation.

Development of a Compact Banana Cultivation System in Kitakyushu City, Japan

(Best Poster selected by Prof. Adi Jaya)

Ryosuke Obata,[1] Takuya Yamaguchi,[1] Kazuo Ishii,[2] Nakako Kawano,[1] and Tomonori Kawano [1] ([1] University of Kitakyushu, [2] Kyushu Institute of Technology)

Most bananas consumed in Japan are imported Cavendish cultivars, which are propagated clonally and exhibit extremely low genetic diversity. This has raised serious concerns regarding their vulnerability to Panama disease, particularly Tropical Race 4 (TR4). In contrast, domestically produced bananas can be cultivated without post-harvest chemical treatments and are therefore attractive from a food safety perspective. In this study, we developed and evaluated a compact banana cultivation system using logistics-pallet-sized plastic planters that allow forklift transportation, aiming to promote domestic banana production in the relatively cool climate of Kitakyushu City, Japan. After 18 months of cultivation, although the number of fruits was lower than that of field-grown plants, fruit size was comparable to those produced under open-field conditions. Plant height analysis indicated that vegetative growth ceased approximately 150 days after moving to the greenhouse, coinciding with flowering. These results demonstrate that banana production is feasible even in cooler regions, and that plant mobility enables flexible selection of cultivation conditions according to seasonal and developmental stages.

Search for stomatal regulatory substances through digital microscope observation of leaf epidermis from *Tradescantia ohiensis*

Keigo Takayanagi,[1] Hirotoshi Sakai,[1] Nobuyuki Uozumi,[2] and Tomonori Kawano[1] ([1] The University of Kitakyushu, [2] Tohoku University)

Stomatal movement regulates transpiration-driven water loss, leaf temperature, and CO_2 uptake, thereby controlling plant responses to drought stress and photosynthetic activity. While stomata are generally studied as regulators of gas exchange, our group focuses on their function as the pathways for transport of liquid form of water and solute into leaves. This protocol utilizes stomatal opening and therefore aims to search for substances that regulate stomatal opening and closing. In this study, we investigated candidate compounds that efficiently regulate stomatal aperture in combination with light stimuli. *Tradescantia ohiensis*, a model plant for stomatal observation, was used to evaluate light-dependent stomatal responses. Catechin-rich green tea was tested as a candidate. Under red light, green tea treatment promoted stomatal opening, whereas under blue light it induced stomatal closure. The green tea treatment resulted in light-quality–dependent differences in stomatal behaviors. Digital microscopy enabled rapid and non-destructive stomatal evaluation and suggested interactions between catechin components and light-dependent signaling pathways.

Time-Series Analysis of Environmental Measures by Government Ministry Using Text Mining

Ryotaro Kobayashi and Tomonori Kawano (University of Kitakyushu)

This study explores a text mining approach to analyzing how government agencies have responded to environmental issues over time. Previous research by Ueda et al. (2014) analyzed Japanese government white papers using peaks in keyword frequency to reveal differences in each ministry's response to environmental issues. However, this approach primarily focused on periods of heightened interest, overlooking the initial response period and fluctuations prior to the peak. To address this limitation, this study proposes a new analytical method that takes into account both peak frequency and the first appearance of a term. By reconstructing and reevaluating the frequency graphs used in previous studies, we reassess the trends in environmental terms. Our results demonstrate that by focusing on the first appearance of a term in addition to its peak frequency, we can more clearly understand the timing of responses to environmental issues and their long-term spread across ministries and agencies.

Relationship between Mantle Color and Photosynthetic Rate in Giant Clams (*Tridacna crocea*) under LED Illumination

Kenshin Takahashi, Ryosuke Obata, Aika Yamada, Nakako Kawano, and Tomonori Kawano (University of Kitakyushu)

Tridacna crocea is a giant clam inhabiting tropical and subtropical coral reefs and harbors symbiotic zooxanthellae within its mantle tissue, enabling growth supported by photosynthesis. However, quantitative evaluations of its photosynthetic performance under controlled conditions remain limited. In this study, we examined the effects of mantle coloration (blue, brown, and green) on photosynthetic characteristics of *T. crocea* under LED illumination. Individuals with different mantle colors were exposed to light at wavelengths of 450 nm and 660 nm with stepwise changes in light intensity. Photosynthetic rates were determined by measuring changes in dissolved oxygen concentration using an oxygen electrode. Differences in maximum photosynthetic rate (Pmax) were observed among mantle color types depending on wavelength. These results suggest that the green-colored individual showed highest photosynthetic performance, possibly reflecting the light reflection and scattering properties of mantle and the light-use efficiency of symbiotic zooxanthellae.

