

Bridging Gap Between Academic Attention, Industrial Application

Dialogue

By LONG Yun & BI Weizi

Dr. Wai Siong Chai, an assistant professor in the Department of Chemical and Environmental Engineering at the University of Nottingham Ningbo China (UNNC), was named in Stanford University's prestigious World's Top 2% Scientists list for three consecutive years from 2023. But when asked what this means to him, he does not talk about prestige.

"This recognition reflects consistent research output, but citations mainly indicate academic attention, not practical deployment," he says. "For example, one of our ammonia fuel reviews received over 1,000 citations in five years, which shows strong research interest, but most of that impact remains within academia rather than industry." That distinction between academic attention and industrial application defines his entire approach to research.

Currently, his research at UNNC focuses on sustainable fuel production through thermochemical conversion of biomass and carbon resources, catalyst and reactor development, process scale-up, and techno-economic and life-cycle assessment of low-carbon fuel system, including sustainable aviation fuel (SAF), methanol and ammonia-based energy systems.

Real challenge

What makes SAF commercially viable? In Chai's field, this is the central question. His answer: "The key challenge is no longer producing fuel molecules, but ensuring the entire system works reliably, at scale, and at a cost industry can accept, both economically and environmentally."

He points out that while individual steps are well understood, failure typical



Dr. Wai Siong Chai. (COURTESY PHOTO)

ly occurs when efficiency, stability and economics must operate together under real conditions.

This is not a theoretical concern. In his team's CO₂ hydrogenation work, structured catalysts show less than one percent performance loss compared to around 10 percent for conventional catalysts under similar conditions. "That difference directly affects operational feasibility," he says.

He has repeatedly seen solutions validated in the laboratory fail under industrial conditions. As he puts it, this reinforces the need to design research with scale in mind from the outset.

With over 50 publications, 5,000+ citations and an H-index of 30, his academic impact is clear. But he is frank about the gap that remains.

Policy alignment and regional context

Having earned both his bachelor's degree and PhD from the University of Nottingham Malaysia and subsequently worked at the University's Malaysia and

China campuses, Chai has experienced how research is translated across different regional and industrial contexts. From this experience, he has learned that strong fundamentals alone are insufficient. "Implementation depends on how well research aligns with industrial and regional contexts," he argues.

In Ningbo, he finds that alignment works. "The strong alignment between policy, industry and research in Ningbo enables faster transition from concept to application," he says, "particularly when supported by regional talent programs and industrial partnerships."

As a chemical engineer watching China's energy landscape, Chai has seen that "transformation" is not a slogan. He has watched it take shape — from the south to the east. Energy transformation and industrial transformation run in parallel. Industries climb higher up the value chain, yet traditional sectors are not cast aside; they evolve alongside.

What enables this, he observes, is not just market force but deliberate, long-

term government planning and policy continuity. "The speed catches me by surprise sometimes. The scale, too. But the direction has been clear and consistent."

Looking ahead to a future carbon-neutral energy landscape, Chai sees clear complementary roles for his two main research areas. "SAF addresses aviation, where few alternatives exist," he explains, "while ammonia and methanol can serve as hydrogen carriers, particularly for marine transport, energy storage and future hydrogen infrastructure."

Learning from failure

Chai's career path was far from a straight line. With only one paper upon graduation, he could not find a lecturing job. He later did his postdoc at Zhejiang University, learning to dig into problems while continuing to publish papers.

He acknowledges that both academic and industrial worlds have become very competitive. Yet his advice to young researchers is not to simply chase more publications. "Young researchers should focus on understanding the real-world problems deeply," he says. "Focus less on chasing quick publication, and more on high-quality, impactful work that can benefit the real world or industry. That requires strong fundamentals, patience and the ability to handle failure."

He admits that sometimes results contradict what you first thought, and that is discouraging. "But when you analyze why a certain technique is not so good, it's the real research part."

This philosophy carries into his teaching. At UNNC, he integrates green engineering and sustainable design principles by treating sustainability as a constraint rather than a topic. "Students are required to evaluate performance, environmental impact, safety and cost simultaneously," he says, "often through open-ended problems where trade-offs must be justified rather than avoided."

systems." As well as bearing edible produce, they generate oxygen, absorb carbon dioxide and purify water and air, serving as indispensable green partners for future long-duration space missions.

Moreover, the unique microgravity environment of space allows scientists to discover a variety of new phenomena related to plant growth and even induce new traits in seeds, thus enabling the cultivation of superior new crop varieties. China has successfully developed over 700 new crop varieties through space breeding, which have been widely adopted across vast areas of farmland, bringing the benefits of space back down to Earth.

