

**HIROSHIMA  
UNIVERSITY**



HIROSHIMA UNIVERSITY

# UP DA TE

**VOLUME 21 • AUTUMN 2023**

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and high-impact research here!





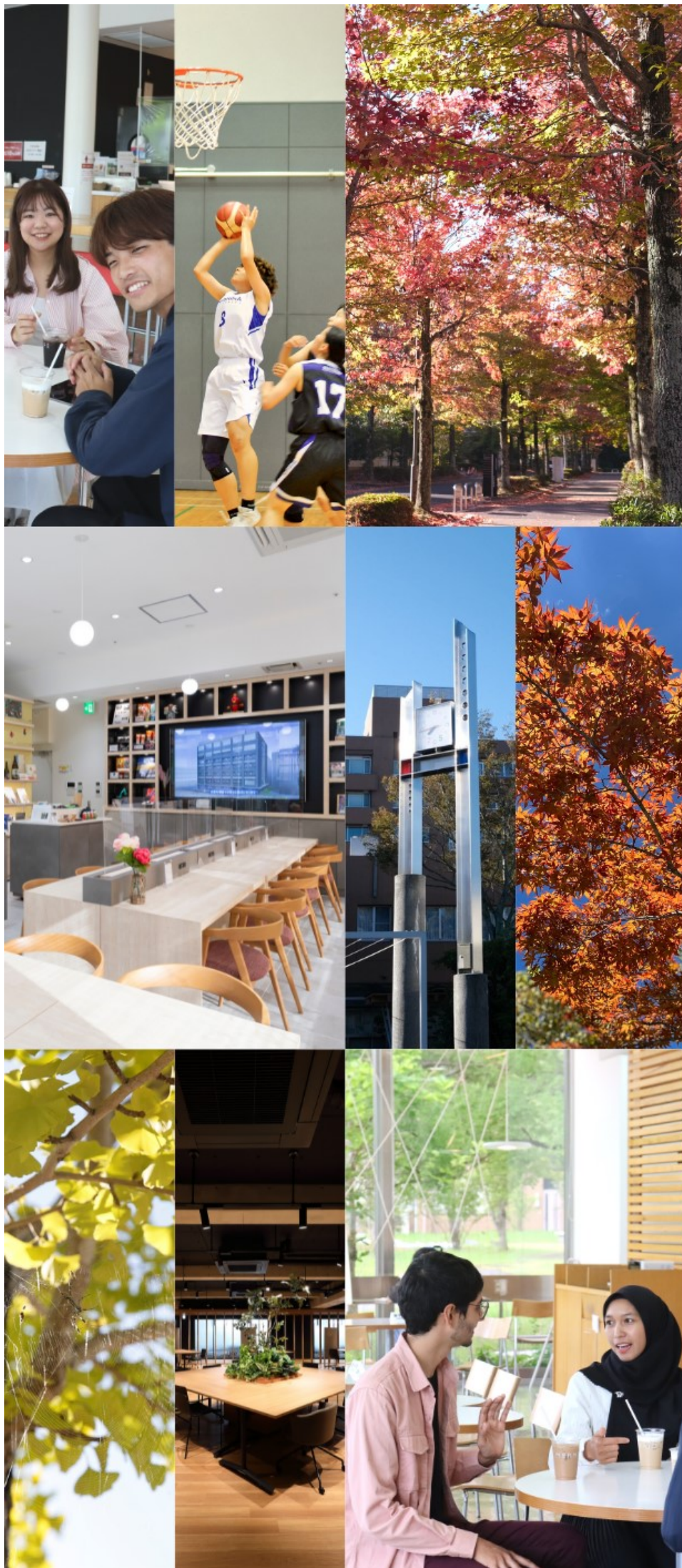
# HIROSHIMA UNIVERSITY

Embodying its founding principle of “a single unified university, free and pursuing peace,” Hiroshima University is one of the largest comprehensive research universities in Japan.

Today, HU is making steady progress as a global university, taking on worldwide challenges and strengthening its global educational network by signing international exchange agreements with universities around the world and opening overseas bases at strategic locations.



HIROSHIMA UNIVERSITY





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# HU launches President 5 Initiatives for Peace Sciences

— New Peace Science (Creating Peace for Safety and Security) —

## Becoming a university that “creates peace” through the President 5 Initiatives for Peace Sciences

Hiroshima University (HU) has drawn up the “President 5 Initiatives for Peace Sciences: Creating Peace to Realize Safety and Security” with an intention of establishing a world-class education and research center that implements the new peace science philosophy of “Science for Sustainable Development.”

These initiatives, unveiled by President Mitsuo Ochi in May 2023, outline the university’s strategic focus areas — five prioritized issues — for achieving its vision during the fourth mid-term objectives period.

HU, which brings together researchers from all fields of humanities, social sciences, and natural sciences, aims to bring peace to people through education and research activities that contribute to the security of society, making the best use of its strength of “convergence knowledge.”

These five initiatives have been set as the challenges that HU should tackle interdisciplinarily by taking initiatives in major social changes.

- 1 Innovation and Economic Security through Formation of Semiconductor Ecosystem
- 2 Global Public Health Security through Vaccine and Drug Development, Regenerative Medicine, and Cell Therapy
- 3 Peace through Comprehensive Radiation Disaster Management
- 4 Maritime and Ocean Governance and Sustainability through Asian Center of Excellence
- 5 Food Security through Livestock Industry Reforms to Improve Nutrition in the South



1

## Innovation and Economic Security through Formation of Semiconductor Ecosystem



To establish a stable supply system for semiconductor products, which are in short supply worldwide, by promoting R&D and human resource development in cooperation with semiconductor-related companies

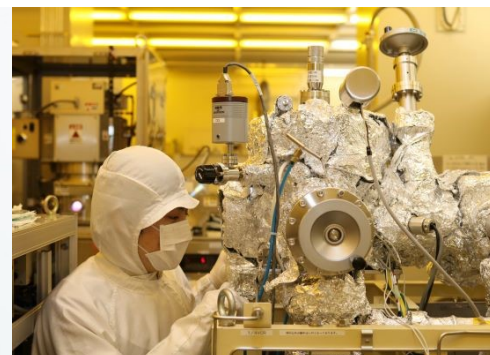
**Initiative leader**

**AKINOBU TERAMOTO**

**Director**  
The Research Institute for Nanodevices



**Keywords:** Semiconductor, New materials, Manufacturing technology, Biomedical and dental engineering, Advanced human resource development, Economic security



2

## Global Public Health Security through Vaccine and Drug Development, Regenerative Medicine, and Cell Therapy



To develop a global workforce with the capacity to create vaccines and other medical treatments for pandemics and other emergencies, as well as to advance the field of regenerative medicine and cell therapy.

