

NTU



Law Scholar, Social Activist & A Project of Pride

Exploring the Unknown with *Materials*

Paul A. Bunn Jr. Scientific Award Recipient

Immersive Art on Campus

First NTUer in Professional Baseball



FEATURES



Exploring the Unknown with Materials: Interview with Dr. Li-Chyong Chen

Flower baskets arrayed outside Dr. Li-Chyong Chen's office at the Center for Condensed Matter Sciences (CCMS) express the heartfelt congratulations of many for election as a new Academician. This is her latest milestone of honorable recognition since she won the Academia Sinica Early-Career Investigator Research Achievement Award, and was named a Fellow of the Materials Research Society in the US and the Taiwan ... Outstanding Women in Science Award. This latest milestone offers conclusive proof of the relentless efforts she has made in physics for nearly...



... more

HONOR



Superintendent James Chih-Hsin Yang of NTU Cancer Center Receives 2022 Paul A. Bunn Jr. Scientific Award from IASLC

James Chih-Hsin Yang, Chair Professor of the NTU Graduate Institute ...

... more

GLOBAL OUTLOOK



Meiji U Prof. Ken Suzuki: Law Scholar & Social Activist who Facilitated NTU, Hokkaido U Partnership

Ken Suzuki began his studies at Hokkaido University's Department of Law in 1979. During his time there, he studied abroad at Renmin University, learned Mandarin and conducted research in Chinese Civil Law. In 1991, he started his career as an ...



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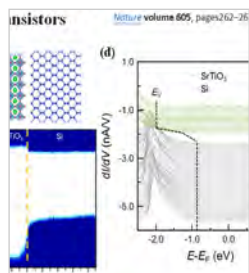


Honoring Bureau Français de Taipei Scholarship Recipients

On September 18, representatives from NTU attended the Réception en l'honneur des boursiers, Promotion 2022 hosted by Bureau Français de Taipei (BFT). The event was held to celebrate the scholarship awardees from Taiwan who are journeying ...

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ACHIEVEMENTS



Published in *Nature*: International Collaboration Based on Cross-Sectional STM

Professor Ya-Ping Chiu (Department of Physics, TSMC-NTU Research Center, Graduate School of Advanced Technology) and her team (graduate ...

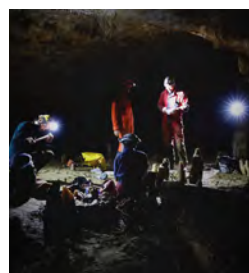
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Evolutionary Generation of Phosphor Materials and Their Progress in Future Applications for Light-Emitting Diodes

In recent years, the technology related to light-emitting diodes (LEDs) has attracted worldwide attention ...

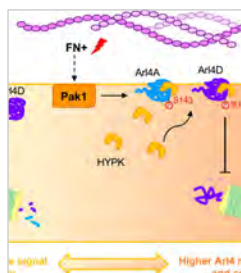
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Split Westerly Winds over Europe: Breakthrough by Int'l Geoscientists

Located at the mid-high latitude at 40-70°N, Europe enjoys comfortable, mild autumn and winter pleasant weather is regulated by the warm, humid westerly ...

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Mechanism of Fibronectin- Induced Small GTPase Stability and Promotes Cell Migration

Professor Fang-Jen Lee, Ph.D. student Ming-Chieh Lin, and the research team from the NTU Institute of Molecular Medicine recently published a paper that ...

[... more](#)

TEACHING & LEARNING



Immersive Art: A New Reality Happening on Campus

An avant-garde immersive experience presented by NTU's College of Electrical Engineering and Computer Science (EECS), College of Bioresources and Agriculture (BICD), and the Department of Drama and Theatre was unveiled at the Future ...

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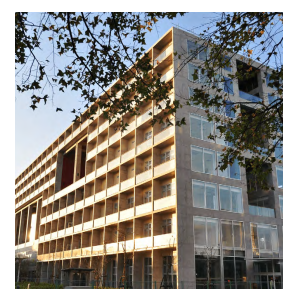


Open Online Course Project for High School Students

The Digital Learning Center (DLC) at NTU has long been committed to promoting the development of digital learning on campus. Since its ...



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Our First English Master Program on East Asian Regional Politics

Located at the junction of Northeast Asia and Southeast Asia, Taiwan has always been an important player in the ongoing geopolitical ...

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PEOPLE



It's Time to Leave Covid-19 Behind and Start a New Life!

"Go NTU!" the joyous sound of the cheerleaders kicked off this year's distinctive convocation. The in-person, onsite event, themed "#NTUNEWLIFE," celebrated the arrival of the incoming freshmen class, inviting students to check in and take pictures. Unlike any such ceremony in the past, this year's program not only included a ...

[... more](#)



The First NTUer in Professional Baseball: Yi-Cheng Lan Realizes His Baseball Dream

Yi-Cheng Lan, who graduated from the Department of Chemistry last year, pitched for the ...



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All It Takes Is All You've Got: Women's Tennis Team

NTU Women's Tennis Team, which includes general student members and professional student-athlete members, has over 34 years ...

[... more](#)



Sugar Production Chimney: A Pillar of Support on Campus

Quietly overshadowing several lecture halls and the Administration Building not far from Roosevelt Road, stands a nearly 20-meter-high chimney covered with verdant vines. This industrial structure, which appears out of place on campus, is the boiler room and chimney of the fermentation lab built in the era of Taihoku Imperial ...

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| FEATURES

Exploring the Unknown with Materials: Interview with Dr. Li-Chyong Chen

Flower baskets arrayed outside Dr. Li-Chyong Chen's office at the Center for Condensed Matter Sciences (CCMS) express the heartfelt congratulations of many for election as a new Academician. This is her latest milestone of honorable recognition since she won the Academia Sinica Early-Career Investigator Research Achievement Award, and was named a Fellow of the Materials Research Society in the US and the Taiwan Outstanding Women in Science Award. This latest milestone offers conclusive proof of the relentless efforts she has made in physics for nearly four decades.

The Beauty of Simplicity and Depth in Physics

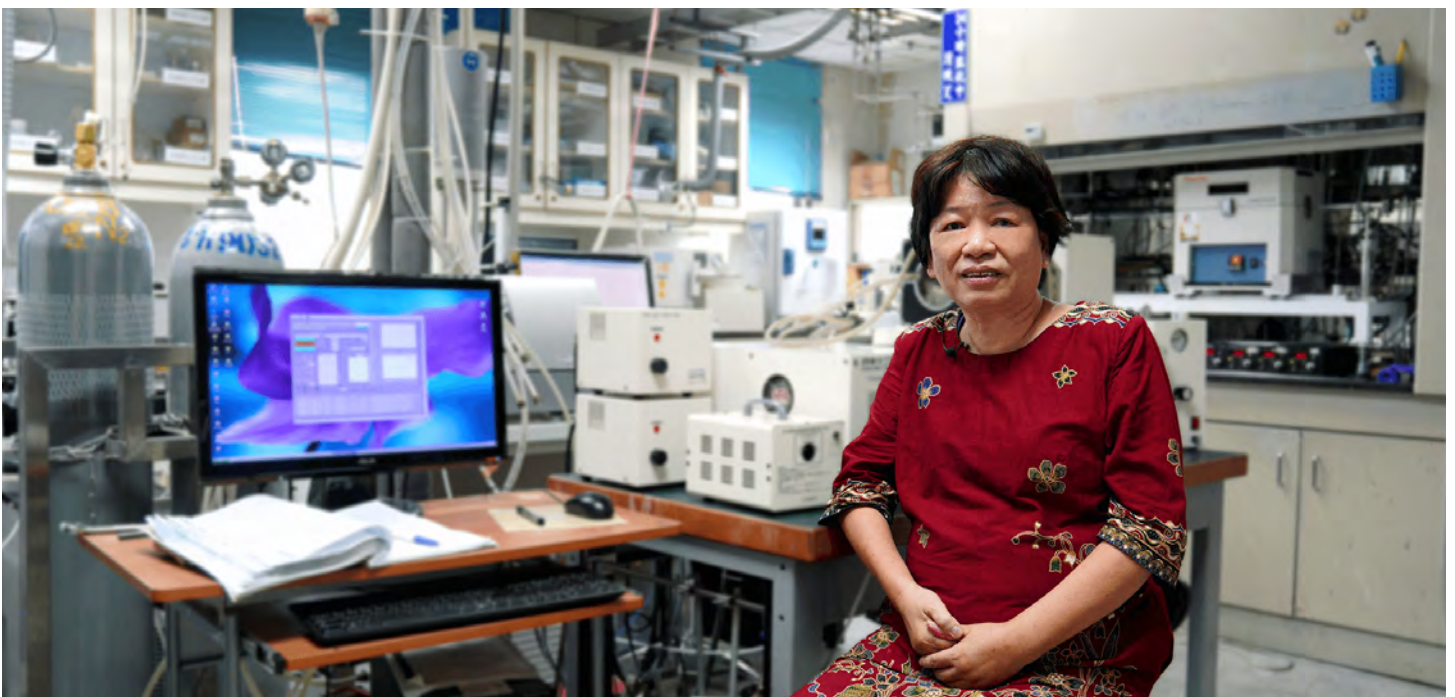
Chen initially followed in her fourth elder sister's footsteps into NTU's Department of Physics after hearing her speech of the "beauty of physics." Thus began her 4-decade sojourn of research in the field. Thinking back on her sister's words, Chen reflected that physics has "the beauty of simplicity" in the sense that Newton's $F=ma$ and Einstein's $E=mc^2$ can decode the mystery of the universe with simple equations." But now, after many years of experience in research, Chen has a deeper understanding. "As beautiful as physics is, it comes with certain challenges." It turns out that behind the beauty of simplicity, nothing is that simple at all. "If you want to go down this road, you have to learn the basics, but that is not simple or beautiful at all!" She chuckled as she spoke, making it clear that she did the