Ultimately, every space-based planting experiment conducted is vital for accumulating the necessary experience, and validating the technologies, that will one day enable us to become extraterrestrial farmers.

tific study and exploration of caves, Xu provided accurate and detailed descriptions of over 300 caves, covering various branches of the discipline. Regarding the Qixingyan Caves in Guilin, he noted that, "The original route from Qixia Cave to Zeng Gong Rock was a straight path of about two li (one li is 500 meters); later, the path led deeper into Zeng Gong Cave before turning back, winding for about three li. Yet the scenic beauty of these two caves is captured almost in its entirety." This description largely aligns with modern surveying data.

Due to the unique formations and high aesthetic value of karst landscapes, sites such as the Stone Forest in Yunnan and Libo in Guizhou have been developed into famous tourist attractions. The South China Karst was inscribed on the UNESCO World Heritage List in two phases, with the first phase listed in 2007 and an extension added in 2014.

Why Farm in Space Station?

Science Outreach

By Staff Reporters

Recently, footage from "Tiangong TV" captured the public's attention, showing clusters of red cherry tomatoes being delicately harvested and packaged by the astronauts aboard Tiangong, China's Space Station. The cosmic occasion marked the start of vegetable harvest season aboard the space station.

With the launch of the Shenzhou-23 manned spacecraft on May 24, rice seeds have once again set out on a jour-

ney into space.

But why are Chinese astronauts so dedicated to farming in space, growing everything from vegetables to rice?

In 2022, the Shenzhou-14 crew completed the full life cycle of rice cultivation — from seed germination and growth, to grain production — within the microgravity environment of space. The rice seeds harvested in space remained capable of normal reproduction once returned to Earth, and the third generation of these seeds has now matured with significantly higher levels of glucose and fructose compared to ordinary seeds grown on Earth.

According to Zheng Huiqiong, a researcher at the Center for Excellence in Molecular Plant Science of the Chinese

Academy of Sciences, the latest experiment involves four cultivation units. Each unit contains six rice seeds, which are used to create two sets of comparative plantings.

"In the microgravity environment of space, a plant's metabolic rates and biological processes undergo profound alterations. Consequently, their underlying genetic mechanisms may also undergo changes," said Zheng.

Given the immense human and material resources invested in space-based agriculture, many people wonder whether the sole objective of space "farming" is merely to provide astronauts with fresh fruits and vegetables to alleviate dietary monotony.

However, each successful plant growth represents something far more significant than a mere culinary indulgence.

The plants grown in space function as miniature "ecological recycling

Ancient Chinese Explorers Mapped Karst Caverns

Traditional Eastern Wisdom

By BI Weizi

China has some of the most extensive and diverse karst landforms in the world. The highest concentrations are found in the provinces of Guangxi, Yunnan, Guizhou, Sichuan and Hunan.

The pre-Qin text *Classic of Mountains and Seas*, a fabulous account of the geography and culture of pre-Qin China as well as a collection of Chinese mythology, contains the earliest accounts of karst caves. During the Southern Song dynasty, *Fan Chengda's Guihai Yuheng Zhi* (*Treatise on the Natural Resources of Guangxi*) documented over 20

caves in Guilin, observing that stalactites form when calcium carbonate precipitates from water as it drips and evaporates — a concept closely aligned with modern karst geomorphology theory.

During the Ming dynasty, Xu Xiake (1587-1641), a Chinese explorer, geographer and travel writer, best known for his famous geographical treatise, travelled throughout China for more than 30 years, extensively documenting his travels. *The Travel Diaries of Xu Xiake*, compiled posthumously, provides detailed descriptions of the karst landforms he observed during his expeditions from 1613 to 1639, along with analyses of the mechanisms underlying their development.

Notably, from 1636 to 1639, he travelled through the provinces of Zhejiang,

Jiangxi, Hunan, Guangxi and Guizhou, surveying the karst landforms of China's southwestern region — the largest in the world and the most extensively developed in the tropics and subtropics. The scope of his explorations far exceeded that of Western scholars of the same period, making an outstanding contribution to global karst studies.

Xu was also the first person in the world to discuss tropical karst, clarify its distribution in China, categorize karst landforms and highlight regional variations.

Regarding the mechanisms of karst formation, he not only described dissolution, but also emphasized the importance of water erosion and gravity in forming karst landforms.