**Keywords:** Vaccine, Regenerative medicine, Cell therapy, Pharmaceuticals, Nucleic acid medicine, Novel coronavirus, GMP education, Advanced personnel training, Economic security

**Initiative leader**

**JUNKO TANAKA**

**Executive VP**  
Kasumi Campus,  
Faculty Personnel  
and Public Relations



3

## Peace through Comprehensive Radiation Disaster Management



Fulfilling the primary objective of peace science by enhancing abilities to respond to radiation disasters using medical and social science approaches.

**Keywords:** Radiation disaster and medical science research, Development of radiation exposure medicine, Exposure medicine system, Livelihood security, History of radiation exposure medicine

**Initiative leader**

**YUKIHIRO HIGASHI**

**Dean**  
Research Institute for Radiation Biology and Medicine



4

## Maritime and Ocean Governance and Sustainability through Asian Center of Excellence



Aiming to provide innovative solutions to global marine and maritime issues by forming a center for interdisciplinary education, research, and social collaboration that brings together diverse experts in cooperation with international organizations, governments, and businesses.

**Keywords:** Ocean, Maritime, Environment, Marine resources, SDGs, Blue carbon, Engineering, International law, Economic security

**Initiative leader**

**SHINJI KANEKO**

**Executive VP**  
Global Initiatives



5

## Food Security through Livestock Industry Reforms to Improve Nutrition in the South



Contributing to the supply of highly nutritious food with a focus on poultry research and dairy cattle research, which boast the highest level of research capabilities and facilities in Japan.

**Keywords:** Food security, Global environmental change, Smart agriculture, Next-generation green revolution, Environmental impact reduction, Creation of renewable energy, Carbon neutrality, Development economics, Public policy studies

**Initiative leader**

**MASAYUKI SHIMADA**

**Dean**  
School of Applied Biological Sciences





# Hiroshima and Egypt: Two Oriental Worlds Weaving Memories and Creating a Peaceful Future

*HU hosted a series of events to mark the anniversary of the atomic bombing on August 6.*



**Hiroshima University hosted the “Hiroshima and Egypt” symposium, exploring the latest discoveries in Egypt and reaffirming its commitment to fostering a peaceful future.**

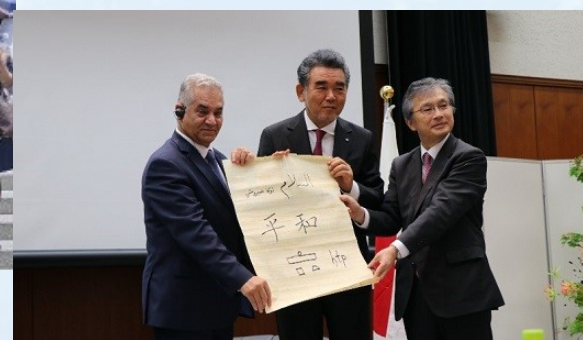
The event, titled “Hiroshima and Egypt: Two Oriental Worlds Weaving Memories and Creating a Peaceful Future,” took place on August 3 and was co-hosted by the Grand Egyptian Museum (GEM), the Japan International Cooperation Agency (JICA), and HU.

President Ochi and Professor Mamdouh Eldamaty of Ain Shams University (Egyptologist, Archaeologist, and Former Minister of Antiques), held a talk session on “Tutankhamun and the Ancient Disease.” When the session concluded, they commemorated the symposium with a sheet of papyrus, upon which the word for “peace” was written in both Japanese and Arabic.

Next, Professor Hany Helal (Faculty of Engineering at Cairo University, Coordinator of the Scan Pyramids Project, and Former Minister of Higher Education and Scientific Research), Major General Atef Moftah (General Supervisor of GEM Project and Surrounding Area), and Dr. Eissa Zidan (General Director of Executive Affairs for Conservation at GEM) gave speeches, shedding light on the latest research on pyramids, the current progress of GEM regarding its official opening, and the fascinating treasures to behold at the museum.

After the symposium, an inter-university networking conference attended by representatives from Senghor University, Ain Shams University, Galala University, Egypt-Japan University of Science and Technology, and Alexandria University took place to deepen collaboration between the two nations.

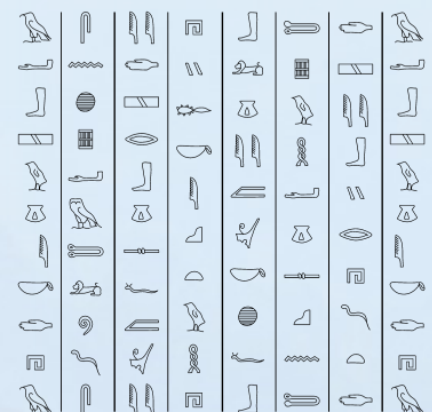
Papyrus with the word “peace” written in both Japanese and Arabic



## Visit to the Peace Memorial Park ▼

On August 3, the group also visited the Hiroshima Peace Memorial Museum and deepened their understanding of the situation in Hiroshima before and after the dropping of the atomic bomb, as well as the horror of nuclear weapons. Afterwards, they laid flowers at the memorial cenotaph for victims of the atomic bomb and renewed their vow to pursue peace.

HU has built a close relationship with Egypt through its two overseas bases and partnerships with eight Egyptian universities and institutions. The symposium and inter-university networking conference are expected to enhance student and academic exchange, promote development, friendly relations, peace, and cultural understanding between the two nations.





# Pursuing peace: A-bomb experiences in kamishibai and music



Commemorative picture  
with President Ochi

Hiroshima University marked the 78th anniversary of the atomic bombing on August 6 with its annual Peace Project at the Higashi-Senda Campus in Hiroshima City. The event, titled “Pursuing peace: A-bomb experiences in *kamishibai* and music,” brought together approximately 200 participants, among them around 100 individuals from 22 countries who were participating in HU’s summer program.

After President Mitsuo Ochi’s opening remarks, students from our partner institution, the University of Idaho, presented a *kamishibai* — a traditional form of Japanese street theater and storytelling involving illustrated paper slides — to recount the stories of those who lived through the atomic bomb.

This *kamishibai* was created by students from the Hiroshima Municipal Motomachi Senior High School after listening to the experiences of A-bomb survivor Keiko Ogura. It was then

translated into English by a group of students from the University of Idaho under Ogura’s supervision.



