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Major Progress of Innovation in 2021

By LU Zijian

The State Council Information Office held a press conference on February 25, at which Wang Zhigang, minister of science and technology, updated the media on China's progress in sci-tech innovation in 2021.

New achievements were made in innovation - driven development, said Wang. In 2021, China's R&D expenditure went up 14.2 percent year-on-year to 2.79 trillion RMB, accounting for 2.44 percent of its GDP. China has risen to 12th in the *Global Innovation Index 2021*, released by the World Intellectual Property Organization last September.

Last year, China strengthened its focus on the whole chain of basic research, technological innovation, commercialization and industrialization of sci- tech achievements, uplifting the inner impetus that drives economic and social development.

Facing the global sci- tech frontier, China supported the exploration of basic research and frontier technologies, which brought the emerging of a series of original and spectacular achievements.

The country also regarded economy as a key factor for development, arranging the industrial chain and innovation chain correspondently, boosting new impetus non-stop.

In terms of the country's major needs, China remained target - oriented, reinforcing the wholistic design of R&D projects and providing key solutions for its major needs using sci-tech as the logical start point and core element.

China also insisted on putting people and their lives first, regarding the improvement of people's health care as an important guidance for R&D.

The building of strategic sci - tech strength was accelerated, including that of national laboratories, national key laboratories, high - level research - oriented universities and research institutes, as well as the development of high-tech enterprises.

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The yield of double-cropping rice developed by Yuan Longping and his team exceeds 1,500 kg per mu at an experimental base in Yazhou District (Batou), Sanya city of Hainan. (PHOTO: XINHUA)

Paralympic Winter Games Kick off Tomorrow

By Staff Reporters

With 78 events across six sports, the Paralympic Winter Games Beijing 2022 will be held from March 4 to 13. The venues and corresponding facilities have been transformed from the Winter Olympics to better serve the athletes.

One key factor in the transformation is to create a barrier- free environment for athletes, staff and audience. The 108 related places and surrounding areas, including competition venues, Olympic villages (Paralympic villages), hospitals and restaurants, have been checked on many occasions to ensure that the barrier-free transformation was complete, according to Dong Lianmin, vice chairman of Beijing Disabled Persons' Federation, at a press conference on February 20.

Special attention was paid to detail. For example, the best viewing spots in the stadium were reserved for those who are wheel chair bound. ***See page 3***

Editor's Pick

Nanfan: Breeding Seeds of Hope

By WANG Xiaoxia

Yuan Longping, the late "father of hybrid rice," once said the success of hybrid rice should be attributed to "Nanfan."

Nanfan is a process that accelerates the seed breeding process in south China's warmer climate, greatly improving the adaptability of varieties, and bearing more than 70 percent of new crop varieties in the country. If Yuan's hybrid rice is one of the masterpieces of China's agricultural science and technology, Nanfan is the collection of them, making a great contribution to China's food security.

Seed breeding, as vital agricultural core technology, was once again noted in China's newly unveiled "No. 1 central document" for 2022. Stepping into the new era, China is building a "Nanfan Silicon Valley" that integrates scientific research, production, sales, sci - tech exchanges and achievement transformation.

Improved conditions

Beginning in the late 1950s, thousands of Chinese agricultural experts began migrating to Hainan, the country's largest Nanfan breeding base, from September to May every year. They used the sunlight and temperature on the island to search for more seed breeding possibilities, while enduring harsh living conditions.

Farmer scientist Li Denghai recalled the early years of his career in Hainan. He arrived to research corn breeding in 1978, and lived in a thatched house, sometimes sleeping in the fields to protect the materials, covered with sacks to protect himself from mosquitoes.

After years of effort, Li's high-yield corn varieties have increased the country's output by more than 100 million tons. The seed company Li founded has established 17 well- equipped breeding bases in Hainan.

Cheng Xiangwen, an 86 - year - old agronomist, has spent nearly 60 spring festivals in Hainan, since he first arrived to develop improved corn varieties in 1964.

Now, authorities have approved 14 new, high - yield corn varieties that Cheng helped develop. Among them, the series of "Jundan" has been promoted in more than 300 million mu (1 mu is about 667 square meters) of land in China.