Optical model for the light collecting role for water droplets on the plant leaf surface and induced water physiology

Hirotoshi Sakai and Tomonori Kawano (University of Kitakyushu)

Plant stomata are generally regarded as sites of gas exchange regulated by environmental factors such as light. Our previous studies have shown that light-induced stomatal opening also contributes to liquid uptake on the leaf surface. In this study, we focused on dew formation on leaves in the early morning and hypothesized that water droplets act as lenses, enhancing local light intensity and promoting stomatal opening. Model and biological experiments demonstrated that condensed water on the leaf surface produces a light-focusing effect and significantly increases stomatal aperture under low-angle incident light. These findings suggest that dew not only modifies the leaf light environment but also actively regulates stomatal behavior. Future studies using NMR techniques and stable isotope methods will investigate whether water movement occurs through dew-induced open stomata. Confirmation of this process would imply that water and dissolved nutrients adhered to the leaf surface can be efficiently absorbed by plants during early morning conditions.

Analysis of the growth of zooxanthellae isolated from *Tridacna crocea* under artificial seawater conditions

Aika Yamada and Tomonori Kawano (University of Kitakyushu)

In general, the endosymbiotic hypothesis has been proposed, suggesting that chloroplasts, which are responsible for photosynthesis in many photosynthetic organisms such as plants, originated from photosynthetic bacteria that were incorporated into eukaryotic cells, giving rise to eukaryotes capable of photosynthesis. It is known that higher organisms capable of photosynthesis are not limited to the plant kingdom but are also widely distributed in the fungal and animal kingdoms. Some marine animals, such as corals and the *Tridacna crocea*, acquire photosynthetic ability by forming symbiotic relationships with algae, such as zooxanthellae. While host organisms benefit from the supply of organic matter from the photosynthetic symbionts, the advantages of symbiosis for the symbiotic organisms themselves (algae) remain largely unknown. In the author's undergraduate research, it was found that zooxanthellae isolated from *Tridacna crocea* exhibit an Allee effect-like growth pattern in artificial seawater, with their proliferation significantly suppressed at initially low densities. In other words, the proliferation of zooxanthellae may require a population density above a certain threshold. From the perspective of population dynamics, it may be possible to discuss the advantages of having a high density of symbionts within the host. In this study, the proliferation patterns of zooxanthellae derived from *Tridacna crocea*, a bivalve that retains zooxanthellae in its body for its own growth and survival, and hypotheses are tested through mathematical analysis.

Where Do Fires Originate?

Keiichiro Matsumura (Representative Director, Dot Noah Holdings Co., Ltd.;
Director, .N M&A・PMI R&D Institute)

Building fires become apparent during use; however, they may be influenced by conditions formed during the construction stage. This study presents a perspective that reframes fire not as a post-occurrence event, but as a structure formed prior to its outbreak, with a focus on electrical work and wiring. In Japan, the number of building fire incidents has remained relatively constant over the long term despite advances in fire prevention measures. A large-scale fire that occurred in a densely built urban area of Kitakyushu suggests that building equipment and wiring—made increasingly complex through aging and repeated renovations—may contain latent risks that are difficult to recognize during the usage stage. This poster examines cases of residential wiring and exposed outdoor wiring to illustrate how the overlap of construction conditions and environmental factors contributes to the formation and manifestation of fire risk. Furthermore, existing practices, such as wiring organization, protective measures, and inspection records, are considered to be structural elements, highlighting the need to reconsider fire prevention as a structural approach within construction.