*Kamishibai* presentation by the  
students of the University of Idaho

The event concluded with a short peace concert, featuring instruments crafted from trees that endured the nuclear explosion’s aftermath. Since 2019, instruments have been fashioned using debris from houses and trees affected by the nuclear bomb. Currently, a viola, a cello, and two violins have been created, forming a string quartet performance.

# HU’s annual tribute: Remembering A-bomb victims



On August 6, HU also held its annual memorial service dedicated to honoring the lives of A-bomb victims, including the staff, faculty, and students of HU’s predecessor schools who were directly affected by the nuclear weapon and tragically lost their lives.

President Ochi and a representative of the bereaved families dedicated a register listing the names of 2,080 A-bomb victims to the cenotaph. This list included 20 individuals who were recently confirmed to have passed away, including eight international students. During the ceremony, participants observed a moment of silence.

In his memorial service address, President Ochi reflected on HU’s commitment to peace and its ongoing initiatives.

“Hiroshima University, acting on behalf of the families of the deceased victims, submitted an application to add the names of students from China, Mongolia, Malaysia, Indonesia, and other Southeast Asian countries to Hiroshima City’s Registry of the Names of the Atomic Bomb Victims. The request was accepted — marking the first instance of such an effort being made,” he said.

University officials and Malaysian students studying at HU also held a memorial service in front of the grave of Mr. Nik Yusof at Kozenji Temple in Hiroshima City’s Saiki Ward. Yusof was a Malaysian exchange student then studying at Hiroshima University of Literature and Science, one of the forerunners of the present HU, when he fell victim to the atomic bombing.

We remain  
committed to  
contemplating  
our contributions  
to peace.  
HU will continue  
to pursue its  
mission as a  
‘peace-pursuing  
university.’



# Peace Study Tour 2023: International students unite for change

Hiroshima University's Peace Study Tour welcomed 125 participants (79 students and 40 faculty from overseas, and six students from another Japanese university) from 25 universities in 15 countries, and featured five summer programs and conferences on topics linked to world peace and stability: Diversity and Inclusion, Smart Cities, Active Peace, Natural Resource Management Aligned with SDGs, Climate Change Crisis, and the Role of Higher Education.

Participants attended lectures, visited relevant sites, and engaged in group work and discussions. In this diverse environment, they shared ideas from various perspectives on peace-related tasks and initiatives, bridging theory and practice. All five programs conducted peace education, deepening participant's understanding of the atomic bomb's devastating consequences and fostering meaningful discussions on peacebuilding.

More [here](#).



## Joint Summer Program



With the Sasakawa Peace Foundation (SPF) and Columbia University

International students engaged in lectures, field visits, and group work focused on natural resource management and peacebuilding.

**Theme:** Collaboration in Natural Resource Management - Advancing Positive Peace and the SDGs



## Kosovo's ambassador visits campus and delivers lecture ►

During the joint summer program, Sabri Kiçmari, Ambassador of the Republic of Kosovo to Japan, visited the campus and delivered a lecture about the relationship between the two countries, focusing on topics such as the political significance of Japan contributing greatly to Kosovo's development.

## INU Student Seminar



Students from the International Network of Universities (INU) discussed Global Citizenship with guest speakers in Hiroshima.

**Theme:** Climate Emergency and Action



Leaders from INU member universities also convened in Hiroshima for the **INU Leader's Summit and Council Meeting**, to explore the theme "The Role of Universities in Internationally Changing Political and Social Contexts."



Executive Vice President Shinji Kaneko (left) and Ambassador Sabri Kiçmari (right)

## CAMPUS Asia Plus Summer School

Students from CAMPUS Asia consortium universities explored diversity and inclusion in Asia.

**Theme:** International Collaborative Human Resources Development Program in Asia to Foster Inclusive Minds



## AGILE Workshop

Students from partner universities in the Agile Entrepreneurship program came together to foster idea generation through lectures, research, and other activities.

**Theme:** Smart City Higashi-Hiroshima: Toward Solutions to Social Issues



CAMPUS Asia and AGILE are both part of the Inter-university Exchange Project.



# Assistant Professor Haruna Katayama listed among Asia's top scientists

Asian Scientist Magazine, a Singaporean publication specializing in science and technology, selected Hiroshima University Assistant Professor Haruna Katayama as one of Asia's foremost researchers in 2023. This acknowledgment comes as part of the magazine's annual "Asian Scientist 100" list.

Every year since 2016, Asian Scientist Magazine compiles a list of Asia's most

outstanding researchers, highlighting recipients of national or international awards as well as those who have made a significant scientific discovery or provided leadership in academia or industry.

Katayama, from the Graduate School of Advanced Science and Engineering, is the first researcher from HU to be included in this list.

She proposed a method to observe Hawking radiation — which has peculiar quantum correlations emitted from an analogue black hole created in an electric circuit. When applied to quantum computers, her work is expected to contribute to the realization of next-generation information processing and communications.



Last year, Katayama was one of the recipients of the 2022 L'Oréal-UNESCO For Women in Science, Japan Fellowship Award.



Tongue pressure meter

## Executive VP Kazuhiro Tsuga gets IADR Distinguished Scientist Award in Geriatric Oral Research

The International Association for Dental Research (IADR) selected Hiroshima University Executive Vice President Kazuhiro Tsuga as one of its distinguished scientist awardees this year for his contributions to the field of geriatric oral research.

"The award is designed to stimulate, encourage, and recognize outstanding research accomplishments in the field of geriatric oral research. This is one of the 17 IADR Distinguished Scientist Awards and is one of the highest honors bestowed by IADR," IADR said.

As part of HU's Department of Advanced Prosthodontics at the Graduate School of Biomedical and Health Sciences, Tsuga has published over 100 papers in scientific journals covering various topics from prosthodontics to gerodontology.

"He is most highly regarded for his research on the oral function of old people, and the tongue pressure meter he developed has been widely used for detecting oral hypofunction in Japan. It has recently become available in Europe and Asia as well," the IADR noted.



## Empowering women in tech: Executive VP Junko Tanaka honored with JAOTEX award

Hiroshima University Executive Vice President Junko Tanaka received the 9th Annual Achievement Award for Advancing Female Technologists by the Japan Association of Technology Executives (JAOTEX).

This award recognizes remarkable contributions to the development of female technologists, including researchers, as part of the Diversity Promotion Committee's initiative to enhance opportunities for women in the industry.