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Sci-tech Cooperation with 84 BRI Countries Set up

By Staff Reporters

By the end of 2021, China had established sci - tech cooperative relationships with 84 countries along the Belt and Road Initiative (BRI), supporting 1,118 joint research projects. There are also 53 joint laboratory projects in agriculture, new energy and health care.

In terms of cooperation in agriculture, an international joint laboratory of water saving irrigation was established by China's Ningxia University and Egypt's Ain Shams University in 2019. The two countries built two test sites for a smart water saving irrigation system using wind solar hybrid power in two farms in Egypt, covering 320 mu.

All tunnels were buried underground, and the irrigation system can cover 50 mu farmland an hour, operated from a smart phone. In cooperation with local enterprises, the system is set in farmland of more than 30,000 mu, benefiting the agricultural industry in the desert areas.

There is also cooperation in other sci-tech fields. Last December, the Innovation Academy for Microsatellites of Chinese Academy of Sciences and the Foundation for Science and Technology Portugal (FCT) established a joint laboratory STARLab, aiming to cooperate further in sea and space sciences. Before that, China and Portugal had already started cooperation and the latter is the first country from the European Union to establish a "blue partnership" with China.

Apart from joint laboratories and research projects, there have been more than 30 bilateral or multilateral technology transfer centers built between China and countries which joined BRI. Since 2016, around 180,000 sci- tech personnel have come to China for exchange and training, and more than 14,000 young scientists for short- term sci- tech research work.

Industrial parks were also built. In the suburb of Minsk, capital of Belarus, the Great Stone Industrial Park jointly built by China and Belarus has attracted more than 80 enterprises from 15 countries. Vehicle - mounted supercapacitors produced in the park have been installed in local buses as batteries, offering green commuting services to local residents.

An agriculture exhibition is held at the Great Stone Industrial Park in the suburb of Minsk, capital of Belarus. (PHOTO: XINHUA)

WWD, Committed to Wildlife Protection

By WANG Xiaoxia

Today is 9th World Wildlife Day (WWD). The day is the most important global annual event dedicated to wildlife established by UN General Assembly on March 3, 2013, in honor of signature of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) in 1973.

This year's theme "Recovering Key Species for Ecosystem Restoration" draws attention to the critically endangered keystone species, to support the restoration of their habitats and ecosystems and to promote their sustainable use by humanity.

In 1981, China became the 63rd party to CITES. Over the past 41 years, the country has promoted the implementation of the convention, taking action and making remarkable progress in ecological protection and green economic development.

With unremitting efforts, 90 percent of China's vegetation types and terrestrial ecosystems, 65 percent of higher plant communities and 85 percent of key protected wildlife populations have been effectively protected, according to the National Forestry and Grassland Administration (NFGA).

The giant panda, crested ibis, Cycas, Chinese dove tree (Davidia involucrata Baill) and other endangered species have all achieved recovery and growth. Wild giant pandas have been downgraded from "endangered" to "vulnerable," as the population living in the wild exceeded 1,800 in 2021. Meanwhile, the number of Tibetan antelopes in the wild has increased from 60,000 - 70,000 in the 1990s to 300,000 - 400,000 in 2021, according to the NFGA.

In terms of habitat restoration, the first batch of national parks, Sanjiangyuan National Park, Wuyi Mountain National Park, Giant Panda National Park, Northeast China Tiger and Leopard National Park, and Hainan Tropical Rainforest National Park, were established in October 2021.

A total of 230,000 square kilometers of land has been protected, which covers nearly 30 percent of the key terrestrial wildlife species found in China. The condition of the flagship species in national parks continues to improve, said NFGA's Sun Hongyan.

However, Sun said the development of national parks should benefit not only wild fauna and flora but also people living there. Efforts are being taken to facilitate an all-round green transformation in economic and social development, featuring harmonious human-nature co-existence.

For example, the Northeast China Tiger and Leopard National Park is expected to provide 10,000 jobs in ecological conservation and increase local farmers' incomes. The Giant Panda National Park has selected and promoted eco-friendly products such as "Panda Tea" and "Panda Honey". The Wuyi Mountain National Park has improved its ecological compensation mechanism, and guided tea enterprises and farmers to build ecological tea gardens with high standards.