hard work willingly. What fascinates Chen is exactly the process of facing and breaking through the unknowns before creating precise applied science.

Cross-disciplinary Capabilities Initiated by GE and Growth with CCMS

Before Chen started her career at NTU, she worked at the Materials Research Center of General Electric Corporate R&D as the first Asian female scientist. Chen is grateful to GE for giving researchers space for both innovation and application. Besides the applied technologies that are related to the industries in which GE is currently involved, researchers can also decide on concepts and issues that the company could explore and develop in the future. Her main focus at that time was finding new luminescent materials that are energy-saving and environmentally friendly without use of radioactive elements.

Chen pointed out that the biggest difference between teaching and researching at NTU and working for a company is that NTU allows a greater degree of autonomy. She explores different topics out of curiosity before hoping her research could benefit society. She feels a sense of belonging in Taiwan, and the interest in chemistry that she developed during her GE days became part of the foundation of her work at CCMS.



| Dr. Li-Chyong Chen, 33rd Academician of Academia Sinica and Director of the Center of Atomic Initiative for New Materials (AI-Mat).

Firm Steps into Exploration

At present, Chen is devoted to conducting research on “artificial photosynthesis,” which involves complex redox reactions. Chen said that her work at GE made her realize the importance of cross-disciplinary research. With the help of colleagues specializing in chemistry, she relearned chemistry by asking questions and starting with fundamental books, such as *Chemistry of the Elements*. Starting in 1999, she began to conduct extensive research in nanotechnology, as a co-PI with her husband Dr. Kuei-Hsien Chen, under the National Program on Nano Science and Technology, funded by the National Science and Technology Council, which led to her focus on energy research.

Chen made fun of herself for having a “fickle” personality, as she tends to get tired of pursuing the same research topic after a while. Her paper on “photocatalytic reaction” based on carbon dioxide reduction technology which was published in 2013 initiated a new research direction after she had dedicated years to fuel and solar cells. Chen’s previous research became a solid stepping stone during the transition, as the theory for photocatalysis and solar cell’s light absorption in the first half leading to the generation of electron holes is interrelated, and the theory for the redox reaction in the second half is the same one for fuel cells. Although the current energy-conversion efficiency remains low, Chen is ambitiously taking on the technical challenges, confident she will research and develop ways to boost the efficiency and reduce the cost of energy conversion and achieve practical use.

Pioneering Female Scientist

Besides keeping motivated about her research, Chen inspires students to believe in their potential. Her student He-Yun Du had planned to work in industry, but changed her mind after Chen made her realize the joy of academic research. Moreover, Chen has worked as the convenor of the Working Group on Women in Physics (WGWIP) cofounded by Professor Ming-Fong Tai of the Department of Physics, Tsing Hua University, and Jauyn Grace Lin, Chen’s colleague at CCMS, to encourage female students to opt for a career in science.

“I’m like a preacher,” said Chen. One main goal of her teaching is to show women how to take care of themselves, strengthen themselves, and develop independent thinking for choosing their careers. During her speeches and discussions, Chen often encourages female students to take the initiative to fight for their rights, be confident in themselves, and do what they think is worthwhile.

Q&A

Q: Who is the female scientist that you admire the most?

A: Mildred Dresselhaus, she is the idol of many.

Q: What’s your favorite sport?

A: General exercise.

Q: What book has had the biggest influence on you?

A: Irvin Yalom’s (contemporary American psychiatrist) novels.

Q: What’s your favorite movie?

A: *Chance or Coincidence*.

Q: What was the last compliment you gave to a student?

A: I like to give students compliments on their behavior. I said: “I saw that you helped Tracy (another graduate student)!”

Q: What’s your favorite pastime?

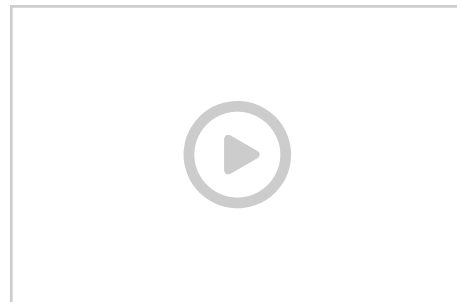
A: Reading Irvin Yalom’s novels.

Q: If you could go back to your university days with a modern gadget, what would you choose?

A: A cellphone because it is the most practical!

Q: Please share your secret of lasting youth.

A: Staying positive!



Introduction video of the 33rd Academician of Academia Sinica Dr. Li-Chyong Chen.



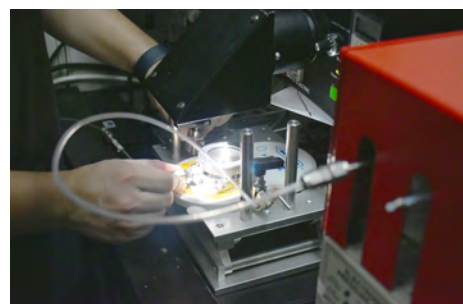
Dr. Chen teaching a foreign research student in the laboratory at CCMS.



Dr. Chen in the laboratory.



Advanced equipment at NTU’s Center for Condensed Matter Sciences (CCMS).



Dr. Chen’s team running an experiment on artificial photosynthesis in a laboratory of the Institute of Atomic and Molecular Sciences, Academia Sinica.



Bio

Li-Chyong Chen

33rd Academician of Academia Sinica

Dr. Li-Chyong Chen received her B.S. in Physics from National Taiwan University (NTU) in 1981, and Ph.D. in Applied Physics from Harvard University (1989). Afterwards, she worked at the Materials Research Center at General Electric Corporate R&D, Schenectady, New York (1989–1994). She was the Director of CCMS (2012–2018) and is currently the Director of the Center of Atomic Initiative for New Materials (AI-Mat) since 2018. Chen is a Fellow of both the Physical Society and the Vacuum Society in Taiwan, as well as the Materials Research Society (MRS) in the US. She has received a number of national and international honors, such as a Laureate of the 22nd Khwarizmi International Award, twice the Outstanding Research Award by the National Science and Technology Council, the Ministry of Education Academic Award, and the Taiwan Outstanding Women in Science. Chen has been named an Academician of the Asia Pacific Academy of Materials and most recently, was elected to be an Academician of Academia Sinica.