Tanaka has been acknowledged for her contributions as a role model for female researchers, her active role in nurturing female researchers as an educator, and her dedication to efforts as an administrator to increase the number of female researchers and create a conducive environment. Her achievements underscore her commitment to empowering and supporting the journey of female researchers.







## Flowering for naught: 120 years with nothing to show

Flowering for some plants is a yearly occurrence, for others, it is a once-in-a-lifetime event. A widespread species of bamboo in Japan, *Phyllostachys nigra* var. *henonis*, takes this one-time flowering event and pushes it to the extreme: they flower once every 120 years before dying to make way for the next generation. Researchers have realized there might be another issue at hand with this monocarpic species, which is the lack of germination of the seeds from a majority of the flowering specimens. Implications of a once dense field of bamboo, something that serves both as a food source and a source of material for crafts, turning to grassland for several years until the regeneration of bamboo begins to start somehow, can impact the ecology of the area in addition to the country's economy. Their findings were published in PLOS ONE.

Upon the observation of some early flowering specimens, researchers decided to take advantage of this event to take a deeper look at the regeneration ecology since there is no recorded data since the last flowering of this species took place around 1908. It was found that more than 80% of the sampled culms flowered but all the flowering culms did not produce seeds, indicating this variation of *P. nigra* does not reliably undergo sexual regeneration via the germination of seeds.



**Bamboo flowering**

© Toshihiro Yamada, Hiroshima University

"The bamboo did not produce any viable seeds that can germinate. Bamboo shoot production was stopped after flowering. There was no sign of regeneration of this bamboo after flowering for the initial three years" said Toshihiro Yamada, professor at Hiroshima University's Graduate School of Integrated Sciences for Life.

Around 0.17 million hectares of Japan are occupied by three species of bamboo, one of them being *P. nigra* var. *henonis*. Given that this variety of bamboo isn't producing viable seeds, it's likely once this flowering event occurs, there will be wide open areas of grasslands, changing the ecology of the area in addition to reducing the availability of bamboo as a resource.

The environmental impacts of a rapidly shifting ecological area extend past the insects and animals that rely on the food or shelter of the bamboo stand but also can impact the area for years to come considering the potential for soil erosion. Bamboo can help keep soil in place thanks to its strong and widespread rhizomes, so a sudden loss of a large area of this plant can lead to changing topography of the area.

There are measures that can be taken to protect the ecological habitat during the time it takes for the bamboo stands to regenerate, such as fertilizer applications or replanting the same bamboo species from non-flowering stands. However, management of the rapidly spreading rhizomatous bamboo can become an issue that would then need to be addressed regularly and somewhat aggressively.

More information to be gained includes addressing why this variety of bamboo doesn't produce many viable seeds, and from there, considerations made on the longevity of this species as a whole have to be made, too. Furthermore, due to its aggressive spread and intense management required to keep it from overtaking forests and other agricultural areas, the best time to make widespread changes might be after the flowering event when the bamboo is at its weakest.

### TOSHIHIRO YAMADA

Professor  
Graduate School of  
Integrated Sciences for Life



### About the study

Yamada, T. et al. (2023). Does monocarpic *Phyllostachys nigra* var. *henonis* regenerate after flowering in Japan? Insights from 3 years of observation after flowering. PLOS ONE (Vol. 18, Issue 6, p. e0287114). Public Library of Science (PLOS). <https://doi.org/10.1371/journal.pone.0287114>



## New parent? Night shift? New analysis suggests ideal nap strategy to survive all-nighters



New analysis of pilot studies on night shift naps conducted from 2012 to 2018 revealed the ideal snoozing strategy that might help counteract drowsiness and fatigue during a 16-hour overnight duty. The findings can also benefit new parents.

Reanalysis of data showed that when staying up all night, scheduling two nap sessions — a 90-minute one followed by a quick 30-minute shut-eye later — is the optimal choice over a single 120-minute snooze in putting off drowsiness and fatigue. The study was published in *Scientific Reports*.

Shift work is a norm in emergency sectors such as healthcare where round-the-clock access to services can be life-saving. And working double shifts on non-traditional hours isn't unheard of among medical professionals. However, night shift work is also known to increase the risk for sleep-related physical and mental health disorders and impair job performance.

Study author Sanae Oriyama, a nursing science professor at Hiroshima University's Graduate School of Biomedical and Health Sciences, reexamined past

pilot studies she co-authored to compare alertness and cognitive performance after taking a nap and throughout a simulated 4 p.m. to 9 a.m. shift.

She found that those who took a single 120-minute nap ending at midnight experienced worse drowsiness as soon as 4 a.m. and lasted until the end of the shift. However, participants who scheduled two naps — the 90-minute one lasting until midnight and the 30-minute one ending at 3 a.m. — staved off drowsiness until 6 a.m. Oriyama suggested adding an extra 30 minutes of shut-eye between 5-6 a.m. given that drowsiness might shoot up from 7-8 a.m.

### SANAE ORIYAMA

Professor  
Graduate School of  
Biomedical and Health Sciences



#### About the study

Oriyama, S. (2023). Effects of 90- and 30-min naps or a 120-min nap on alertness and performance: reanalysis of an existing pilot study. In *Scientific Reports* (Vol. 13, Issue 1). Springer Science and Business Media LLC. <https://doi.org/10.1038/s41598-023-37061-9>

## These metals forming modern economy's backbone have brittle joints. A 3D printing method has a fix

A new 3D printing method shrunk brittle zones plaguing steel and aluminum's juncture to a size of less than two microns, overcoming a fundamental barrier to fusions of these titans of the automotive, aerospace, and critical infrastructure sectors.

These two metals have been rivals for market share, especially in the auto industry. Combining them can deliver weight savings without sacrificing structural integrity — valued by automakers as it is a step toward slashing carbon emissions. Yet fusions of steel and aluminum remain unexplored due to the brittle inter-metallic compound (IMC) formed where their contrasting metallurgical properties meet.

"The challenge in combining aluminum alloys with ferrous materials, like the stainless steel used in our study, is the formation of the extremely brittle inter-metallic compound. To improve joint strength, a joining method must suppress IMC formation to an ultra-thin layer," said research co-lead Motomichi Yamamoto, professor at Hiroshima University's Graduate School of Advanced Science and Engineering.

Their 3D printing method combined the hot wire technique, diode laser, and fluxes to control IMC thickness in the joint zones of stainless steel and aluminum (aluminum-magnesium) alloy.

Via the hot wire method, the researchers heated the aluminum alloy close to its melting point before depositing it into the molten pool.