WEEKLY REVIEW

One Single Rocket Brings 22 Satellites into Space

China launched a Long March-8 rocket to place 22 satellites in space on February 27, setting a domestic record for the most spacecraft launched by a single rocket. These satellites will be mainly used for commercial remote sensing services, marine environment monitoring, forest fire prevention and disaster mitigation.

High- tech Zones Have Shown Strong Growth Momentum

The annual revenue of the China's 169 state - level high - tech zones is expected to exceed 48 trillion RMB in 2021, up about 12 percent year on year, according to Shao Xinyu vice minister of science and technology last Friday.

Deep Space Exploration Laboratory Established

China's deep space exploration laboratory, co - established by the CNSA, Anhui province and the University of Science and Technology of China, was officially inaugurated on February 25. It will carry out research on major national projects in deep space exploration and promote the transformation of research achievements.

Evidence to Support Broader Application of Acupuncture Therapies

Professor Xu Nenggui and his team from Guangzhou University of Chinese Medicine made systematic reviews of acupuncture therapies and formulated the world's first clinical evidence atlas of acupuncture. This research was published in the *British Medical Journal* on February 25.

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Double First-class Initiative Enters a New Phase

By LI Linxu

Aiming to build more world-class universities and disciplines, China expanded Double First-class Initiative list on February 11.

The list now consists of 147 universities, up by seven percent compared to the previous list, and 331 disciplines, ranging from science and engineering to social sciences.

Meanwhile, 16 disciplines at 15 universities have been warned and told they must improve to preserve their status on the list, with their progress to be reviewed again in 2023.

The initial plan, conceived in 2015, is going to develop a growing number of world-class universities and disciplines by 2030 and build an education powerhouse by 2050.

As a flagship initiative to boost the high-quality development of China's higher education sector, it runs in a five-year cycle.

In its first round, significant progress has been made in terms of faculty team, talent cultivation, key core sci-tech breakthroughs, international cooperation, as well as governance mechanisms, said an official from the Ministry of Education (MOE) during a media briefing, adding that more efforts should be made to meet the urgent needs of the country's economic and social development.

Degree Awarding Ceremony of Beijing Institute of Technology. (PHOTO: XINHUA)

In the new round, the initiative will focus on serving national strategic needs, developing top talent for the country, striving to make breakthroughs in key core technologies, boosting the country's competitiveness internationally, and optimizing management and evaluation mechanisms, said a MOE's official, suggesting that the government will increase investment in basic research and emerging interdisciplinary subjects.

Of note is that Peking University and Tsinghua University are empowered to develop disciplines at their own discretion during this time.

Peking and Tsinghua were the only two Chinese mainland's universities in the top 100 of four prominent global rankings for the world's top universities in 2015, when the country first conceived the initiative.

Since then, more and more Chinese universities have joined those global lists, including Shanghai Jiao Tong University, Fudan University, Zhejiang University, and the University of Science and Technology of China.

Last year, Chinese mainland's universities dominated in the Times Higher Education (THE) Asia University Rankings 2021, with a total of 91 universities coming from Chinese mainland in the ranking.

Prior to the updated list, an important policy concerning further implementation of the Double First-class Initiative was released by the MOE, in conjunction with the Ministry of Finance and the National Development and Reform Commission.

The policy attaches great importance to the cultivation of strategic sci-tech talent in key core fields and first-class leading talent and innovative teams.

International cooperation is also greatly highlighted in the policy, calling for further promoting of high-level opening and cooperation, and deeply integrating into the global innovation network, while actively participating in the research of major global issues.

Internationally competitive and attractive high-end platforms, resources, and environment will be provided, so as to attract global talent coming to work in China, as per the policy.

Tech Experts Gather to Further 6G Development

By Staff Reporters

"Online discussion + Remote interaction," that's the theme for the 2nd Global 6G Conference to be held in Nanjing from March 22 to 24. Technology academics from China and other countries will focus on topics such as 6G application scenario and requirement, 6G network architecture and 6G wireless transmission technology.

The Conference will include one symposium, nine theme forums, and two international panel discussions during the three-day session. Universities and colleges, research institutions, telecommunication operators, equipment manufacturers from countries around the world, including the U.S., UK, Canada, Finland, Sweden, Japan, Singapore, Greece and Saudi Arabia will attend. It is expected that a multiple white paper series on 6G technology will be released.