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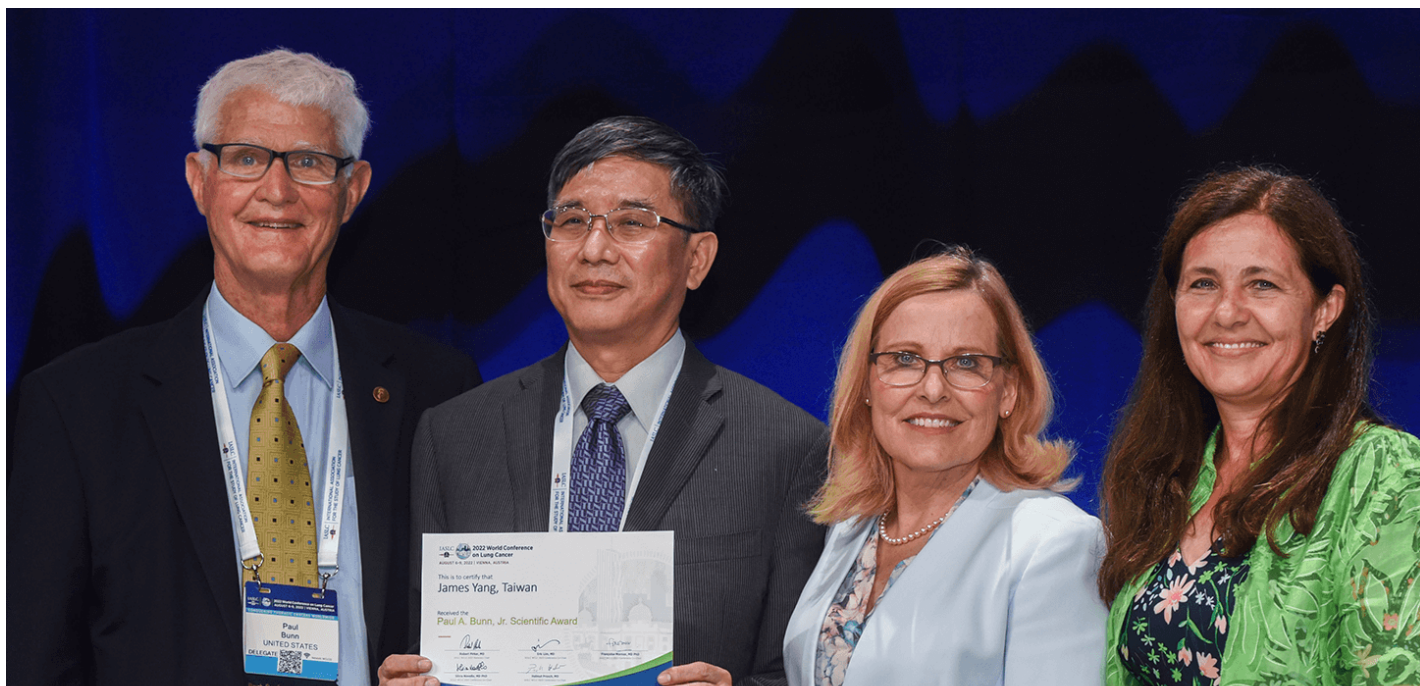
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HONOR

Superintendent James Chih-Hsin Yang of NTU Cancer Center Receives 2022 Paul A. Bunn Jr. Scientific Award from IASLC



From the left, Prof. Paul A. Bunn Jr., University of Colorado; Prof. James Chih-Hsin Yang, NTU; Prof. Karen Kelly, University of California Davis Comprehensive Cancer Center, CEO of IASLC; Prof. Heather Wakelee, Stanford University, current President of IASLC.

James Chih-Hsin Yang, Chair Professor of the NTU Graduate Institute of Oncology and Superintendent at NTU Cancer Center, was bestowed the 2022 Paul A. Bunn Jr. Scientific Award from the International Association for the Study of Lung Cancer (IASLC) for his contributions to the understanding of epidermal growth factor receptor mutated nonsmall cell lung cancer. He received the award in person from IASLC's President, Prof. Heather Wakelee, CEO, Prof. Karen Kelly and Prof. Paul A. Bunn at the opening ceremony of the World Conference of Lung Cancer (WCLC) 2022 in Vienna on August 6.

Yang is recognized for his many contributions to the application of epidermal growth factor receptor tyrosine kinase inhibitors (EGFR TKI) to EGFR mutated lung cancer patients. The large-scale clinical experiment on EGFR TKI that he led together with fellow Asian researchers helped establish EGFR TKI as the front-line treatment for lung cancer patients. Yang also lead trials that helped afatinib, the second-generation EGFR TKI, which later received internationally approved indication for the rare EGFR-mutant lung cancer. He also participated and lead early development of third-generation EGFR TKIs.

Yang is the 18th scientist to receive this prestigious award, and he continues to pioneer lung cancer treatment through investigating new drugs and combination treatments. His works are the foundation of many current lung cancer treatment standards. As he continues to lead multidisciplinary medical and research teams to explore new treatments, he continues to save the lives of many cancer patients.



Banner of Prof. James Yang from Taiwan displayed at the conference along with three other Distinguished Service Awardees.



Click or Scan the QR Code to visit IASLC website and learn more about the Paul A. Bunn Jr. Scientific Award.

GLOBAL OUTLOOK

Meiji University Prof. Ken Suzuki: Law Scholar & Social Activist who Facilitated NTU, Hokkaido University Partnership



After coming to Taiwan, Prof. Suzuki developed a keen interest in Taiwanese Law. He realized it is simultaneously influenced by both the Chinese and Japanese Law systems, both of which he had studied in depth.

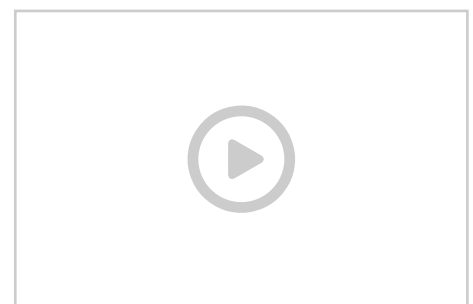
Developing a Lifelong Interest in Taiwan Law

Ken Suzuki began his studies at Hokkaido University's Department of Law in 1979. During his time there, he studied abroad at Renmin University, learned Mandarin, and conducted research in Chinese Civil Law. In 1991, he started his career as an Associate Professor at Hokkaido University. Following the advice of a colleague in the Political Studies Department, he applied for funding from the Japan-Taiwan Exchange Association and came to NTU's Department of Law in 1999 to serve as a visiting professor.

During the exchange, Professor Suzuki developed a keen interest in Taiwan Law and cultivated a partnership between Hokkaido University and NTU. A young student in NTU's Department of Law at the time, Sieh-Chuen Huang became one of the first exchange students at Hokkaido University. Today, nearly 23 years later, she has become a professor and Vice Dean of the NTU College of Law. Her relationship with Professor Suzuki has transformed from that of student and teacher to one of close colleagues, as she represented NTU in inviting him to a visiting professor again this year.

A 23-Year Promise: Translating the History of Taiwan Law

This is the third time that Professor Suzuki has served as a visiting professor at NTU. Not only is he comparing the law systems of China and Taiwan under martial law, but he is also fulfilling a promise he made 23 years ago. During his first visit, he met the pioneer in the field



Meiji University Professor Ken Suzuki: The Law Scholar and Social Activist who Facilitated the Partnership between NTU and Hokkaido University.

of Taiwan legal history, NTU Professor Tay-Sheng Wang, and promised to translate his book, *Introduction to Taiwan Legal History*, into Japanese.

Utilizing his final time as a visiting professor at NTU, Professor Suzuki is completing this translation and plans to publish the Japanese version when he returns to Japan. He describes this project as more significant than his own thesis, as it will surely encourage more Japanese scholars to study Taiwan Law and facilitate academic exchanges in the field of Law between these countries.

A Project of Pride: Publishing *The Birth of Taiwan's Same-Sex Marriage Law*

As an openly-gay scholar of Civil Law, Professor Suzuki has always been passionate about marriage equality. He personally participated in the progression of the LGBTQ+ Rights Movement in East-Asia, marched in the first Tokyo Pride Parade in 1994, and organized the first Sapporo Pride Parade in 1996. He sees Hokkaido as a comparatively open-minded place in Japan, given its relatively diverse history of family cultures.

Professor Suzuki has closely followed the LGBTQ+ Rights Movement in Taiwan, participating in nearly every Taiwan Pride since 2005. When Taiwan legalized marriage equality on May 24, 2019, he personally went to Taipei's Household Registration Office to witness the marriage of his friends and leading advocates for marriage equality, Chih-Chieh Jian and Victoria Hsu, the respective Secretary General and Lawyer of the Taiwan Alliance to Promote Civil Partnership Rights (TAPCPR).

