中国科学院
CHINESE ACADEMY OF SCIENCES
CASNewsletter
NO. 179 • September 2021

THE BEAUTY OF LIFE ON EARTH

Edited by Bureau of International Co-operation, Chinese Academy of Sciences

CAS Newsletter
– Monthly –
Editorial Board:
52, Sanlihe Road, Beijing, 100864, China

Executive Editor: Ru Zhitao
Designer: Tian Chi

Learn more

[IMAGE: ANSO]

Exhibition on improving public awareness of biodiversity

An exhibition aiming to improve public awareness of biodiversity kicked off on August 30 in the Beijing Botanical Garden of the Institute of Botany, Chinese Academy of Sciences (IBCAS).

The exhibition — The Beauty of Life on Earth: Man and Biodiversity in Protected Area — focuses on scientists, photographers, practitioners of biodiversity protection, and ecological protection advocates. It stresses the significance of protecting the biodiversity through photos.

The photos demonstrate how scientific researchers provide diagnoses and treatment for pandas, as well as how scientists monitor the environment of the Fanjing Mountain Natural Reserve in Southwest China's Guizhou Province.

CAS academician Bai Chunli, also President of the Alliance of International Science Organizations, or ANSO, said the exhibition will improve public awareness of the importance of protecting the environment and biodiversity, and enable more people to actively join in protecting Earth and promoting the sustainable utilization of natural resources through pictures, videos and lectures.

The exhibition was initiated by ANSO and sponsored by the UNESCO Beijing Office, the Chinese National Committee for Man and the Biosphere Programme, the Endangered Species Scientific Commission, the International Society of Zoological Sciences, and the IBCAS.

Biodiversity is not only a cornerstone of maintaining nature's ecological balance, but also the basis for human survival and development. The 15th meeting of the Conference of the Parties to the UN Convention on Biological Diversity will be held in Kunming, Southwest China's Yunnan Province in October.

Source: Xinhua

CHINA'S EFFORTS

IN SPACE EXPLORATION

NAOC releases details of new first-class site for astronomy observatory

Infrastructure construction at the Lenghu site in Northwest China's Qinghai Province [IMAGE: DENG LICAI/NAOC]

The National Astronomical Observatories of China (NAOC) of the Chinese Academy of Sciences (CAS) on September 1 unveiled the details of a world-class site on the Qinghai-Tibetan Plateau for the construction of an optical astronomy observatory.

The announcement was published in the journal *Nature*.

The site, which sits at an altitude of 4,200-4,500 meters, is on a summit near a town named "Lenghu", or "Cold Lake", in Northwest China's Qinghai Province.

The Lenghu site's optical observation conditions are similar to those of top-tier observatories in the Western Hemisphere, according to Professor Deng Licai, leader of the NAOC's large optical and infrared telescope team.

Deng said that the site has an extremely arid climate with 70 percent of the nights in a year having clear and photometric conditions, and a median night temperature variation of only 2.4 degrees Celsius, indicating very stable local surface air.

Deng and his team started selecting the site in 2017. With help from the local government, they have completed the initial infrastructure construction at the potential site at an altitude of 4,200 meters on Mount Saishiteng near Lenghu Town.

During the period, the team and constructors climbed to the site dozens of times, carrying instruments and recording important data.

In the announcement, the team said that the site occupies a unique geographic position in the Eastern Hemisphere and bridges the huge gap between Mauna Kea (155.8246° W), Atacama (70.4042° W) and the Canary Islands (17.8577° W).