As 5G technologies are already commercialized on a large scale, research on next-generation mobile communications has begun in the industry around the world. Based on 5G, 6G will further develop from serving people and things, to supporting the efficient interconnection of intelligent terminals. It is expected to link the real physical world with the virtual digital world, continuing to improve people's quality of life and encouraging the transformation and upgrading of social production methods.

Some countries such as China, the U.S, South Korea and Finland have launched 6G research projects, catalyzing the development of 6G technology by increasing funding for R&D.

China has prioritized the development of 6G. The *Outline of the 14th Five-Year Plan (2021-2025)* clearly states that, "The forward-looking 6G network technology reserves need establishing." It has successively established the National 6G Technology R&D Promotion Working Group and General Experts Group and IMT-2030 (6G) Promotion Group, which contribute to the work of 6G.

Since 2019, FuTURE FORUM the Conference organizer has launched a series of 6G white papers on 15 themes, such as application requirements, new antenna technology and space-air-ground integration. This research has comprehensively directed the current innovation path of 6G.

The 2021 Global 6G Conference will comprehensively present innovative ideas and the latest achievements in 6G technology R&D and build a bridge for global sci-tech cooperation and collaborative innovation. The Conference is expected to contribute to establishing globally unified 6G standards and support the sustainable development of the information and communication industry.

Case Study

Sanjiangyuan National Park: An Ecology Protection Solution

By ZHONG Jianli

In recent years, China has made great strides in developing its national park system.

The system aims to maintain the integrity of natural ecosystems, protect biodiversity, and leave precious natural assets to future generations.

In 2021, the first batch of five national parks, including the Sanjiangyuan National Park, were officially established. This is not only a milestone in the development of China's ecological civilization, but a landmark in the history of nature conservation in the world.

A snow leopard, captured by an infrared camera in Sanjiangyuan National Park, July 2020. (PHOTO: XINHUA)

An example of ecological protection

Located in Qinghai province, Sanjiangyuan National Park, with a complete ecosystem, is the largest national park in China. Known as the "water tower of China," it is home to the headwaters of the Yangtze River, Yellow River and Lancang River.

Before the Sanjiangyuan National Park was set up, thanks to more than a decade of ecological protection and restoration, the degradation of its ecosystem was alleviated. The water resources increased by nearly eight billion cubic meters, and the grassland yield rose by 30 percent.

However, some problems constantly emerged as the area was previously managed by different departments or jurisdictions.

To end the segmented management of the Sanjiangyuan area, Qinghai province upgraded its policy system. Eighteen management policies and four technical standards for developing the area were formulated. In addition, a standardized and unified system for protecting the natural reserves was finally formed.

With all these efforts, the protected area of Sanjiangyuan was expanded to more than 190,000 square kilometers, covering 15 towns and 68 administrative villages.

To date, 109 natural reserves of various types in Qinghai province have been integrated into 79. A new system of protecting natural reserves, centering on the national park, has basically taken shape in the province.

"One household, one post" system

Different from national parks in other countries, a lot of herdsmen live in the Sanjiangyuan National Park. How to ensure they live a better life while protecting the ecological environment is a big question facing the authorities.

The idea of employing park rangers was proposed, and the "one household, one post" system was established.

Under this system, as long as one member of the household is hired as a park ranger, the whole family can participate in the subsidized job.

According to statistics, 17,211 herdsmen have been hired as park rangers, and the average annual income of each household has increased by 21,600 RMB.

This system not only helps herdsmen increase their incomes, but also enables them to participate in the management of the national park, reflecting the harmony between human and nature in the park.

Policy Watch

Revised Sci-tech Progress Law Highlights Openness, Sharing

By CHEN Chunyou

China's commitment to open science through legislation has been placed front and center in a revised version of its *Law on Progress of Science and Technology*, which came into effect on January 1, 2022. This is born out by the fact that in the previous version of this law the word "openness" appeared three times, while in the latest legislation, it appeared 15 times.

According to Yan Wenjun, a professor of University of Chinese Academy of Sciences, the open science movement aims to remove access barriers to scientific research, enabling researchers to share findings, data and facilities, and promoting the free dissemination of science.