In March of 2022, with the remarkable support of Executive Yuan Minister Audrey Tang, Professor Suzuki published his book *The Birth of Taiwan's Same-Sex Marriage Law* in Japanese, introducing the social movements and political processes that brought about marriage equality in Taiwan. This monumental book has already sparked much discussion about marriage equality in Japan.

Enjoying Life as a Visiting Professor at NTU

When Ken Suzuki first came to NTU, the Department of Law was still located on the Xuzhou Road campus. When he came to NTU the second time in 2010, the College of Law had recently moved to the grand Wan-Tsai Building on NTU's main campus. This third visit marks the last time Professor Suzuki plans to do research abroad. While he notes that NTU has become more internationalized during the last two decades, he has not noticed any other big changes. "Maybe this is because I came to Taiwan almost ten times each year before the pandemic, and I witnessed the process of change over time," he said.

Ken Suzuki has enjoyed his time as a visiting professor at NTU, appreciating its open-minded environment, conducive to free thinking. Walking on the NTU campus is reminiscent of walking through his alma mater, Hokkaido University, as both universities were originally imperial colleges of Japan. Not only do the two universities share similarities in campus architecture, but through his efforts they have established a partnership that continues to grow and flourish today.



Prof. Suzuki: Professor, School of Law, Meiji University, Visiting Professor, College of Law, National Taiwan University.



The relationship between Prof. Sieh-Chuen Huang, Vice Dean of the College of Law, and Prof. Suzuki has transformed from that of student and teacher to one of close colleagues. Representing NTU, she invites him to serve as a visiting professor this year.



Suzuki Ken has enjoyed his time as a visiting professor at NTU, finding it to be a free-thinking and open-minded environment without limitations.

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| GLOBAL OUTLOOK

Honoring Bureau Français de Taipei Scholarship Recipients



| Director of French Office in Taipei Jean-François Casabonne-Masonnave with all the awardees.

On September 18, representatives from NTU attended the Réception en l'honneur des boursiers, Promotion 2022 hosted by Bureau Français de Taipei (BFT). The event was held to celebrate the scholarship awardees from Taiwan who are journeying to France for study and research in the coming semester. In his opening remarks, BFT Director Jean-François Casabonne-Masonnave encouraged the awardees to be open-minded and flexible during their sojourns in France. Representing NTU, Johnny Wu, Head of Global Relations, NTU Office of International Affairs, took the stage to thank BFT for their efforts in creating such prestigious opportunities for international academic exchanges and congratulate the awardees.

The NTU-BFT Scholarship Mobility Grant

This year's event had special significance for NTU, as it also marked the beginning of a new initiative between NTU and BFT: the NTU-BFT Scholarship Mobility Grant. The new grant is aimed to further internationalization by sending NTU scholars to France on short-term research exchanges. Following their nomination by the NTU Office of International Affairs and approval by BFT, five scholars were awarded the grant this year.

The Mobility Grant Recipients

Three of the awardees attended the ceremony on September 18, including Associate Professor Vita Pi-Ho Hu of the College of Electrical Engineering and Computer Science and two doctoral candidates of the Department of Civil Engineering, Ching-Chung Chou and Aritra Pal. Professor Hu will be conducting research at the Laboratoire des Technologies de la Microelectronique, a joint research unit between the French National Centre for Scientific Research (CNRS) and the



| NTU BFT Scholar Mobility Grant Awardees with Attachée of French Office in Taipei Sasha Ting (Third from the right) and Johnny Wu (First from the right), Head of Global Relations, NTU Office of International Affairs.

Université Grenoble Alpes (UGA). Ching-Chung Chou will be a visiting scholar at the École des Ponts ParisTech (ENPC), and Aritra Pal will be conducting research at the National Institute of Applied Sciences (INSA) in Strasbourg.

NTU's Partnership with France

France is a key international partner for NTU with official exchange programs with 45 French universities, and NTU students have showed a great interest in France's academic strength. The BFT collaboration allows more students and scholars to study and conduct research in France, further strengthening our international academic ties. NTU is grateful to BFT for the invaluable support it provides for international academic collaboration, and we wish all the scholarship and grant recipients the best of luck on their adventures studying abroad this semester!

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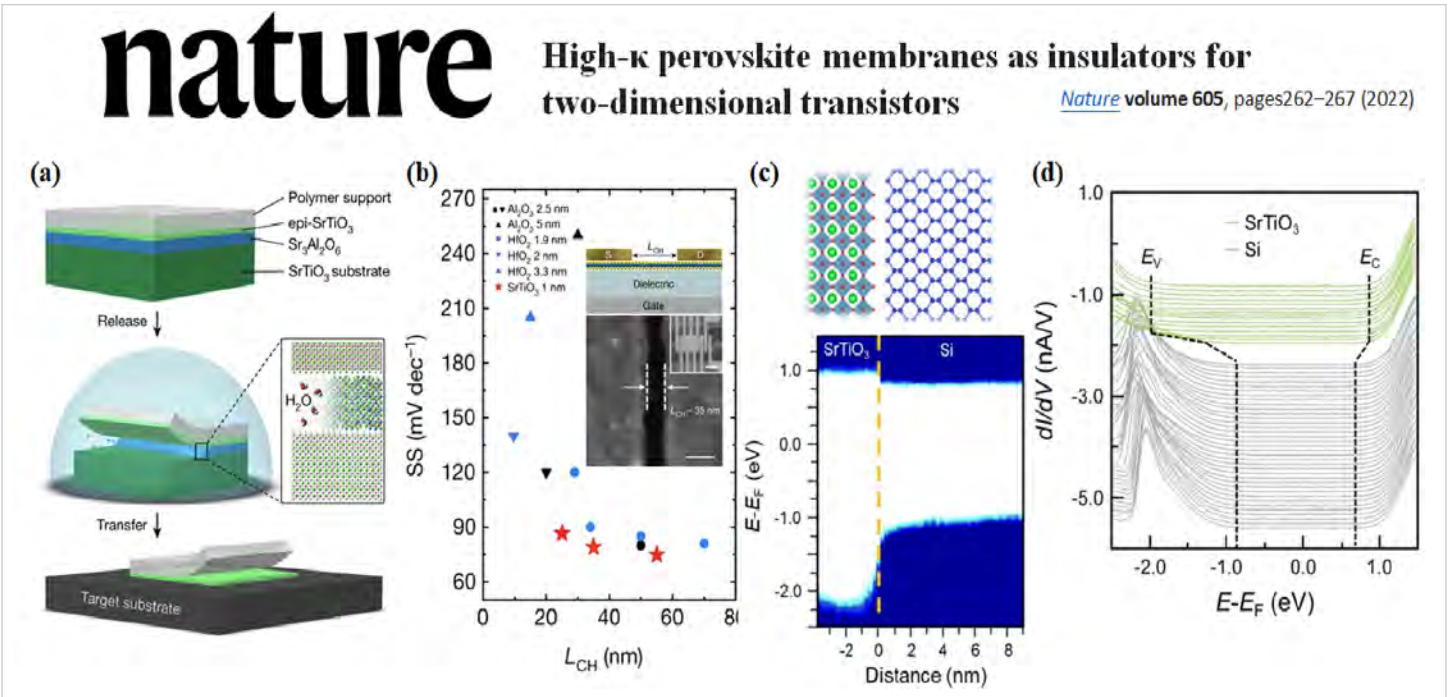
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ACHIEVEMENTS

Published in *Nature*: International Collaboration Based on Cross-Sectional STM



The transferable high-dielectric perovskite strontium titanate thin film (SrTiO₃, $\kappa \sim 270$) successfully achieved the capacitance equivalent thickness of molybdenum disulfide (MoS₂) two-dimensional material transistors to the sub-nanometer (sub-1nm) scale. Through the Van der Waals gap between the device interfaces, the subthreshold-swing (SS) of the short-channel molybdenum disulfide two-dimensional material transistor reached the lowest recorded value (74.7mV/dec).