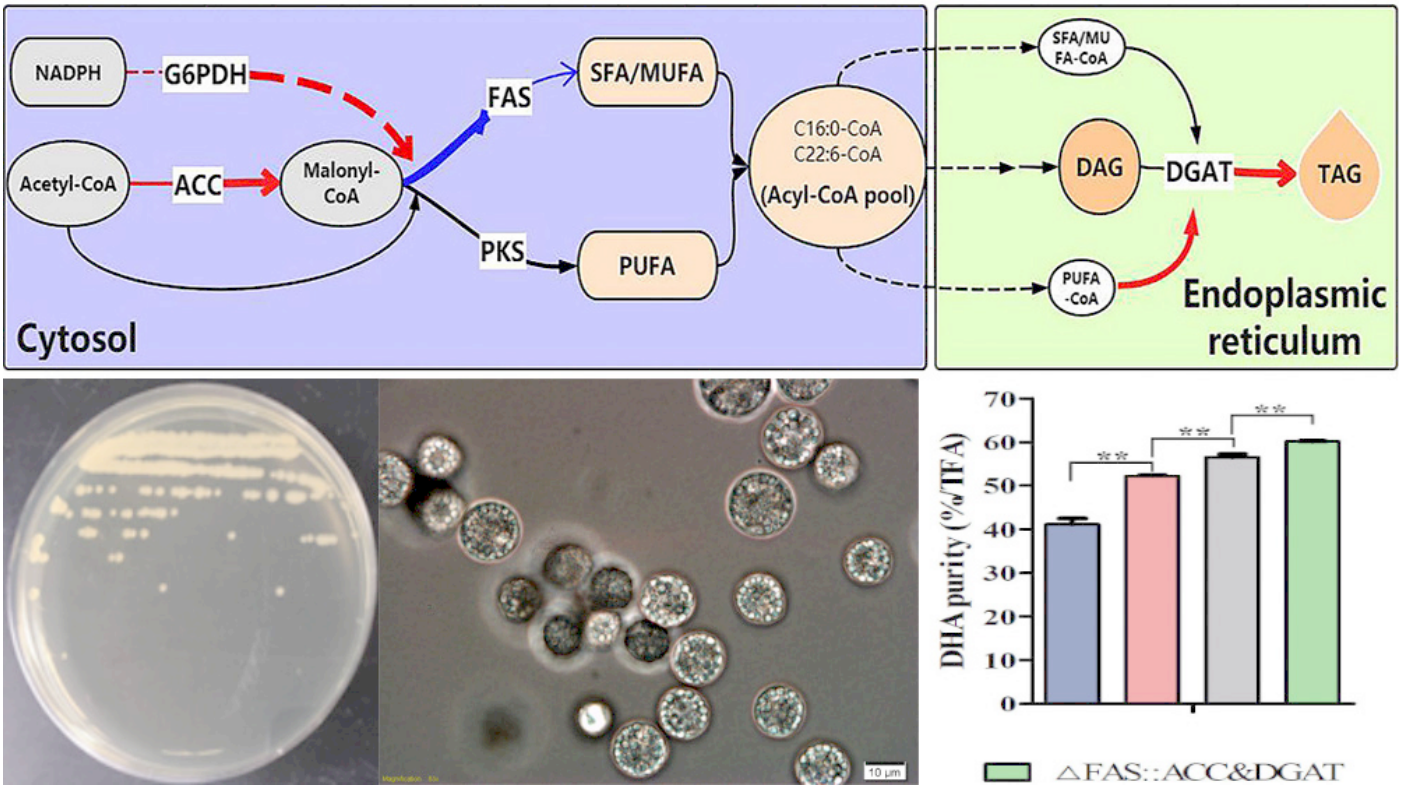
NAOC members work at the Lenghu site in Northwest China's Qinghai Province. [IMAGE: DENG LICAI/NAOC]

This will form a perfect network of ground-based, high-quality observatories ready for great scientific discoveries, according to the team.

"Research activities will include searching for signs of life on exoplanets, investigating electromagnetic counterparts of gravitational wave outbursts and many more," said Deng.

Observational and weather data for the Lenghu site collected during 2018 and 2020 are available on a public website at lenghu.china-vo.org.

Source: CGTN



A high-purity DHA cell factory created using metabolic engineering methods [IMAGE: WANG SEN AND SONG XIAOJIN]

A cell factory to produce high-purity DHA developed

Docosahexaenoic acid (DHA, C22:6) is an important nutrient for the brain and visual development of newborns. It is widely used in the pharmaceutical and food industries.

Aurantiochytrium has become one of the representative strains for DHA production due to its high biomass and high lipid content.

Recently, researchers at the Qingdao Institute of Bioenergy and Bioprocess Technology (QIBEBT) of the Chinese Academy of Sciences (CAS) have developed a novel strain producing high-purity DHA through a metabolic engineering strategy.