Fire Risks and Preventive Measures in Industrial Waste Treatment Facilities

Keisuke Nohara (President & CEO, Nohara Shokai Co., Ltd. ; Director, Nohara Energy Materials Laboratory)

Industrial waste treatment facilities face inherent fire risks because combustible materials and ignition sources frequently coexist within processing lines. This study categorizes key hazards originating from mixed waste (e.g., lithium-ion batteries and aerosol cans) and from equipment/physical factors (e.g., metal fatigue, electrical tracking, electrostatic discharge, and heat accumulation leading to spontaneous ignition). Fundamental causes are analyzed from an operational perspective, and practical countermeasures implemented at the facility are presented. In addition to technical issues, prevention is hindered by human and organizational factors, including failure to detect early warning signs, normalcy bias, productivity pressure discouraging line stoppage and cleaning, and insufficient training on chemical reactions and static electricity. An integrated prevention model is proposed: hardware measures such as early detection (temperature/infrared) linked to automatic sprinklers and electrostatic control through dust management and grounding; and operational measures including the “courage to stop,” experiential KYT training[*1], near-miss sharing, and strict inbound waste control. This framework emphasizes safety as the ultimate efficiency to support sustainable facility operations.

[*1] Hazard Prediction Training (KYT) is a Japanese workplace safety method designed to prevent accidents by proactively identifying and addressing potential dangers before they cause harm. KYT stands for Kiken Yochi Training (危険予知トレーニング in Japanese); where Kiken = Hazard and/or Danger; Yochi = Prediction and/or Anticipation; Training = Training. Therefore, KYT = "See danger before it sees you" — a simple, team-based drill rooted in Japanese kaizen (continuous improvement) philosophy to achieve zero accidents through better awareness and communication.

Novel Firefighting Foam for PV fires; Bubble Shade - PV fires can be extinguished safely

Kensuke Nakao (CEO, Horse Sheep Monkey Inc.)

Photovoltaic (PV) installations are rapidly increasing worldwide, leading to a growing number of PV-related fires. Unlike conventional fires, PV fires are difficult to extinguish because power generation continues under sunlight, creating persistent electrical hazards and increasing the risk of electric shock and re-ignition. Current firefighting procedures require multiple complex steps, including power isolation, blackout installation, leakage checks, and limited use of water cannons, placing a heavy operational burden on firefighters. This study presents Bubble Shade , a novel black firefighting foam specifically designed for PV fires. The foam blocks sunlight at the panel surface, rapidly reducing power generation, electrical current, and thermal output simultaneously. By integrating light-shielding, cooling, and fire suppression into a single action, Bubble Shade simplifies PV firefighting operations and improves responder safety. Validation experiments using inclined PV panel mock-ups demonstrated that the black foam significantly reduced light transmission compared to conventional white foam, resulting in rapid flame suppression and prevention of re-ignition. These results indicate that Bubble Shade can convert previously complex and high-risk PV firefighting procedures into a safer and more efficient single-step response, addressing a critical and emerging challenge in renewable energy infrastructure safety.

Selected Photos

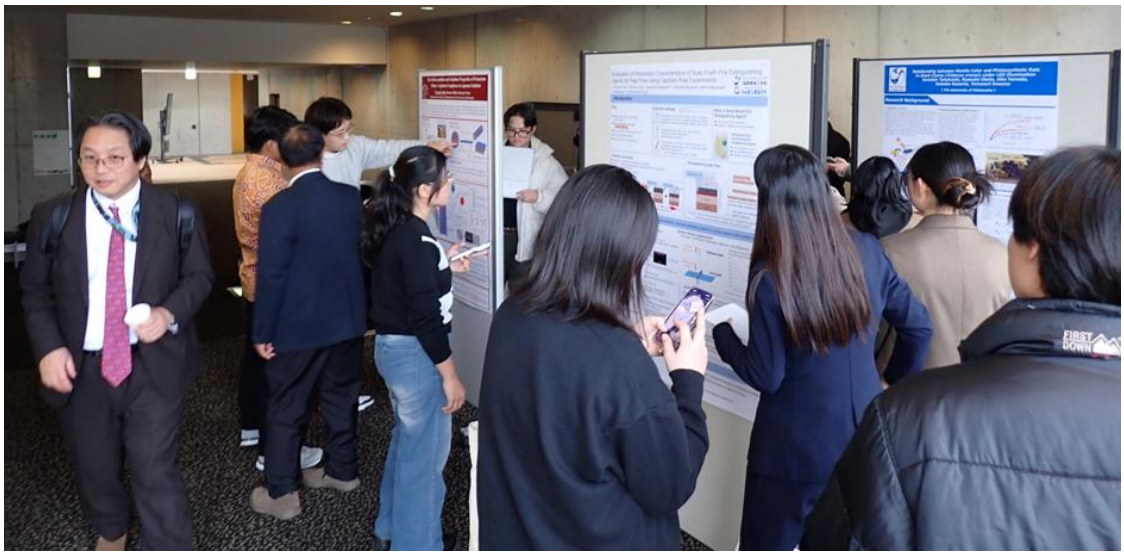
Ceremonial Event: with the President of Univ. Kitakyushu (Prof. Yanai) and the Rector of Univ. Palangka Raya (Prof. Salampak)