Professor Ya-Ping Chiu (Department of Physics, TSMC-NTU Research Center, Graduate School of Advanced Technology) and her team (graduate student Zi-Liang Yang and Dr. Bo-Chao Huang) took part as co-authors in the research of 2D layered semiconductors with cross-sectional STM conducted by Prof. Lain-Jong Li, Chair of the University of Hong Kong and Prof. Sean Li of the University of New South Wales. Their research results were published in the prestigious international journal *Nature* in March 2022.

As Moore's Law continues to advance, Short-channel Effects (SCE) have become an inevitable problem in the process of continuous scaling down of transistor devices. The general method to avoid SCE is to reduce the Drain Induced Barrier Lowering (DIBL) caused by the drain, a gate oxide layer with a high dielectric constant can be adopted to increase the controllability. However, if the dielectric constant of the oxide layer is too high, it is easy for the electric field to pass through the oxide layer from the drain, resulting in the phenomenon of fringing induced barrier lowering (FIBL) caused by the marginal electric field, which weakens the performance of the device. Therefore, the current mainstream transistor gate oxide layers take advantage of hafnium dioxide (HfO₂) and zirconium dioxide (ZrO₂) as high dielectric constant materials (with the coefficient of $\kappa \sim 20-30$).

The research uses transferable high dielectric perovskite strontium titanate thin film (SrTiO₃, $\kappa \sim 270$) to achieve sub-nanometer

(sub-1nm) capacitance equivalent thickness (CET) of molybdenum disulfide (MoS₂), as well as taking advantage of the Van der Waals gap between the molybdenum disulfide and strontium titanate thin films to change the distribution of the electric field around the drain electrode, and the influence of the energy barrier reduction effect caused by the marginal electric field is greatly reduced.

Professor Ya-Ping Chiu's research team used cross-sectional STM to detect the high-resolution (0.2nm) electronic energy band structure at the interface of the device. By analyzing perovskite thin films (SrTiO₃) and two-dimensional materials (MoS₂) and the density of states between them and electrodes, they demonstrated the two-dimensional nature of the interface's electrical properties.

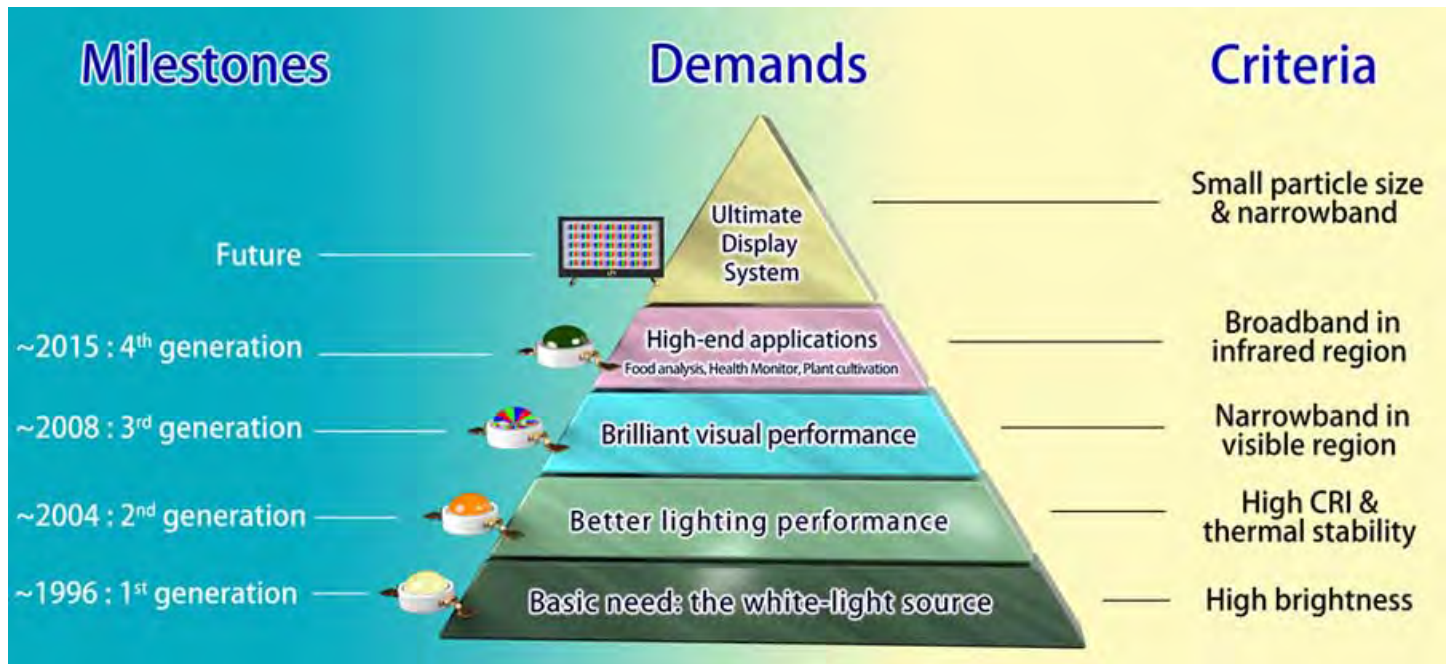
This was the first time that cross-sectional STM was used to characterize two-dimensional material transistors, providing direct evidence of the electronic structure at the fundamental atomic-level interface. In the future, this key characterization technology will continue to be adopted to deal with issues related to the key interface science of low-dimensional semiconductor transistors.



Click or Scan the QR Code to read the journal article in *Nature*.

ACHIEVEMENTS

Evolutionary Generation of Phosphor Materials and Their Progress in Future Applications for Light-Emitting Diodes



A schematic diagram of milestones in the development of phosphor materials. The demand for LED devices starts from basic white light lighting systems and high color rendering lighting systems, eventually moving towards high-quality backlight systems and high-end applications.

In recent years, the technology related to light-emitting diodes (LEDs) has attracted worldwide attention. As a key light conversion material in LED devices, phosphor materials play a vital role in the development of LED components. During the last several decades, the requirements for phosphor materials have become ever more stringent, from the initial pursuit of high brightness to narrow-band emission and eventually spectral regulation engineering that contributes to different functions. Although substantial progress has been made in the development of phosphor materials, the need to meet all the requirements of high-end applications remains highly challenging. Therefore, understanding the principles of past phosphor design is an important cornerstone for the continuing development of novel phosphor materials.

Recently, the team of Distinguished Professor Ru-Shi Liu of NTU's Department of Chemistry published a review on the evolution of phosphor materials and their applications in light-emitting diodes in order to clarify the history of phosphors, the design principles, and the future of phosphor crystal structures.

At first, the development goal of LED was to meet the basic needs of everyday life, as in a high-efficiency source for emitting white light. Therefore, the first-generation phosphor was aimed at achieving high brightness and efficiency. Afterward, people sought a better LED light source, namely, one that could accurately display colors. High-quality video systems came next, as well as backlight devices. Besides the aforementioned requirements for phosphors, there was also the pursuit of narrow-band emission based on the control of crystal structure, as well as research and development of narrow-band emission phosphor materials.



Encapsulated light-emitting diodes converted from different generations of phosphor materials.

This review provides a complete introduction to the past development of phosphors and explains the key mechanisms of phosphor research and development, which will contribute to the future development of novel phosphors.



Click or Scan the QR Code
to read the journal article
in *Chemical Reviews*.

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| ACHIEVEMENTS

Split Westerly Winds over Europe: Breakthrough by Int'l Geoscientists



| Dr. Hsun-Ming Hu working in Batura Cave, northern Italy, in 2018.

Located at the mid-high latitude at 40-70°N, Europe enjoys comfortable, mild autumn and winter weather. Such pleasant weather is regulated by the warm, humid westerly winds from the North Atlantic Ocean. During the 15th to 19th centuries, Europe experienced the unexpectedly coldest winters in the last ten thousand years. This period is known as the “Little Ice Age” (LIA). It was hypothesized that LIA was caused by volcanic eruptions and low solar activity. However, the detailed climate pattern of Europe remains unclear.

Dr. Hsun-Ming Hu, the first author, and Prof. Chuan-Chou Shen, the leader of this international project, published their latest prominent finding(1) of the split westerly winds over Europe during the early LIA in the prestigious journal *Nature Communications* (August 20). Their finding overturns previous understandings of the southward westerly drift that occurs during this interval.