The enhanced DHA purity not only improves the product quality of DHA oil, but also reduces the purification processing cost.

Their work was published in the journal *Agriculture and Food Chemistry* on August 20.

Their strategy includes both partial deactivation of the competing pathway of DHA biosynthesis by disrupting one copy of the fatty acid synthase gene and strengthening of substrate supply and triacylglycerol synthesis by the overexpression of acetyl-CoA carboxylase and diacylglycerol acyltransferase.

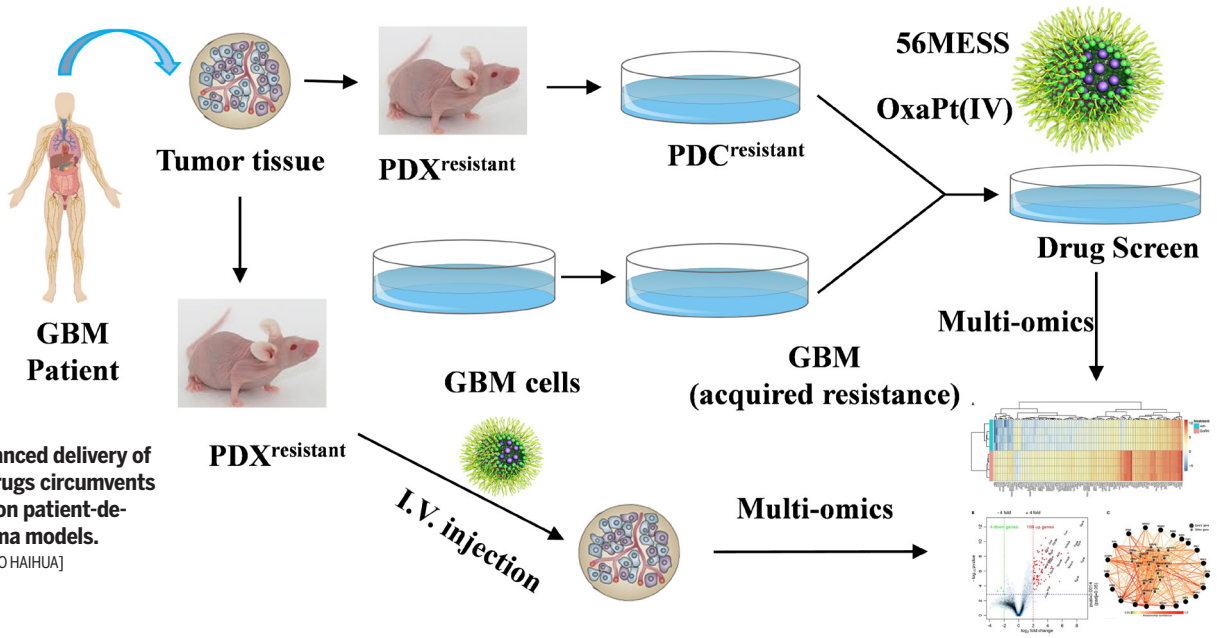
The DHA contain of the mutant was 331 mg/g, of which DHA accounted for 61 percent of the total fatty acids.

Moreover, the cell growth rate, biomass, and lipid yield of the novel strain have not changed significantly, ensuring that the new strain can meet industrial requirements.

(Text by Wang Sen and Song Xiaojin)

For more information, please contact:
Cheng Jing
E-mail: chengjing@qibebt.ac.cn
Qingdao Institute of Bioenergy and Bioprocess Technology (QIBEBT),
Chinese Academy of Sciences

Source: Qingdao Institute of Bioenergy and Bioprocess Technology (QIBEBT), Chinese Academy of Sciences



Convection enhanced delivery of Pt-based nanodrugs circumvents TMZ resistance on patient-derived glioblastoma models.
[IMAGE: PROFESSOR XIAO HAIHUA]

New platinum-based nano-drugs can combat glioblastoma drug resistance on a patient-derived mouse model

Glioblastoma (GBM) is the most common and deadly brain tumor in adults, with a five-year survival rate of less than 10 percent. Currently, temozolomide (TMZ) is the first-line anticancer drug for GMB, but its drug resistance has long been a problem. It is known that acquired mismatch repair defects and overexpression of O6-methylguanine-DNA-methyltransferase (MGMT) are associated with TMZ resistance. Therefore, it is crucial to find new treatment options and drugs other than TMZ with different action mechanisms to address this problem.