They presented their findings at the 76th Annual Assembly of the International Institute of Welding and the International Conference on Welding and Joining.

#### Testing the optimized calibrations

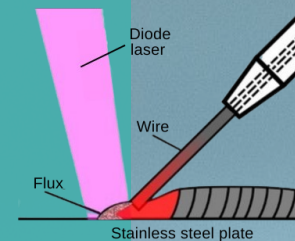
Based on their findings, the team applied the optimal combinations and fabricated specimens to test for tensile strength. The optimized calibrations achieved stainless steel and aluminum bonds that withstood separation stress of up to 17404.5 pounds per square inch on average.

"We hope that this new process will help to create innovative product designs and revolutionary improvements in product performance by enabling high-strength direct joining of stainless steels and aluminum alloys," Yamamoto said.

HU engineers collaborated with Mitsubishi Electric Corporation for this research.

### MOTOMICHI YAMAMOTO

Professor  
Graduate School of Advanced  
Science and Engineering







# A breakthrough in slowing cancer tumor growth

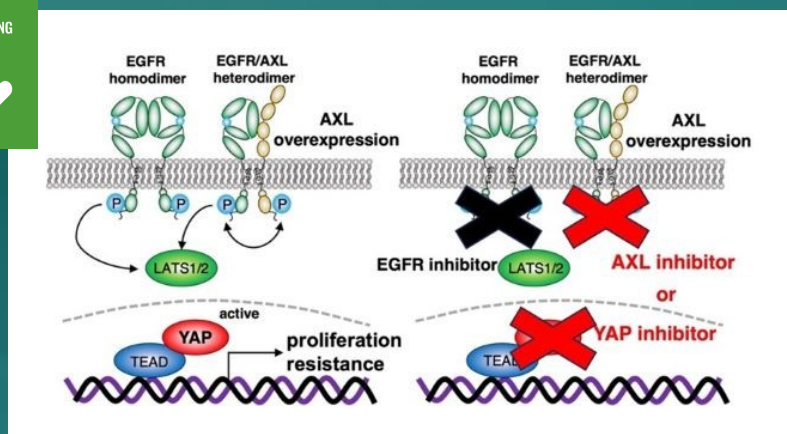
**AXL and EGFR inhibitors combined hold promise in fighting certain head, neck, and lung cancers**

An international team of researchers has demonstrated that a combination of inhibitors may suppress tumor growth and prevent relapse in patients with certain cancers, including head and neck squamous cell carcinoma and lung adenocarcinoma. Their findings, published in *Oncogene*, support the future development of innovative therapeutic approaches targeting these cancers.

Scientists know that in humans and other mammals, the Hippo signaling pathway plays a key role in the rapid increase of cells that occurs with cancers in the body. Yes-associated protein 1, or YAP, is a protein that is critical in regulating the progression of tumor growth, and it plays an important role in the beginning and spread of a variety of cancers. Dysregulation of the Hippo pathway activates YAP, contributing to head and neck squamous cell carcinoma. Both have attracted attention as signaling pathways that regulate cancer cell traits.

Epidermal growth factor receptor, or EGFR, is a protein on cells that contributes to their growth. When a mutation occurs in the gene for EGFR, it can grow too much, leading to cancer. EGFR is frequently amplified and highly overexpressed in head and neck squamous cell carcinoma, and mutated and activated in lung adenocarcinoma. So the EGFR inhibitor, a drug that blocks the cancer's growth, is used as a targeted therapy in fighting these cancers.

In earlier work, the research team clarified the mechanism by which EGFR activates YAP through the Hippo pathway. However, EGFR-targeted monotherapy has shown a low response rate. Based on this evidence, researchers believe that EGFR inhibitors may temporarily inactivate YAP, but when YAP is re-activated, it increases resistance to the EGFR inhibitors used to fight the cancer. Scientists do not yet fully understand how the YAP is re-activated.



**Schematic of mechanistic mechanism by which AXL activates YAP**  
© Toshinori Ando, Hiroshima University Hospital

The team focused their current study on AXL, a receptor-type tyrosine kinase. They set out to clarify the mechanism that causes the cancer cells' resistance to EGFR inhibitors, specifically focusing on the novel regulatory mechanism of YAP by AXL. Receptor-type tyrosine kinases like AXL play an important role in cell processes. When it is working properly, AXL is mainly expressed in immune cells, and does the work of removing dead cells and controlling the duration of immune responses. But when AXL becomes dysregulated, they can contribute to cancers, including lung adenocarcinoma, acute leukemia, and head and neck squamous cell carcinoma.

The team used comprehensive transcriptional analysis and in vitro experiments in their study. With this research, the team clarified that AXL stimulates YAP through a novel mechanism when AXL combines with EGFR. This combination activates YAP via the EGFR-LATS1/2 axis. LATS1/2, or large tumor suppressor kinases, are important members of the Hippo pathway. The team determined that the combination of AXL and EGFR inhibitors working together inactivates YAP and suppresses the viability of head and neck squamous cell carcinoma and lung adenocarcinoma cells.

"The combination therapy targeting both EGFR and AXL or YAP simultaneously may effectively suppress tumor growth and prevent resistance and relapse in patients with EGFR-altered cancers, including head and neck squamous cell carcinoma and lung adenocarcinoma," said Toshinori Ando, assistant professor at the Center of Clinical Oral Examination, Hiroshima University Hospital.

Looking ahead, the team plans to try to generate effective drugs that can target EGFR, AXL, and YAP.



**TOSHINORI ANDO**

Assistant Professor  
Hiroshima University Hospital

## About the study

Okamoto, K., et al. (2023). AXL activates YAP through the EGFR-LATS1/2 axis and confers resistance to EGFR-targeted drugs in head and neck squamous cell carcinoma. In *Oncogene* (Vol. 42, Issue 39, pp. 2869-2877). Springer Science and Business Media LLC. <https://doi.org/10.1038/s41388-023-02810-7>



# Climate action plans mobilize limited urban change, researchers report

Adaption and mitigation efforts might be improved with inclusivity and transparency



The Intergovernmental Panel on Climate Change Fifth Assessment Report (AR5), highlighted record-high human-caused greenhouse gas emissions and its impact on the climate system. Since then, hundreds of cities across the world have published climate action plans (CAPs) detailing their strategies for addressing climate change.

To better understand the content and structure of these CAPs — and what lessons may be learned from them — researchers from Hiroshima University analyzed 278 urban CAPs published between 2015 and 2022. They published their findings in *Urban Climate*.