In 2018, Dr. Hu collected an 8-cm-long stalagmite in Batura Cave, northern Italy. By conducting high-precision radiometric U-Th dating techniques and trace element analyses in the HISPEC, NTU's Department of Geosciences, the drifting histories of the westerly winds in Europe-Mediterranean realm were revealed. The comparison of Batura records with previous published precipitation data shows that during the early LIA, the westerly winds not only drifted southerly, but also split into two branches away from mainland Europe. The absence of moisture from warm, humid currents in turn resulted in dry, cold winters in Europe. The team concluded that the double westerly winds had been triggered by frequent high-pressure anomalies over northern Europe.



| Researchers working in a European cave.

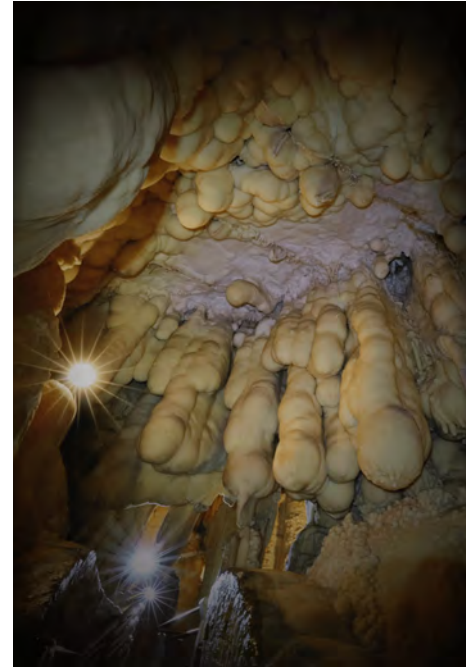
Model simulations suggest that the frequent high-pressure anomalies over Europe could be induced by both concurrent sea-ice melting in the North Atlantic and low solar activity during the early LIA. With the effect of global warming, the North Atlantic sea-ice could keep melting in the coming decades, which means the scenario revealed in this study could happen again. As a consequence, the ecosystem and Europeans could face severe impacts from droughts. Dr. Hu emphasized that the drift of the westerlies did affect the ancient civilization, such as the collapse of the western Roman Empire.⁽²⁾



⁽¹⁾ Click or Scan the QR Code to read this journal article in *Nature Communications*.



⁽²⁾ Click or Scan the QR Code to read the relative journal article in *Climate*.



Bàsura Cave in northern Italy.

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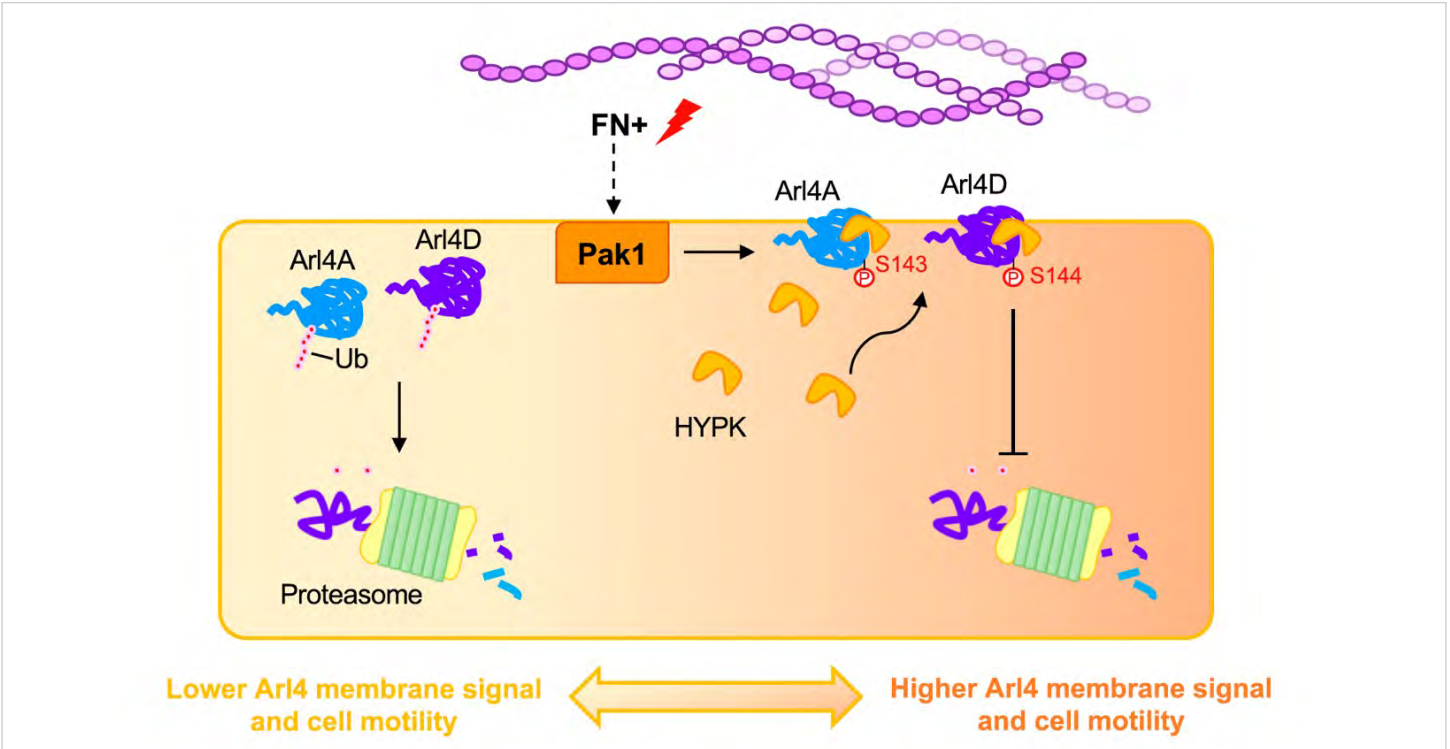
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ACHIEVEMENTS

Mechanism of Fibronectin-Induced Small GTPase Stability and Promotes Cell Migration



Professor Fang-Jen Lee's Research Reveals the Mechanism of Fibronectin-Induced Small GTPase Stability and Promotes Cell Migration.

Professor Fang-Jen Lee, Ph.D. student Ming-Chieh Lin, and the research team from the NTU Institute of Molecular Medicine recently published a paper that was featured in the *Proceedings of the National Academy of Sciences*, an authoritative international science journal, on July 20, 2022.

The role that GTPase Arl4A/D plays in cell migration has always been a mystery. Through relentless research, Lee and his team discovered for the first time that fibronectin can trigger small GTPase Arl4A/D proteins stability and enhance cell migration. This finding is a huge step towards understanding the molecular mechanism by which fibronectin guides cell migration or induces metastasis.

Cell migration is a fundamental process that involves the coordination and arrangement of molecules inside and outside the cell. This complex procedure is key to individual development and the evolution of a single cell to an adult organism. Fibronectin is an important extracellular matrix component, essential to the communication between intra and extracellular environment, guiding the adhesion of other extracellular matrices and the migration of cancer cells under pathological conditions.

Cells attached to fibronectin will induce intracellular signals, leading to elevation of Pak1 kinase activity which should be finely tuned in the cell migration processes. Numerous studies have shown that abnormal proliferation of Pak1 gene is highly oncogenic and

associated with Parkinson's disease. Lee's team has already made the discovery that feedback regulation between Arl4A and Pak1 activates Pak1 and promotes cell migration. By digging deeper into how extracellular signals regulate the operation of these molecules, we can better understand the complexity of cancer cell migration mechanisms.

Lee has long dedicated himself to elucidating the mechanism of Arl4 small GTPases signaling involved in cancer development. His latest study reveals that fibronectin induces Pak1-dependent phosphorylation of Arl4A/D, which enables the chaperone protein HYPK to bind small GTPases. This process results in the prevention of Arl4A/D proteasomal degradation and promotes their targeting the plasma membrane for cell motility. Now, thanks to this groundbreaking discovery, there will be a new research direction for the control of Pak1 kinase and small GTPase-induced cancer cell migration and related clinical diseases.

This research was supported by the National Health Research Institutes and the Ministry of Education.



Click or Scan the QR Code to read this journal article in PNAS.

| TEACHING & LEARNING

Immersive Art: A New Reality Happening on Campus



| Immersive Art at NTU: A New Reality Happening on Campus.