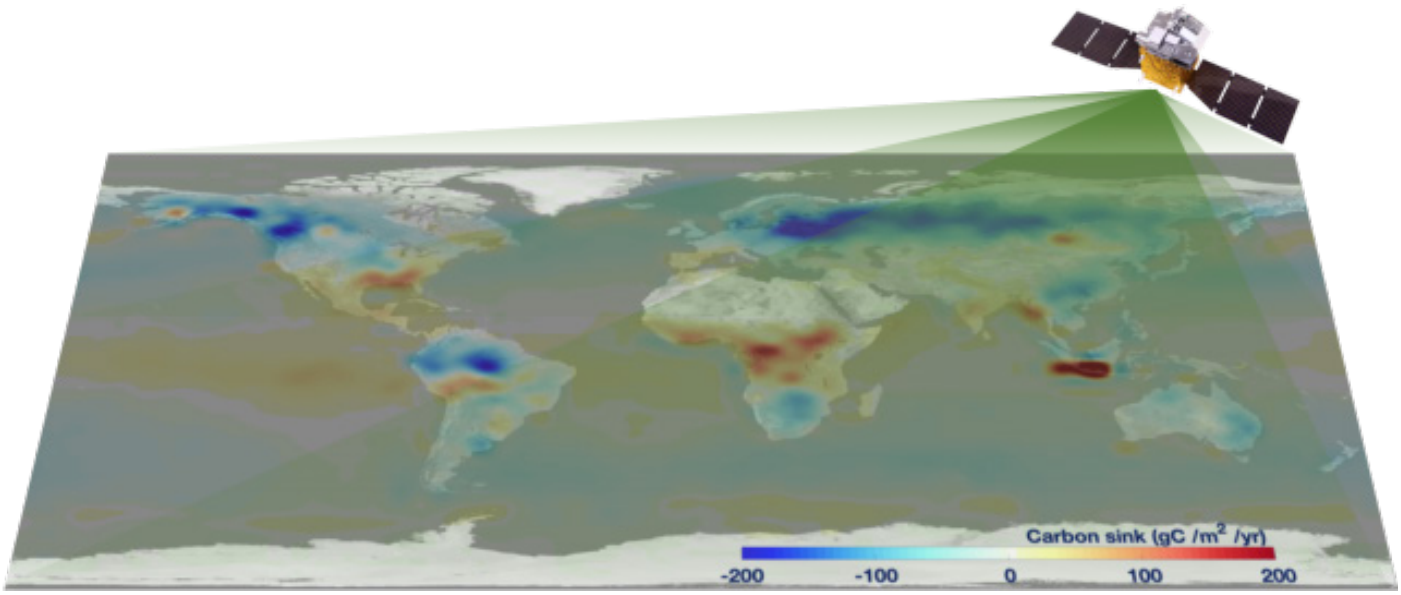
In a recent study published in *Nature Biomedical Engineering*, a research group led by Professor Xiao Haihua at the Institute of Chemistry of the Chinese Academy of Sciences (ICCAS) and Professor W. Mark Saltzman at the School of Engineering and Applied Sciences at Yale University developed a platinum-based nanodrug to tackle TMZ resistance.

The researchers first designed a reduction-responsive biodegradable polymer to encapsulate a platinum(IV) prodrug of oxaliplatin and a platinum(II) DNA intercalator 56MESS separately to form two nanoparticles. Secondly, the researchers established a TMZ-resistant patient-derived GMB primary cell line (GBM-PDC^{Resistant}) and an acquired drug-resistant transgenic engineered GMB cell line (GBM-Transgenic^{Resistant}) to screen the aforementioned platinum-based nanoparticles in vitro. They found that both of them can reverse TMZ resistance. Thirdly, the researchers further developed a TMZ-resistant patient-derived xenograft mouse model of GMB (GBM-PDX^{Resistant}) in vivo. Subsequently, with the help of advanced convection-enhanced delivery technology (CED), these nanoparticles were able to directly deliver drugs to the target brain area for bypassing the blood-brain barrier in mice. They found that nanoparticles loaded with the DNA intercalator 56MESS can work better to inhibit the growth of drug-resistant GMB tumors and prolong their survival rate. Finally, through RNA-sequencing, the researchers found that the signal transduction and metabolic pathways altered by 56MESS-based nanoparticles are quite different from those of TMZ, confirming their unique mechanism of action.