The team applied a qualitative analysis to identify key climate action planning elements, such as the co-benefits, synergies, trade-offs and conflicts in the reports. They also identified trends in urban CAP adoption, areas of focus, pledges to reduce greenhouse gas emissions and to achieve zero carbon, as well as how baseline greenhouse gas emission inventory is reported.

The researchers found that CAPs were increasingly adopted and published from 20 in 2015 to 56 in 2020, with cities leveraging social media and teleconferencing platforms to adopt or publish their plans. Most of the 278 plans included both mitigation and adaption plans, but 3% focused solely on adaption and 16% on mitigation. Some 268 CAPs focused most on transportation, followed closely by the energy, buildings and waste sectors. The researchers also analyzed connections between the sectors and how cities considered potential co-benefits in their planning, finding that cities are more likely to focus on these linked sectors over others: transport and energy; transport and waste; energy and waste; transport and urban governance/policy/planning; and energy and urban governance/policy/planning.

The researchers plan to use their findings to develop an integrated and comprehensive urban climate planning framework to serve as a guiding tool for developing robust climate action plans with globally accepted benchmarks, criteria and standards.



**AYYOOB SHARIFI**  
Professor  
The IDEC Institute



**PRINCE ABOAGYE**  
Doctoral student  
Graduate School of Humanities  
and Social Sciences

## About the study

Aboagye, P. D., & Sharifi, A. (2023). Post-fifth assessment report urban climate planning: Lessons from 278 urban climate action plans released from 2015 to 2022. In *Urban Climate* (Vol. 49, p. 101550). Elsevier BV. <https://doi.org/10.1016/j.uclim.2023.101550>

# Do measurements produce the reality they show us?



Quantum physicists have found that the outcomes of measurements are shaped by the complex dynamics of measurement interactions, questioning our usual understanding of observable reality.

Researchers recently analyzed the dynamics of a measurement interaction, where the value of a physical property is identified with a quantitative change in the meter state. This is a difficult problem, because quantum theory does not identify the value of a physical property unless the system is in a so-called “eigenstate,” a very small set of special quantum states for which the physical property has a fixed value. They solved this problem by combining past and future information into a description of the dynamics of the system during the measurement interaction, demonstrating that the observable values of a physical system depend on the dynamics of the measurement interaction by which they are observed. Their findings were published in *Physical Review Research*.

“In this paper, we investigate how quantum superpositions in the dynamics of the measurement interaction shape the observable

reality of a system seen in the response of a meter. This is a major step towards explaining the meaning of ‘superposition’ in quantum mechanics,” said Holger Hofmann, professor in the Graduate School of Advanced Science and Engineering.

The analysis of the team’s study suggests that superpositions describe different kinds of reality when different measurements are performed. The reality of an object depends on the object’s interactions with its surroundings.

“Our results show that the physical reality of an object cannot be separated from the context of all its interactions with the environment, past, present and future, providing strong evidence against the widespread belief that our world can be reduced to a mere configuration of material building blocks,” said Hofmann.



**HOLGER F. HOFMANN**  
Professor  
Graduate School of Advanced  
Science and Engineering

## About the study

Matsushita, T., & Hofmann, H. F. (2023). Dependence of measurement outcomes on the dynamics of quantum coherent interactions between the system and the meter. In *Physical Review Research* (Vol. 5, Issue 3). American Physical Society (APS). <https://doi.org/10.1103/physrevresearch.5.033064>



Issue 2 | Since 2023

## Feature GET TO KNOW OUR RESEARCHERS

**Meet some of our researchers  
working on cutting-edge  
science in their fields.**

*\*Answers in the questions were edited for  
clarity and brevity.*

We asked two scientists, recognized as among the best in Japan by Research.com, questions about their fields and exciting developments in their work.

These researchers are some of the leading scholars in their disciplines, demonstrated by their impressive rankings on Research.com's best scientists list. The rankings are based on the Discipline H-index (D-index), calculated by considering only the publications and citation values belonging to a given field. Top researchers from over 3000 universities and research institutes are featured on the list.

### **About Research.com**

Research.com is a research portal dedicated to promoting high-quality research and inspiring young scholars to contribute to the advancement of science.

Check out the  
rankings [here](#).



## Katsuya Inoue

Professor

*Graduate School of Advanced  
Science and Engineering*

As a chemist, Katsuya Inoue's work blends chemistry and physics to investigate the properties of unique molecules down to the level of individual electrons.

The major research themes of Inoue's work include magnetism and chirality. His work blends chemistry and physics to investigate the properties of unique molecules down to the level of individual electrons.

While a graduate student, MS and Ph.D., at the University of Tokyo, he studied molecular magnets, which are usually made using organic, or non-metal, materials. Certain organic materials can also have the special property of being chiral, meaning the molecule can come in mirror-image versions, like human hands: identical, but non-superimposable. In the late 1980s, no researchers had combined the fields of spin systems with chirality.

"At that time, magnetism and chirality were totally different areas in science. However, I felt that spin-chirality systems, which include both spin described by quantum mechanics and crystals described by classical mechanics, have the potential to open up a totally new field."

Inoue completed his Ph.D. research in 1993 on magnetism in organic molecules.

"The ideas almost disappeared. But, very deep inside, I kept my interests about chirality."

After earning his Ph.D. in 1993, Inoue accepted a position as a lecturer at Kitasato University, and in 1996, he moved to associate professor at the Okazaki National Institutes, located near Nagoya. (This Institute became part of the National Institute of Natural Sciences in 2004.) While there, he expanded his research to include chiral magnets, the study of materials that are magnetic and possess an electric field inside the ma-





Prof. Katsuya Inoue

## Best Scientists - Chemistry & Material Sciences

To learn more about Professor Inoue's research, visit his profile [here](#).



terial simultaneously. Inoue's work also expanded due to a fateful conversation with another professor at the Institute.

"We knew each other quite well, but we were only after-work-drinking friends, not professional co-workers. But, he was leaving... He moved to Kyushu Institute of Technology and only then did we start our professional collaborations."

Eventually, Inoue also transferred to a new position, becoming a Professor at Hiroshima University at the end of 2004.

In 2005, the collaborations with his theoretical physicist friend led to the co-authorship of a research paper that they published in the journal "Progress of Theoretical Physics Supplement," which Inoue credits with stimulating the start of the field of chiral magnetism. Finally, he combined his dual interests in spin and crystal chirality.

"When we published in 2005, chiral magnets were brand new. Now, around the world there are about 50 different research groups who study these topics full-time," says Inoue.