An avant-garde immersive experience presented by NTU's College of Electrical Engineering and Computer Science (EECS), College of Bioresources and Agriculture (BICD), and the Department of Drama and Theatre was unveiled at the Future Exhibition Hall in August. Experimenting with virtual images, immersive technologies, arts, and education, the experience allowed students to admire art while exploring a virtual forest world.

The Future Exhibition Hall was officially inaugurated in April and is Taiwan's first campus white cube for new media experiment purposes. The space not only supports the display of art and creativity but provides space for experimental research and innovative teaching. According to Vice President for Academic Affairs and host of the Advanced Display Technology Cross-Disciplinary Program, Prof. Shih-Torng Ding, "The Future Exhibition Hall is a space for NTU students to incubate ideas and explore all possibilities."

"Wandering in Kavalan: A journey to Taipingshan for a taste of Kumquat" is a unique digital exhibition made possible through the joint efforts of EECS and BICD members. The exhibition draws on MR technologies, 360-degree videos, fragrances, and sounds to create a fully interactive and immersive world where visitors embark on a journey of sensory experience.

"The Carnival of the Animals" presented by students from the Department of Drama and Theatre features lively stereo images set off by Camille Saint-Saëns' spirited music. The work will be performed at the exhibition hall regularly so students who are nearby can appreciate the breakthrough technologies in art as they visit NTU.



| Professor Shih-Torng Ding, Vice President for Academic Affairs, hosting the press conference for the "Advanced Display Technology Cross-Disciplinary Program."



| A scene of the stereo images from "The Carnival of the Animals."

“Dream Within Dreams”, a work of modern dance performance created by students from the courses “3D and Advanced Computer Graphics Software” and “Immersive Technology in Theater: Design and Implementation” who have redefined dance performance. Dance movements were captured and processed with the Kinect 2.0 device and the TouchDesigner software. By projecting the show on walls using 3D projection technologies, human dance is no longer limited by space.

Given the rise of immersive art forms, Hsiao-Mei Hsieh, Associate Professor and Chair of the Department of Drama and Theatre, and Lung-Pan Cheng, Assistant Professor of EECS, co-launched a course titled “Display Technology and Immersive Experience Design” to collaborate with industry experts and guide students in bringing their imagination to life through technology. In the future, EECS, BICD, and the Department of Drama and Theatre will continue to collaborate and present works of NTU students at the Future Exhibition Hall, offering all who visit an unforgettable immersive voyage.



Tzu-Ling Yang and Yu-Hsien Lin from the Department of Drama and Theatre performing “Dream Within Dreams” at the Future Exhibition Hall. Their body movements merge with technological elements, creating a spectacle.

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TEACHING & LEARNING

Open Online Course Project for High School Students



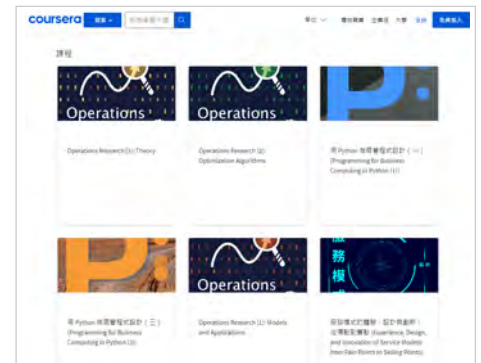
Associate Professor Ling-Chieh Kung, Department of Information Management hosting a seminar at The Affiliated Senior High School of National Taiwan Normal University (HSNU).

The Digital Learning Center (DLC) at NTU has long been committed to promoting the development of digital learning on campus. Since its inauguration, DLC has served as a platform for open courses, such as the National Taiwan University OpenCourseWare (NTU OCW) and National Taiwan University Massive Open Online Course x Coursera (NTU MOOC x Coursera), offering over 300 online courses to students on and off campus.

In 2020, NTU officially extended its NTU Open Online Course Project to high school students to further promote its online learning resources as well as attract potential college candidates. Through tutoring programs, NTU collaborated with Chenggong High School and The Affiliated Senior High School of National Taiwan Normal University to help sophomores there access NTU's online learning resources and prepare for college. To date, NTU has been working with six high schools, including general high schools, community high schools, and experimental high schools to help increase students' college preparedness.

Given the success of the project, DLC is now positioned to expand this project to high schools nationwide starting from this academic year. The project will offer high school students the chance to access NTU's open curriculum and attend a series of courses from NTU OCW and NTU MOOC x Coursera as part of their electives starting this Fall. Students can also join physical and online seminars to share conversations and exchange ideas with NTU professors.

As a leading institution of higher education in Taiwan, NTU bears the social responsibility to close the achievement gap in local society through addressing the difficulties student face



NTU MOOC courses on Coursera.



Professor Ming-Jen Lin, Department of Economics, sharing insights on the application of economics with HSNU students.

while preparing for college. The online project not only allows student to self-learn but also provides them a better picture of college courses. What's more, students can embark on their journey of self-exploration by engaging with different fields of studies ahead of time.



The NTU Open Online Course Project for High School Students welcomes all the senior high schools to participate in the project. Click or Scan the QR Code for more details.



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| TEACHING & LEARNING

Our First English Specialization Program on East Asian Regional Politics



| NTU College of Social Sciences Building

Located at the junction of Northeast Asia and Southeast Asia, Taiwan has always been an important player in the ongoing geopolitical tussles of the region. In recent years, China has drastically transformed its position in East Asia and the world given to its rapid economic and military development. As China increases its political influence, more social science researchers are shifting their focus to East Asia to study how China will shape the political and economic landscape of the region.

This year, NTU's College of Social Sciences launched an English specialization program on East Asian Regional Politics under the Program for East Asian Studies. The program includes in-depth courses that help students acquire a geopolitical framework of analysis for the East Asia region while combining disciplinary international political studies with a focus on the geopolitical and economic dimensions of East Asia.

The program provides students interested in public affairs and international studies with a unique opportunity to grasp Taiwan's role in the changing geopolitics and developments of East Asia as well as explore means for Taiwan to overcome the challenges of an intensifying cross-strait relationship.

In addition to policy and decision-making training, all courses of this specialization program are conducted in English to help students improve their linguistic competence. Through discussing international affairs and analyzing complex public agenda in English, students can develop and polish their communication skills. International students who are interested in the political situation of the East Asia region will also be welcome to join the program and participate in the conversation.



| The Koo Chen-Fu Memorial Library of the NTU College of Social Sciences



Click or Scan the QR Code
to learn more about the program.

NTU's English specialization program on East Asian Regional Politics includes seminars on various topics, such as Asian democratization, Asian regionalism, and the political economies of East Asia. Students who enroll in the program will acquire a comprehensive understanding of not only the political and economic interactions among the countries in East Asia but also the geopolitical implications of an emerging China. Through this program, students will learn how to analyze regional relations in East Asia and formulate practical and feasible policies in their future careers, whether in the public sector or the private sector.

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PEOPLE

It's Time to Leave Covid-19 Behind and Start a New Life!



NTU Cheerleaders kick off the ceremony with a spectacular routine.

“Go NTU!” the joyous sound of the cheerleaders kicked off this year’s distinctive convocation. The in-person, onsite event, themed “#NTUNEWLIFE,” celebrated the arrival of the incoming freshmen class, inviting students to check in and take pictures. Unlike any such ceremony in the past, this year’s program not only included a spectacular routine by the NTU Cheerleaders but a variety of sparkling talents presented by many NTU student clubs. At the event, formal speeches and standard music were replaced by interactive Q&A sessions and entertaining videos, creating a light-hearted mood among the crowd.

At the ceremony, President Chung-Ming Kuan affirmed, “Starting from August 1, NTU will reopen the doors of the Administrative Building. This marks the return to “normal” campus life—students can freely walk into a classroom to attend lectures and share conversations with their professors and peers in person. International students and exchange students will also be returning to campus, adding diversity and color to the University.” In addition to stressing the importance of gearing to international standards and gradually implementing the “Future NTU” action plan, Kuan also encouraged students to make independent decisions and to own their decisions by acting on them.

NTU offers a wide range of opportunities, including Future NTU and international exchange programs, for its students to explore their passions and interests during their four-year sojourn on campus. “I hope you will actively explore your options, as well as stay focused on learning and taking concrete actions to work towards realizing your goal and aspirations,” said Kuan, “What you make of your time at NTU and your life is fully up to your own decisions and actions.”