This work provides a new method of using reduction-responsive polymers to deliver platinum-based drugs combined with advanced CED techniques to treat resistant GBM.

For more information, please contact:
Professor Xiao Haihua
Email: hhxiao@iccas.ac.cn
Institute of Chemistry,
Chinese Academy of Sciences (ICCAS)

Source: Institute of Chemistry, Chinese Academy of Sciences (ICCAS)



[IMAGE: IAP]

China produces its first global carbon flux dataset

Chinese researchers have produced the country's first global carbon dioxide flux dataset based on observed data from the carbon dioxide monitoring satellite TanSat.

This means China is now capable of conducting quantitative spatial monitoring of the global carbon budget.

With the rapid development of atmospheric detection and model simulation technology, the method of tracing carbon emissions by observing atmospheric carbon dioxide concentration is considered effective for the evaluation of greenhouse gas emission reduction efforts, said Yang Dongxu, an associate researcher at the Institute of Atmospheric Physics under the Chinese Academy of Sciences.

China launched its carbon dioxide monitoring satellite TanSat on December 22, 2016, becoming the third country after Japan and the United States to monitor greenhouse gases by satellite.

The satellite's mission is high-precision monitoring of global atmospheric carbon dioxide concentrations, and provision of satellite data for scientific research.

Using the TanSat observation data, the researchers estimated the global terrestrial carbon net flux between May 2017 and April 2018. Their estimate was almost the same as those from Japan's GOSAT satellite and the American OCO-2 satellite.

Researchers establish an observed value and a simulated value for the amount of carbon dioxide in a given place at a given time, said Yang. They use data assimilation to reduce the differences between the two figures.

The results showed that the uncertainty was reduced by up to 50 percent compared with the previous flux.

The global carbon flux dataset facilitates the public's understanding of the impact of actions such as reducing carbon dioxide emissions and increasing carbon sinks according to climate change trends.

The achievement was recently published in the journal *Advances in Atmospheric Sciences*.

Source: Xinhua

Kevin lectures at a training course held by GIG for professionals from 12 countries.

A British environmental organic chemist's decades-long collaboration with China

Kevin C. Jones, Distinguished Professor at Lancaster University (LU) in the UK, received the Guangdong Science and Technology Cooperation Award earlier this year for his outstanding contributions to scientific collaboration between the UK and South China's Guangdong Province, with the Guangzhou Institute of Geochemistry (GIG) of the Chinese Academy of Sciences (CAS) as one of his nominators.

"It has been such a pleasure to work with colleagues at GIG for many years now, so it is a great honour to be nominated for this prestigious award by friends and collaborators," said Kevin, "Actually, it feels like the award is shared by all our team or 'research family'."

As one of the world's leading environmental organic chemists, Kevin has pioneered research into the sources, fates and effects of environmental pollution over the last three decades. In recognition of his achievements, he was elected a foreign member of the Norwegian Academy of Science and Letters in 2007 and awarded CAS's Visiting Professorship for Senior International Scientists when the program was first introduced in 2009.

With an extensive network of international partners, Kevin has collaborated intensively with a number of institutions in Guangdong Province. GIG has been one of the most important. "My links to GIG started with my friend and colleague Professor Zhang Gan, who came to work with me in the UK nearly 20 years ago now. We have maintained our links ever since," said Kevin.

The outcomes of the collaboration have been fruitful and multi-dimensional. One of them was the establishment of the monitoring network of atmospheric persistent organic pollutants (POPs) across countries such as China, Japan, South Korea, India, Pakistan, Thailand and Russia. The monitoring system, which has become a recognized tool for assessing global atmospheric POPs, contributes substantially to China's compliance with the *Stockholm Convention* and control of POPs.