Many global challenges today need to be solved by cross-regional and interdisciplinary cooperation, said Yan in an article published on *S&T Daily*, noting that the traditional communication and management mode, characterized by seclusion and paid use, hinders the openness and sharing of sci-tech resources and affects innovation.

Since the 21st century, the call for open science has become more and more popular. China has taken the lead in legislating for open science.

The phrase "openness and sharing" appeared four times in the revised law. Article 24 of the law stresses the openness and sharing of the basic research bases, saying that the building of these bases will be strengthened nationally.

For research institutes already funded, article 54 stipulates that a mechanism for opening and sharing sci-tech resources should be established and improved, so as to facilitate effective utilization.

The sharing mechanism in article 46 of the former version of the law mainly refers to the sharing between sci-tech R&D institutions. With the word openness added in the revised version, the sharing becomes open to the public. The scope of sharing is therefore greatly expanded.

In addition, there are new regulations on the openness and sharing of non-state-owned sci-tech resources, noting that the R&D institutes established by social capital are encouraged to open and share sci-tech resources to a reasonable extent. This is absent in the former version.

In terms of the openness and sharing in regional sci-tech innovation, article 77 says that major national strategic regions can rely on regional innovation platforms to establish a benefit-sharing mechanism, and push ahead with the openness and sharing of scientific instruments, equipment and sci-tech information resources, to improve the efficiency of regional commercialization of sci-tech achievements.

The regulations on openness and sharing mainly revolve around sci-tech resources. Yan said this is vital to both basic research and regional sci-tech innovation.

There is a long road ahead to fully open up science. Based on the international experience and Chinese situations, the revised law proposed new regulations on open science. Yan believes it will work as a guide and standard for law legislation in the future, and exert a profound influence on Chinese sci-tech progress.

UNESCO Recommendation on Open Science adopted in 2021. (PHOTO: VCG)

Nanfan: Breeding Seeds of Hope

From page 1

Over the years the Chinese Government has improved the working and living conditions for agricultural experts on the island. 268,000 mu of land was designated for Nanfan base. Laboratories, apartments, schools and hospitals have also been built. This has allowed scientists to focus their energy on seed breeding.

Common mission

On October 26, 2021, at an experimental base in Yazhou District (Batou), Sanya City, the yield of double-cropping rice developed by Yuan Longping and his team exceeded 1,500 kg per mu, fulfilling Yuan's last wish.

Yazhou, 40 kilometers west of downtown Sanya, has seen many breakthroughs in seed industry development, which has become a common mission for the community.

The Sanya Yazhou Bay Science and Technology City has pooled a variety of talent and resources, in the process attracting more than 20 institutes and universities, along with 420 agriculture-related enterprises. Libraries, classrooms and labs are open to all students, and even courses and teachers can be shared.

On November 29, 2021, the Hainan Yazhou Bay Seed Laboratory unveiled the first batch of major projects, and the project leaders made a pledge to fulfill 75 major tasks. There is no upper limit for funds, only assessment, said Xia Mian, director of the laboratory's cooperation and exchange department.

To transform research results into productivity, a public service platform was established to facilitate transaction of intellectual properties (IP). More than 2,000 IPs were sold at a high price in Yazhou, among the 20,000 IPs listed at the platform.

Spiritual heritage

Seed breeders harvest better crop varieties, which also breeds the Nanfan spirit of brave, pioneering, innovative and practical.

Cheng Xiangwen still goes to the field every day, dedicated to breeding high-yield corn varieties with stronger resistance that are easier to harvest with machines. Most of his life has been spent studying and cultivating corn.

Today the Nanfan spirit is being embraced by young farmers, who still work in the fields, using more technology than their predecessors.

Zhu Lin, PhD student from the China Agricultural University, said that compared with the pioneers, they use more advanced equipment and convenient facilities and will take full advantage of local conditions.

"Top agricultural experts in China gather here. We learn from their experience as well as their spirit," said Wei Yuanhao, postgraduate student from Nanjing Agricultural University, impressed by the openness and sharing of knowledge in Yazhou.

"The amazing innovative environment inspires me to do something for the seed industry," said Di Mengliang, R&D staff member from Hainan-based Yuan Longping High-tech Agriculture Co., Ltd, whose estimated value exceeds 2.5 billion RMB.