This year, NTU welcomed 4,594 new undergraduate students and 5,496 new graduate students. By offering this eye-opening convocation, the school hopes all newcomers can leave their pandemic-related fears and troubles behind and celebrate their new sojourn at NTU. It is hoped that every class member can build an exciting new life on campus and explore infinite possibilities.



NTU Choir leads in singing the NTU anthem.



Welcoming the new members of the NTU family.

PEOPLE

The First NTUer in Professional Baseball: Yi-Cheng Lan Realizes His Baseball Dream

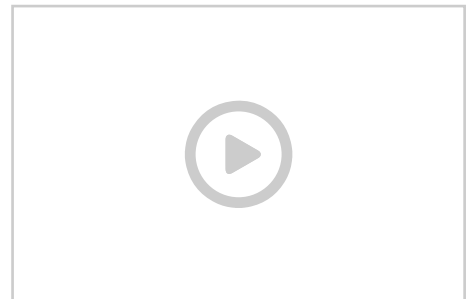


Yi-Cheng Lan encourages NTUers to be brave in trying new things and chasing their dream; "Look at things from different perspectives with humility and be a good team player."

Yi-Cheng Lan, who graduated from the Department of Chemistry last year, pitched for the NTU baseball team during his student days. He took part in the 2022 Chinese Professional Baseball League (CPBL) Draft this July and was selected in the 7th round by the professional baseball team Wei Chuan Dragons. He was the first NTUer to play in the professional league in the CPBL's 33 years of history.

Lan affirmed that he was very fortunate to have had the opportunity to test his talents during his time at NTU, and to develop a strong interest in baseball in the process. He also had the opportunity to train continuously and unlock his potential with the lessons and encouragement of NTU's baseball team coach. Even though he often experiences frustrations in his baseball career, he wants to do his best by challenging himself and pushing through his limitations. He wishes to leverage his strengths to compete with other good players and establish his place in professional baseball.

Yu-Hua Lu, Lecturer of the Athletic Department and one of NTU's baseball team coaches, said that Yi-Cheng Lan has a strong thirst for knowledge as well as a well-rounded perspective. Lan often approached him with information on sports science and weight training, showing a passion to make continuous progress. Cheng-Nan Kang, Professor of the Athletic Department and head coach for the team for nearly 3 decades, said that "NTU students tend to know what they want. They have clear goals for which they set clear deadlines, and they will try their best to achieve their goals."



Left-handed pitcher Yi-Cheng Lan pitching at the 2022 CPBL Draft try-out.



Yi-Cheng Lan who pitched for the NTU baseball team in his student days joins the Wei Chuan Dragons as the first NTUer in professional baseball league history.

Lan said that the most vital task in high school and university was to cultivate the ability to think and manage things logically, and NTU's education has taught him to be fully prepared so as to increase the probability of success. Believing that college is the best place and period to explore oneself, he encourages NTU students to get out of their comfort zone to try new things and face new challenges in order to discover their real interests and develop their strengths while maximizing their potential. "I hope my story gives more people the courage to pursue their dream."

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PEOPLE

All It Takes Is All You've Got: Women's Tennis Team



NTU Women's Tennis Team wins the gold in the women's general group at the National Intercollegiate Athletic Games.

NTU Women's Tennis Team, which includes general student members and professional student-athlete members, has over 34 years of history. General students can be recruited by participating in the team tryouts held at the NTU Freshmen Cup and NTU Cup every semester. Student-athletes, on the other hand, are eligible to join solely based on their GPA scores.

For two decades, Associate Professor Chi-Hui Wang led and organized the team, helping to establish its style and value. In 2016, Wang passed the baton to Associate Professor Hsiao-Han Chao, a former national tennis player. Chao not only focuses on helping students improve their skills on the tennis court, but she also generously spends time with students, not only discussing tennis strategies, but offering them guidance in life skills.

Over the past 6 years, NTU Women's Tennis Team has won a total of 16 championships in a wide range of competitions. One of their greatest achievements is their record of entering the semifinals of women's general group in the National Intercollegiate Athletic Games for six consecutive years, during which they took home three golds, two silvers, and a fourth place in total.

Notably, Kuan-Yi Lee of the Department of Life Science won the team's first bronze medal for the women's single in the student-athlete group and gold for the women's double with her partner Chao-Ying Huang from the College of Medicine. Huang herself broke the



Associate Professor Hsiao-Han Chao coaching a student during a match in the group competition at the National Intercollegiate Athletic Games.

national and team record as the first non-athlete student to win a women's double gold in the student-athlete group in that competition. Her victory continues to inspire students who are passionate for sports—to push themselves to excellence.

NTU Women's Tennis Team practices every Wednesday and Friday night and hosts special team events for specific occasions, such as holidays, graduations, and birthdays to build rapport among the team members. Even after graduation, alumni continue to support the team by joining gatherings or just watching the team play in live-streamed matches.

Without hard work, passion, and dedication, nothing is possible. Despite limited space, time, and budget, every single team member strives to bring out her best through practice and overcoming her challenges. Surely, no setbacks will stop this team from making great strides and continue winning.



Kuan-Yi Lee (right) and Chao-Ying Huang (left) win the gold in the women's doubles of the student-athlete group at the 2022 National Intercollegiate Athletic Games.



Click or Scan the QR Code to visit NTU Women's Tennis Team Facebook page.

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| PEOPLE

Sugar Production Chimney: A Pillar of Support on Campus



Completed on March 19, 1931, the chimney of the boiler room is nearly 20m in height and 6.188m in diameter.

Quietly overshadowing several lecture halls and the Administration Building not far from Roosevelt Road, stands a nearly 20-meter-high chimney covered with verdant vines. This industrial structure, which appears out of place on campus, is the boiler room and chimney of the fermentation lab built in the era of Taihoku Imperial University, NTU's institutional predecessor.

Taihoku Imperial University, which later became National Taiwan University, was founded in 1928 by the Japanese colonial government, and the construction of the fermentation laboratory was completed three years later. The lab belonged to the Department of Agrochemical Chemistry, which boasted advanced sugar production equipment and technology at the time.

To support Imperial Japan's Southern Expansion Doctrine, the Departments of Sugar Chemistry and Zymurgy were established to help develop local agriculture. Professor Eiziro Hamaguti, Head of the Sugar Chemistry Department, significantly improved sugar production technology in Taiwan with his research. Between 1938 and 1939, the Taiwanese sugar industry reached its peak production record of 1,418,731 tons of sugar.

Since sugar production is driven by a vast amount of steam power, the 62 centimeter-thick red brick walls of the colossal boiler were designed to store massive thermal energy. The room belonged to the Department of Zymurgy, overseen by Professor Tamezi Baba, who used the stored heat to carry out fermentation experiments. Baba extracted "Clostridium toanum Baba" from bagasse, a discovery that led to the production of a fuel that relieved Taiwan's energy crisis during WWII when the Allies blockaded Imperial Japan's oil imports.



The boiler's 62 cm thick, red brick walls and 42 by 37 cm front gate.

The thriving sugar industry constructed numerous towering sugarcane factory chimneys that reached into Taiwan's sky during Japanese rule. Unfortunately, these very chimneys became the targets of the U.S. bombers. Most of the chimneys were destroyed by airstrikes, and now only 6 of the chimneys remain standing today, all in southern Taiwan. This makes our chimney, which has stood on the NTU campus for nearly a century, especially precious. It is not only the sole industrial chimney standing on the campus of any university in Taiwan, but it also bears historical value for having survived several eras, including the period of Japanese occupation, the peak of the local sugar industry, the Second World War, and the rechristening of Taihoku Imperial University as National Taiwan University.

Now, the chimney has taken on a new life as the new site of the Center for Student Well-being, the Disability Support Services Office, and the Student Safety Center with the strong support of President Chung-Ming Kuan.

Shih-Pe Wang, Vice President for Student Affairs, stated at the opening ceremony: "The Center for Student Well-being marks an important milestone of our work on campus. I hope this space can be transformed into a hub for departments and people to work together and support their peers. This boiler room is not just a valuable historical asset but serves to warm the hearts of people and the community of NTU."



President Chung-Ming Kuan inspecting the results of the remodeling construction.

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