>> **PAGE 9**

Kevin (front row, middle) and Professor Zhang Gan (back row, third from the right) at the signing ceremony of the joint announcement of I-RICE

>> **PAGE 8**

Kevin also played a leading role in founding the International Research and Innovation Centre for the Environment (I-RICE), a joint initiative by LU, GIG, and CAS's Institute of Urban Environment, in 2012. This has enabled LU and GIG to complement each other in research, share staff and equipment, and deliver joint PhD programs. The impact has reached far beyond that. As Kevin put it, "We have been able to build links, collaborations, teams and partnerships with many other scientists and organizations in China, and across the world... I think the GIG team has actually helped to pioneer this open and friendly spirit to international collaboration as a 'model' for other Chinese groups and research organizations."

In recent years, Kevin has been providing powerful support for GIG's endeavors to create an international research mechanism focusing on environment pollution and health in coastal zones along the 21st Century Maritime Silk Road. With his active participation, a training course was launched by GIG in Guangzhou in 2018, providing training on monitoring and risk assessment of persistent toxic substances for more than 20 professionals from 12 countries, including several involved in China's Belt and Road Initiative. In 2019, he assisted GIG in organizing the SETAC A/P Focus Meeting, where excellent scientists from around the world gathered to brainstorm international research schemes to address concerns on environment pollution and health.

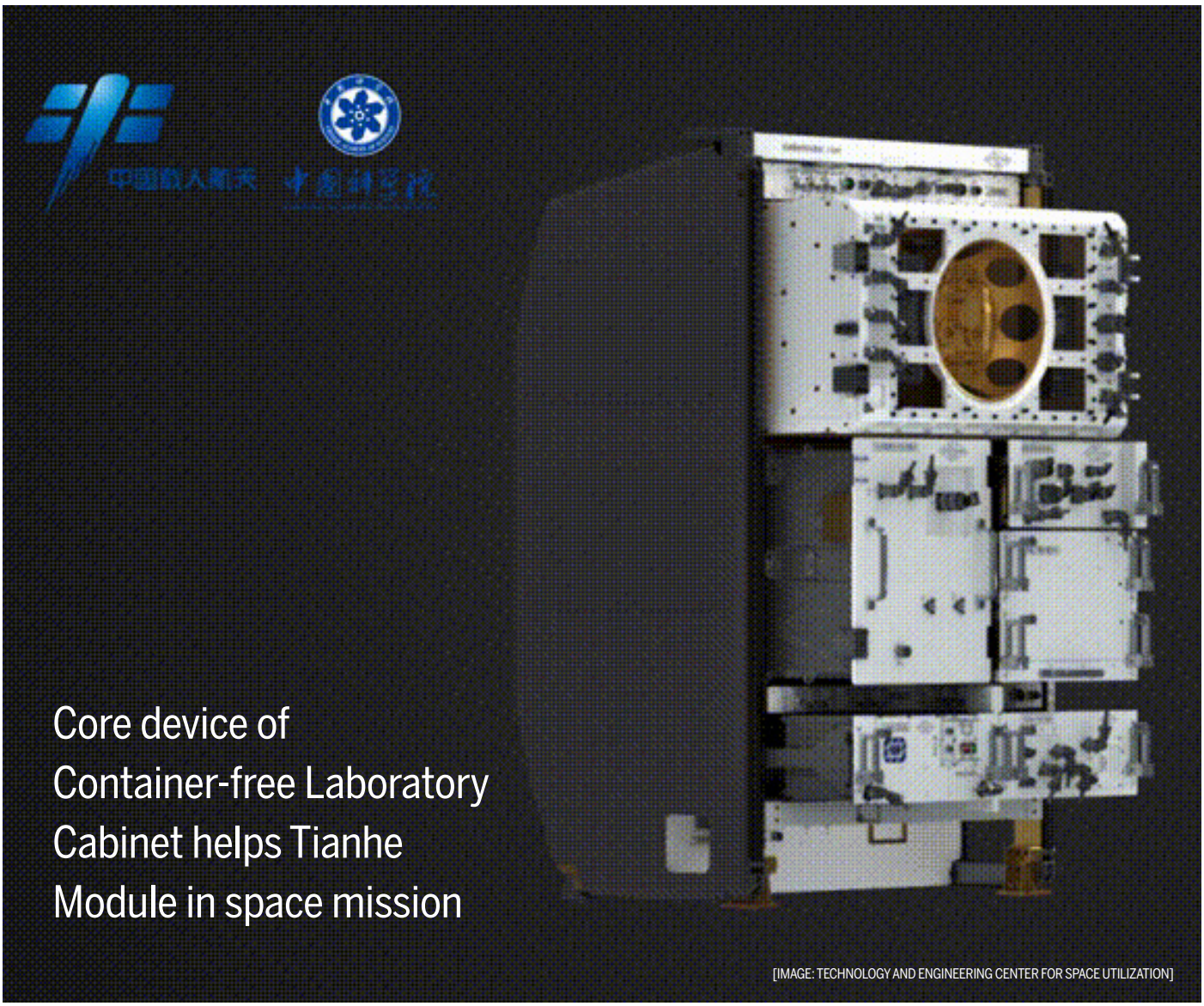
Kevin's influence on early-career scientists must also not be overlooked. So far he has hosted 17 visiting scientists and PhD students from GIG in his laboratories, and thanks to his coordination, six PhD candidates from EU countries spent 1-2 years conducting joint research at GIG with the support of the EuropeAid-funded project SEW-REAP. "We have seen young students grow up to become mature and leading scientists in their own right — establishing research expertise, labs and teams of their own — a very rewarding experience!" said Kevin.