Dereliction of Duty: U.S. Flunking Its COVID-19 Pandemic Exam

A makeshift hospital in Central Park, New York in 2020. (PHOTO: VCG)

Voice of the World

By QI Liming

The U.S. Department of Health and Human Services (HHS) has "persistent deficiencies" in its ability to prepare for and respond to public health emergencies, and past public health emergencies dating to 2007, U.S. congressional auditing agency warned in a report released in January, citing concerns raised by the COVID-19 pandemic.

Based on infectious- diseases surveillance data and securing appropriate testing and medical supplies, HHS is at "high risk" of botching a future crisis, said the Government Accountability Office (GAO), noting that the department failed to implement some previously made recommendations to improve its pandemic response.

In another report in late January, titled *New GAO Report: HHS Faces Outstanding Issues as it Assumes Vaccine Responsibilities*, GAO had warned that HHS appeared unprepared to assume full responsibility for the nation's COVID-19 vaccine program.

Analysis of adverse pandemic prevention in the U.S.

The Heritage Foundation's Senior Fellow, Robert E. Moffit elaborated on U.S. government's long and shameful record of failures in battling COVID-19.

Moffit said that the data deficiency has been particularly serious with the Centers for Disease Control and Prevention (CDC). Analysts at the Heritage Foundation have identified CDC's repeated failure to modernize its data collection and dissemination for frontline health care workers as a major weakness. The problem persists, even though Congress statutorily authorized data modernization as far back as 2006.

HHS has also failed to provide "clear and consistent communication" to the public and other policymakers. That included information on vaccine distribution and dosage, the use of medical equipment, and, of course, testing.

The loss of trust is perhaps the biggest failure. Hypocritical politicians who blatantly violated their own COVID-19 rules have contributed heavily to undermining public trust. Public health authorities also played their part, with mixed messaging on such topics as the efficacy of masking, mandates, and massive lockdowns, while suppressing scientific and medical dissent.

In the aftermath of the COVID- 19 pandemic, Americans must hold these public officials accountable. That day cannot come soon enough, Moffit concluded.

Public criticism in the U.S.

According to Johns Hopkins University, by the end of February 27, the U.S. has had the world's largest official death toll from the coronavirus pandemic, with more than 948,400 recorded deaths. The total number of cases stands at more than 78.9 million.

According to the data collected by Pew Research Center in February, there is increasing public criticism and confusion over the COVID-19 response in the U.S. and 58 percent of Americans favor vaccine requirement for air travel.

Nearly two years after the coronavirus outbreak took hold in the U.S., Americans are increasingly critical of the response to COVID-19 from elected office bearers and public health officials.

Amid debates over how to address the surge in cases driven by the omicron variant, confusion is now the most common reaction to shifts in public health guidance: 60 percent of U.S. adults say they've felt confused as a result of changes to public health officials' recommendations on how to slow the spread of COVID- 19, up seven percentage points since last summer.

Positive ratings of public health officials have fallen 10 points since last August and are well below ratings for their initial response to the outbreak in early 2020.

Opinions from officials and congressmen

"The department's [HHS] response to the COVID - 19 pandemic has highlighted long- standing concerns we have raised about its ability to execute its role leading federal public health, and medical preparedness for, and response to, such public health emergencies," said the GAO report, which was shared with nine congressional committees.

During the COVID - 19 pandemic, many Americans have been confused by shifting guidance from the CDC as to what they can do to protect themselves and people they interact with. "The American people have stopped listening to the CDC because of their confusing and conflicting guidance — justifiably so," said Senator Richard Burr when releasing bipartisan legislation to overhaul the government's pandemic response.

Senator Patty Murray, Burr's counterpart in the Senate, said that "The pain of this pandemic is unforgettable, and we have a responsibility to make sure its lessons are unforgettable, too."

Only Cooperation will Bring Environmental Benefits

Opinion

By YU Haoyuan

Greenhouse gas emissions and soil degradation are just some of the pressing environmental challenges facing the planet, with many countries realizing the severe circumstances need urgent attention. Resolving the issue, however, is going to take the collective effort of all nations working together.

In this regard, the world is still faced with competition over collaboration. Recently, the Biden administration extended tariffs on China's solar modules, which means it is difficult for the products to enter U.S. market.