Inoue predicts that the recent advances in understanding chiral science will lead to applications including IT devices within computer processors. Rather than electrical signals, future computers could send magnetic signals based on the "left or right hand" versions of magnetic chirality.

\* The full version of this article was first published on the HU website in 2016

## Hiroyuki Kamiya

Professor

Graduate School of Biomedical and Health Sciences

Biochemist Hiroyuki Kamiya's research on DNA combines the fields of molecular biology, biochemistry, biotechnology, and pharmaceutical sciences. In particular, his research explores two topics. First, he examines the molecular mechanisms that drive mutation and cancer formation by DNA damage. And second, he studies the design of DNAs for genome editing.

**Q: What scientific problem are you trying to answer?**

**A:** Oncogene activation and tumor suppressor gene inactivation occur by mutations. I want to reveal the mechanisms of mutations. (B) Genome editing possibly contributes to the therapy of genetic diseases. I want to establish safe genome editing without artificial nucleases such as CRISPR-Cas9.

**Q: What do you find most exciting in your field of research?**

**A:** DNA forms the double helix, and the genetic information is transmitted to RNA and protein. These are achieved by base pairing. I feel that the geometry of the A:T (adenine:thymine) and G:C (guanine:cytosine) pairs (the Watson-Crick pairs) is elegant and beautiful.

**Q: What got you into this field?**

**A:** I was interested in biology when I was a senior high school student. After I entered a university, my interest focused on cancers and biological evolution, and both are related to DNA.

**Q: What are the discoveries that have led up to your current work?**

**A:** The findings (A) that an oxidized form of guanine induced mutations at sites distant from its position (I named "action-at-a-distance mutations") and (B) that long single-stranded DNAs edit-



Prof. Hiroyuki Kamiya

## Best Scientists - Molecular Biology

To learn more about Professor Kamiya's research, visit his profile [here](#).



ed target genes without artificial nucleases in cells.

**Q: From your perspective, what are your study's economic or social stakes?**

**A:** (A) Understanding how cancers generate and getting tips on how to improve the anticancer drugs' efficacies and (B) establishing a safe genome editing method. Our results would help people's health.

**Q: How important for you is pursuing science that aligns with SDGs?**

**A:** I would be very happy if my research results could help achieve SDG goal number 3. However, the basic science is also very important and scientists have the right that they can do research according to their interests.

**Q: Is there anything exciting coming up in your research that you want to share?**

**A:** The findings (A) that oxidative DNA damage and cytosine deaminase, two important factors that cause mutations in cancerous tissues, are linked and (B) that the designed DNA actually edited a target gene in the genomic DNA in a nuclease-free manner. Except for both projects, we recently succeeded in the detection of a damaged nucleotide (DNA precursor) in living cells.



# WOMEN IN

*Meet our researchers*

# ACADEMIA

Borneo

## A wildlife ecologist explores Borneo's jungle to answer a longstanding ecology question

**Out of this living laboratory emerged unexpected insights on coexistence from an "unusual" source.**

For some scientists, a typical workday means stepping into the laboratory. For wildlife ecologist Miyabi Nakabayashi, it means stepping out. The Bornean jungle is her living laboratory. And in it, workplace hazards can mean encounters with venomous snakes and saltwater crocodiles or bites from bugs and blood-suckers.

Work usually means staying for 22 hours in the jungle, shifting around a weighty antenna to get a signal on the whereabouts of radio-collared wildlife, collecting fecal samples from treetops, or staking out behind thickets. Her many tools include machetes, some of which have grips she fashioned after the katana.

For nearly two decades she has been researching mammalian ecology, specifically their behavior and role in seed dispersal. "I loved animals since I was a child. But maybe the most impactful event was when I was a high school student. I went to Borneo. It was a special event held by a museum in Kyoto Prefecture," she said. There, she saw a civet for the first time.

"It looked like the typical carnivore, but it was eating fruits high up on the tree, maybe about 30 meters from above the ground. I found that strange. I was fascinated by it," she said. "So I got many questions. I learned there are eight civet species on Borneo island. So how do they coexist in the Borneo jungle? I had so many questions."

Since then, she's been studying civets to find an answer to a longstanding ecology question. How do similar species coexist in the same habitat despite having overlapping resource needs?

### A masterclass on coexistence

When two species occupy the same niche, the competitive exclusion principle states that the one with advantageous traits will eventually outcompete and displace the other. But in nature, there are many examples of species coexisting instead of driving competitors towards extinction.



Dr. Miyabi Nakabayashi,  
Hiroshima University

Ecologists have long been interested in uncovering what enables wildlife to thrive together. Its understanding could inform biodiversity management and conservation efforts.

In 2021, Nakabayashi and her co-researchers unveiled findings from over three years of observing Borneo's mammalian carnivores such as civets, sun bears, wild cats, and otters. They found that some carnivores strategically avoid each other by adjusting their hunting schedules, helping reduce rivalries over resources within their shared habitat.

A year before, Nakabayashi published results from her eight-year study of four Paradoxurine civet species inhabiting overlapping domains. Usually, immature and unripe fruits are avoided as they are nutrient-poor, difficult to digest, and often laced with toxic or distasteful compounds. However, Nakabayashi found that small-toothed palm civets also feed on immature and unripe fruits despite not having a specialized stomach to digest them. Such slight differences in food choices and behavior help explain how multiple species can live together in the same habitat without excluding each other.

### Agriculturists of the jungle

Nakabayashi also found that civets are master agriculturists. Her study showed that the defecation behavior of binturongs, a large stocky civet, plays a crucial role in the dispersal and establishment of hemi-epiphytic figs, a crucial food source for many creatures in the Bornean jungle. She received the 24th Kira Award for Young Scientist from the Japan Society of Tropical Ecology for this research.

Out of the animals that feed on these figs, she noticed that binturongs deposit their seed-speckled droppings on specific microsites most suitable for these plants to successfully establish themselves.

She also found that binturongs may remember the fruiting period of fig trees they visit. And like farmers planning around harvest, they seem to pattern their movements around figs' fruiting season. Nakabayashi was granted the award for young researchers by the Mammal Society of Japan this year for her series of studies on civets.

Nakabayashi admits more research is needed to answer the coexistence question. There is much to learn about harmonious coexistence from civets and yet we have barely scratched the surface.