In the field of speleology, the scien-

Tech+Culture

Sci-Tech Guardians of Ancient Books

By Staff Reporters

When we think about reading, we often picture books with pages smelling of ink or electronic screens displaying shifting light. However, on the fourth floor of the Shaanxi Library, there is a group of dedicated people who spend their days immersed in ancient texts dating back a thousand years or more. Their work goes further than just reading as they are the preservers of these precious books.

Scientific "diagnosis" prescribes the cure

Restoring ancient texts is a far more complex process than simple "cutting and pasting." The Qisha Tripitaka, a collection housed at the Shaanxi Provincial Library, is a monumental compilation of Buddhist scriptures from the Song and Yuan dynasties. It possesses immense historical, literary and artistic value. Some pages had fused together so tightly that they could not be opened or turned, resembling solid "bricks of books."

The restoration team deliberated long and hard before taking action. "Before we began the actual repair work, we first subjected the texts to a comprehensive 'scientific health checkup,' including pH testing, microscopic fiber analysis and multispectral imaging," said Xue Jimin, deputy director of the department of historical documents at the library.

"By determining the pH level, we know exactly what concentration of deacidification solution is required. By analyzing the paper fibers, we can select patching paper that perfectly matches the original material. With precise data on paper strength, we can confidently proceed with page separation and backing, ensuring that we do not inadvertently damage the ancient texts," Xue explained. He noted that this technological assessment serves as the "diagnostic report" preceding restoration, enabling conservators to apply precise treatments rather than working blindly.

Effective restoration can only be achieved after a precise diagnosis. The restoration team used a combination of dry separation techniques and progressive

humidification methods to gently separate the fused pages. They also leveraged the naturally alkaline properties of the local water supply in northern China for the necessary deacidification.

In January 2026, the restoration of the two precious volumes of the Qisha Tripitaka was successfully completed. Following an expert review, the quality of the restoration work was officially rated "excellent."

The ongoing "revitalization" of ancient books

In this library, the quest to breathe new life into ancient books does not end on the restoration bench.

In 2024, the library's Qisha Tripitaka restoration project was selected as a "Public Welfare Project for the Preservation and Utilization of Ancient Books." After being resuscitated via the hands of restoration experts, this ancient text has now been made available to a wider public audience with the aid of community engagement.

Staff members from the Department of Historical Documents, who are responsible for cataloging and organizing ancient texts, discovered a true "treasure" within the dusty stacks. They found a record indicating that Wang Zheng, a Ming Dynasty poet, had designed a device resembling a bicycle. This fact had been buried in ancient texts and was largely unknown to the public. A digitization team formed by these staff members constructed a physical replica of the "bicycle" using LEGO bricks, winning top honors in relevant competitions. The team also produced animated short films based on ancient texts, bringing these dormant classics to life and introducing them to campuses and digital screens in a style that resonates with young people.

From 2008 to the present, the Shaanxi Library has restored 247 rare ancient works comprising over 100,000 pages, according to statistics. Zhou Yunyue, director of the library said, "We will continue to strive to ensure the enduring legacy of even more precious ancient texts, thereby making a greater contribution to preserving China's outstanding traditional culture and building China into a leading country in culture."



The precious collection "Qisha Tripitaka" from Shaanxi Library is on display at the joint exhibition of "Belt and Road" documentary resources and cultural and creative products in Xi'an, Shaanxi province. (PHOTO: VCG)

Deeper Media Ties Elevate China-ASEAN Partnership

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Two major initiatives were launched at the forum to translate discussions into tangible results. The "ASEAN-China Social Media Content Creators Programme" was inaugurated to support exceptional cross-border content creators in sharing regional stories through youth-oriented narratives. In addition, the "2026 ASEAN-China Youth Cultural Heritage Tour Series" was also announced, with plans to organize young people from both sides to foster cultural identity through immersive tours.

In an interview with *Science and Technology Daily*, Prak Thaveak Amida, undersecretary of state at Cambodia's Ministry of Information, reiterated that future media cooperation should focus on strengthening personnel exchanges

and accelerating digital transformation in response to both the challenges and opportunities of the digital age. "We can work together, share the experience, share the knowledge, and exchange the best practices. Then we can improve skills [across the region]."

Looking ahead, Amida hoped that media organizations from China and ASEAN would work together to tell authentic development stories, dispel external biases and misinformation, and jointly shape a better future for the peoples of both sides.

Since its launch in 2018, the forum, co-hosted by the CIGG and the ASEAN-China Centre, has served as an important platform to showcase China's development practices, strengthen people-to-people bonds, and promote pragmatic cooperation between China and ASEAN.