Clean energy should be an essential sector for the world's two biggest economies to cooperate in and benefit people around the world, which makes it seem ridiculous for the U.S. to thwart environmental cooperation.

Over the past decade, the U.S has often interfered in China's export of solar panels and asked its allies to follow suit. During this period, the U.S. has twice imposed so- called "anti - dumping duties" on China, not to mention the number of seizures of Chinese photovoltaic (PV) products.

Despite this suppression by the U.S., China has continued to demonstrate its determination to replace fossil fuels with low-carbon renewable energy.

The recently concluded Winter Olympics Games Beijing 2022 is a great example. All 26 stadiums' electricity was provided by 100 percent solar and wind energy, and more than 700 clean energe vehicles were put into use for transporting athletes. *Nature* quotes Michael Davison, assistant professor in the U.S. School of Global Policy and Strategy, saying that Beijing 2022 has shown that a broader carbon- neutral world is possible and the Games reduced carbon emissions by about 1.3 million tons.

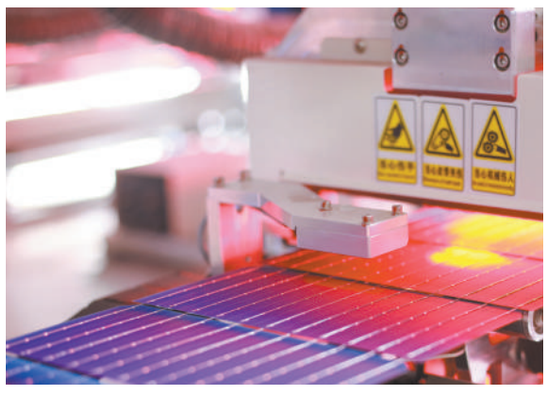
China has been gradually accelerating its energy transition since announcing it would invest more in renewables manufacturing in 1995. Through years of collaborations with multiple countries, including Germany, the UK and the U.S., China has already taken the lead in clean energy production figures. According to the Center for Strategic and International Studies, China is now the largest wind and solar energy producer and the largest renewable energy investor worldwide.

The data released by the China Photovoltaic Industry Association shows that China has exported many PV products to different countries such as Spain, Japan, the Netherlands and Vietnam over the past few years. It is believed that the lower cost and the massive use of clean energy will bring benefits to reduce gas emissions globally.

The solar panel ban from the U.S. could bring a shortage of material supply for the Chinese PV industry, which may cause a shortage of clean energy products and increase the global cost of clean energy production.

Global energy expert, Wood Mackenzie, recently released a report outlining that nearly 70 percent of global manufacturing of solar modules is made in China. Moreover, China's increasing technological advancement is expanding strong productivity and lower cost of solar panels, which will meet the global emissions targets "harder than ever if without greater dependence on China."

Only cooperation, not conflict can benefit all. China has shown its efforts toward environmental issues. The U.S. should stop pursuing hegemony and shift its policy to cooperate more with other countries, especially China.



A solar module assembly line in China. (PHOTO: XINHUA)

NSB Calls for International Engagements

Comment

Edited by QI Liming

A new data- rich report, known as *Science and Engineering Indicators*, was released by the National Science Board (NSB), National Science Foundation (NSF)'s oversight body, in late January this year.

Drawing on statistics gathered by the NSF and compiled in a series of policy- neutral collections, the report confirms that China has overtaken the U.S. as the world's leader in several key scientific metrics, including the overall number of papers published and patents awarded.

Annual R&D spending

The new report notes that total global R&D spending has tripled over the past two decades, with much of the growth driven by China and other Asian countries.

Accordingly, the U.S. contributed 23 percent to growth in global R&D performance from 2000 to 2019, whereas China alone contributed 29 percent to growth in global R&D, buoyed by its high annual R&D growth. The annual increase of China's R&D spending, averaging 10.6 percent annually from 2010 to 2019, continues to greatly exceed that of the U.S., with an annual average of 5.4 percent from 2010 to 2019.

Consequently, the share of global R&D performed by the U.S. declined from 29 percent in 2010 to 27 percent in 2019, while China's share increased from 15 percent to 22 percent.