# Hiroshima University at a Glance

(as of May 1, 2023)

**12** SCHOOLS  
(UNDEGRADUATE)

- Integrated Arts and Sciences
- Letters
- Education
- Law
- Economics
- Science
- Medicine
- Dentistry
- Pharmaceutical Sciences
- Engineering
- Applied Biological Science
- Informatics and Data Science

**4** GRADUATE  
SCHOOLS

- Integrated Sciences for Life
- Biomedical and Health Sciences
- Humanities and Social Sciences
- Advanced Science and Engineering

**1** RESEARCH  
INSTITUTE

- Graduate School of Innovation and Practice for Smart Society

STUDENTS

**15,000+**

UNDERGRADUATE AND GRADUATE



INTERNATIONAL STUDENTS



**1,800+**

FROM 80+ COUNTRIES & REGIONS

Hiroshima University hosts students worldwide, with the highest number coming from CHINA, INDONESIA and VIETNAM.



INTERNATIONAL  
EXCHANGE AGREEMENTS



400 AGREEMENTS WITH  
354 INSTITUTIONS IN

**56** COUNTRIES  
& REGIONS

OVERSEAS BASES



**23**

IN 15 COUNTRIES & REGIONS



THE UNIVERSITY IMPACT  
RANKINGS 2023

**3rd** FOR THE  
OVERALL  
SCORE  
IN JAPAN



TOP  
**100**  
IN THE WORLD  
FOR 6 SDG  
CATEGORIES

ADMISSIONS

For admissions inquiries or to learn more about the graduate degrees offered at HU, please click or scan the QR codes below.

Admissions



Graduate  
Degrees at HU





## CAMPUS LOCATION & ACCESS



- ① 〈Hiroshima City (Midori District)〉  
Elementary School  
Junior High School  
Senior High School
- ② 〈Higashi Hiroshima City〉  
Kindergarten
- ③ 〈Hiroshima City (Shinonome District)〉  
Elementary School  
Junior High School
- ④ 〈Mihara City〉  
Kindergarten  
Elementary School  
Junior High School
- ⑤ 〈Fukuyama City〉  
Junior High School  
Senior High School



## WHAT'S NEW ON CAMPUS



**20**  
**SEP**  
2023

### Autumn Term Commencement Ceremony

The ceremony marked the graduation of 318 students, including 34 undergraduates and 284 graduate students, with 206 being international students.



**1**  
**OCT**  
2023

### Autumn Term Entrance Ceremony

Hiroshima University welcomed 329 new students — of which 298 are international students — at its 2023 Autumn Term Entrance Ceremony.



### HU Original Goods

HU has launched a new line of original merchandise, including a green hoodie and dry t-shirt. Both items incorporate the university's emblem and its signature green color, blending tradition with a timeless design aesthetic.

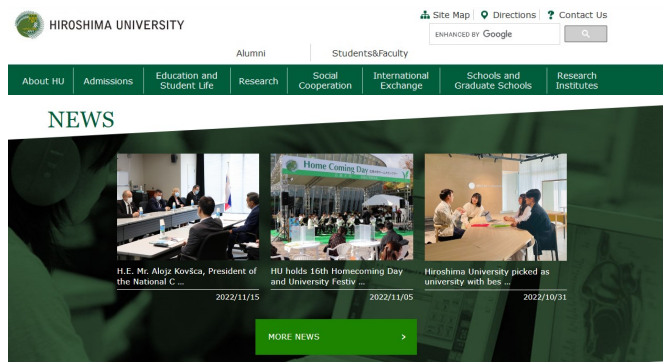


# FIND MORE ABOUT HU

## HU OFFICIAL WEBSITE – ENG

Latest News, Events and Research, as well as links to each university section are available from this webpage.

<https://www.hiroshima-u.ac.jp/en>



## HU STUDENT VLOGS

What is it like being an international student at HU? Our student vlogger takes you through her journey as an international student at HU as she shares the charms of the university and its surroundings.



 <https://youtu.be/TRxoBTcmTWo>

## UPDATES FROM OUR LABORATORY

This webpage is the source for visitors worldwide to stay updated about what happens in the lab at HU.

<https://www.hiroshima-u.ac.jp/en/laboratory-updates>



### Finding researchers at HU is now easier than ever!

Introducing the Researcher Directory — HU's researcher search system. Users may now search the research fields and achievements of approximately 1,900 researchers affiliated with HU by topic, Sustainable Development Goals (SDGs), discipline, alphabetical order, or simply entering a keyword in the built-in search box.

Check out the site here ↓

<https://www.guidebook.hiroshima-u.ac.jp/en>



Topic

SDGs

Discipline

Alphabetical order

## SOCIAL MEDIA ACCOUNTS



HU Facebook  
[@HiroshimaUniv.en](https://www.facebook.com/HiroshimaUniv.en)

HU Research Facebook  
[@HiroshimaUniversityResearch](https://www.facebook.com/HiroshimaUniversityResearch)



HU X (formerly Twitter)  
[@HiroshimaUnivEn](https://twitter.com/HiroshimaUnivEn)

HU Research Twitter  
[@HiroshimaUniv](https://twitter.com/HiroshimaUniv)



HU YouTube  
[HiroshimaUniv](https://www.youtube.com/HiroshimaUniv)



HU Instagram  
[@hiroshima\\_univ](https://www.instagram.com/hiroshima_univ)



HU LinkedIn  
[HiroshimaUniv.en](https://www.linkedin.com/company/HiroshimaUniv.en)

## 75+75th Anniversary Project Commemorative Goods

Available now are a 315-piece jigsaw puzzle and a scarf, both featuring the most iconic sites of HU. These items, created by Hiroshima-based illustrator Hirofumi Kamigaki, were specially designed to commemorate HU's 75+75th anniversary.

HIROSHIMA UNIVERSITY UPDATE

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# Hiroshima University 75+75th Anniversary Project



Introducing new  
catchphrase and logo

Born under a new system in 1949, Hiroshima University's history dates back to 1874, when the Hakushima School — its oldest predecessor school — was founded. In over 140 years, the university has produced numerous talented individuals.

In this sense, 2024 marks 75 years since the foundation of HU and 150 years since the founding of its oldest predecessor school.

As part of HU's 75+75th anniversary project, the university has created a new catchphrase and logo.

Catchphrase

***Row out into a sea of chaos; go  
beyond the horizon of creativity.***



**HIROSHIMA UNIVERSITY**

*University of World-wide Repute and  
Splendor for Years into the Future*

Hiroshima University  
Public Relations Office  
E-mail: [koho@office.hiroshima-u.ac.jp](mailto:koho@office.hiroshima-u.ac.jp)