Keynote Speakers and audience

Guest speakers and audience

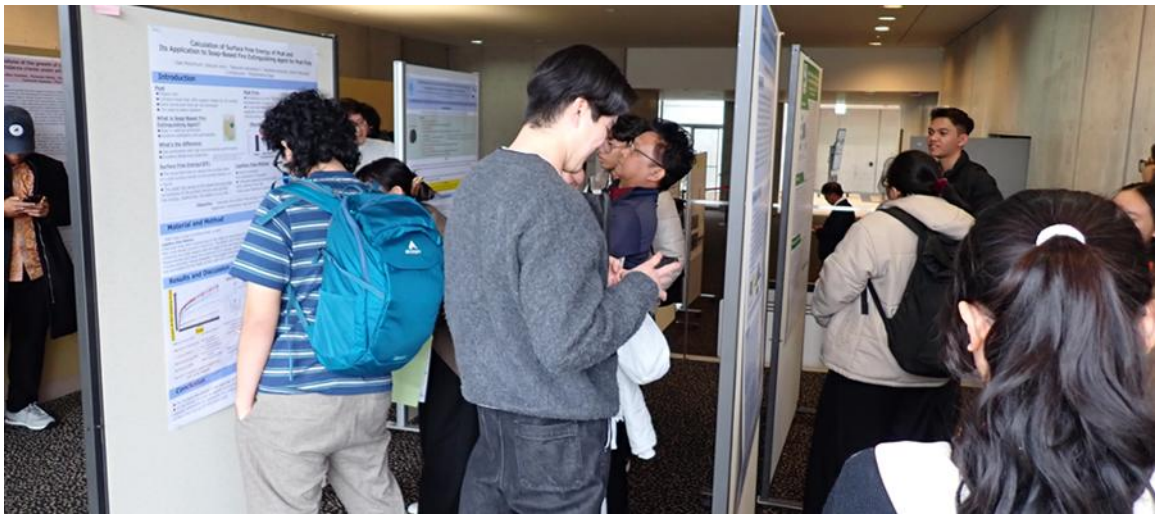
Poster session

Poster session



Poster session

Poster session



Poster session

Poster session

Excursion to Shabondama Soap Company

Students Experiments and Campus Tour

Lectures at Wakamatsu Fire Station

Demonstration of Fire-Fighting Agents Spray at Wakamatsu Fire Station

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Technical tour at Wakamatsu Fire Station

Lectures by Professors at The Univ. of Kitakyushu

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Group works and discussion by international young scholars

LIST OF COMMITTEE MEMBERS

KEYS2026a Kitakyushu was organized by International Photosynthesis Industrialization Research Center (IPIRC), The University of Kitakyushu as the host, with (1) Peat Fire Carbon Credit Commercialization Study Group at Kitakyushu Foundation for the Advancement of Industry, Science and Technology (FAIS), (2) Shabondama Soap Co., Ltd., and (3) the Kitakyushu branch of the International Laboratory of Plant Neurobiology at the University of Florence (LINV@Kitakyushu) as co-hosts.

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Co-organizer: Prof. Kazuya Uezu (Univ. Kitakyushu, Kitakyushu, Japan)

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Prof. Katsunori Yanagawa (Univ. Kitakyushu, Kitakyushu, Japan)

Prof. Akihiro Kawaguchi (Kitakyushu Foundation for the Advancement of Industry, Science and Technology and Univ. Kitakyushu, Kitakyushu, Japan)

Dr. Takayoshi Kawahara (Shabondama Soap Co., Ltd., Kitakyushu Japan)

Mr. Kensuke Nakao (Horse Sheep Monkey Inc., Kitakyushu Japan)

Ms. Mori Chida (Univ. Kitakyushu, Kitakyushu, Japan)

Ms. Hiroko Kuga (Univ. Kitakyushu, Kitakyushu, Japan)

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