A postdoc from Professor Zhang's research group recalled her first visit to LU years ago, "On a sunny afternoon, Kevin popped up in our office and treated us to ice cream, which was so lovely! His team had guest scientists from all corners of the world, Thailand, Turkey, Nigeria, Pakistan, Italy, Spain, China and more. He was open-minded and always welcomed discussion."

Looking back on his decades of collaboration with Chinese co-workers, Kevin said, "One of the wonderful things about international collaboration is experiencing different cultures and learning about different countries, their people and perspectives of the world. I remember some great trips around China, always shared with my friendly and kind hosts. We have enjoyed fantastic Chinese cuisine together in many provinces! It has been a special highlight for me to bring some of my UK, European and North American colleagues to China for the first time, and to see their eyes opened to the wonders of China, and to share travels and experiences together."

(Text by Wu Manqing from GIG, photos by Kevin C. Jones and GIG)

Source: Guangzhou Institute of Geochemistry (GIG), Chinese Academy of Sciences



Core device of Container-free Laboratory Cabinet helps Tianhe Module in space mission

[IMAGE: TECHNOLOGY AND ENGINEERING CENTER FOR SPACE UTILIZATION]

The Tianhe Core Module, the first part of a planned new space station of China, was recently launched. The core device of the Container-free Laboratory Cabinet, one of the two cabinets in the cabin, was developed by a collaborative research team from the Institute of Intelligent Machines (IIM) of the Hefei Institutes of Physical Science (HFIPS) of the Chinese Academy of Sciences (CAS) and CAS's Shanghai Institute of Ceramics (SIC).

"What we have been focusing on is the experimental chamber subsystem of the container-free materials," said Shi Yungao, Director of the Advanced Manufacturing Center of IIM.

They have been working on this chamber subsystem project for five years, over which they tackled the technical difficulties including the design and manufacture of a complex high vacuum cavity structure, the release and recovery of experimental samples and suspension position control.

Boasting the function of functionality in electrostatic levitation experiments, the device can shorten the operation time required of astronauts and improve the efficiency of scientific experiments and man-machine efficiency.

After being in orbit, it is expected to advance research into deep undercooling solidification processes, mechanisms of metals and nonmetals, the preparation of new functional materials, and precisely measure thermophysical properties of high temperature melts.

Tianhe means "harmony of the heavens" in Chinese. As one of the three main parts China plans to use to build its first self-developed, permanent space station, the module will house Chinese astronauts during stays of up to six months.

Source: Hefei Institutes of Physical Science (HFIPS), Chinese Academy of Sciences