International patents granted

The report also examines trends in other measures of scientific activity that largely correlate with the trends in spending. For example, the share of international patents granted to inventors in the U.S. and other high- income countries declined over the last decade, whereas China's share increased from 16 percent in 2010 to 49 percent in 2020. China ranked No.1 in terms of international patent applications in 2021.

Knowledge- and technology-intensive industries

In addition, China has continued to increase the output in "knowledge- and technology- intensive industries," a metric that tracks the transfer of science and engineering (S&E) capabilities to the marketplace. China surpassed the U.S. in total manufacturing output of those industries in 2011.

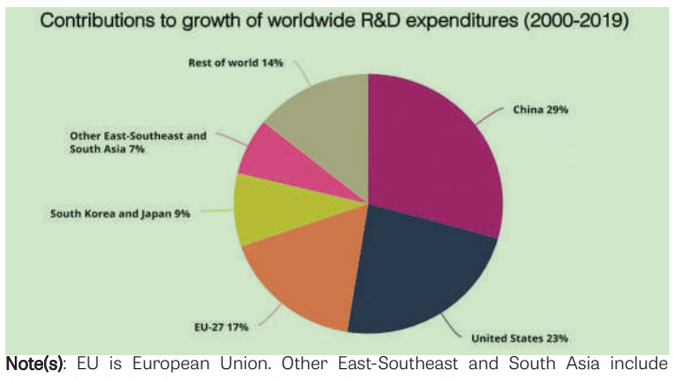
The report further stresses that "U.S.- trained S&E doctorate recipients who are on temporary visas at the time of graduation are a vital source of science, technology, engineering and mathematics (STEM) workers," and the policy mentioned in the report asserts that the country's ability to attract and retain scientific talent should not be taken for granted. According to *Science*, this situation urges the U.S. government to maintain a "clear, consistent, and predictable visa system, and ensure that those who come here feel welcome and secure."

STEM workforce

According to the report, for decades, the U.S. has led the world in the number of S&E doctorates awarded (41,000 in 2018); however, China is closing the gap. Indeed, as of 2007, China surpassed the U.S. in awarding the most doctorate degrees in natural sciences and engineering (excluding social and behavioral sciences). In 2018, China awarded nearly 38,000 doctorates in natural sciences and engineering while the U.S. awarded 31,000.

The vitality and diversity of the U.S. STEM workforce are major concern for NSB, which highlights the "missing millions" of members stemming from the under- representation of women and Black, Hispanic and Indigenous people across various fields.

Women and minorities continue to be underrepresented in this segment of the labor force. According to NSB, the number of women and Black workers must double, and the number of Latinos triple, for it to reflect the true demographics of the country.



Note(s): EU is European Union. Other East-Southeast and South Asia include Cambodia, India, Indonesia, Malaysia, Mongolia, Myanmar, Nepal, Pakistan, Philippines, Singapore, Sri Lanka, Thailand, Vietnam and etc.

(DIAGRAM: SCIENCE AND ENGINEERING INDICATORS.)

Strengthening international collaborations

NSB calls for forging closer ties between academia and industry, and keeping borders open to promote international partnerships.

Given the reported trends, the board concludes in its policy brief that the U.S. "no longer leads by default" and advocates the U.S. to position itself as a "keystone" in the global R&D ecosystem.

To be a keystone of global science and engineering means strengthening international collaborations and engagements, not withdrawing from them. It means being a dependable partner and responsibly fostering open exchanges of ideas and people across fields, public and private sectors, and borders. It means being a hub of the worldwide S&E talent flow.

Hi! Tech

SpeeChin: A Voiceless Siri

By Staff Reporters

Imagine commanding a smart device without speaking or clicking a button? Now, thanks to an electric necklace invented by Cornell University, this is entirely possible .

Called SpeeChin, the necklace is not made up of silver, gold or semi-precious stones like conventional jewelry, but instead holds an upward facing infrared camera to capture images of the human neck and face under the chin. Based on a special machine algorithm, SpeeChin can translate a user's jaw movements into instructions and directly command the paired smart device, just like using Siri without voice.

According to the experiments, the necklace can recognize simple English and Mandarin with an average accuracy of 90.5 percent and 91.6 percent respectively.

Designers hope that it can make increase the convenience of using a smart phone in places requiring a quiet environment. In addition, people who cannot speak because of the illness can also benefit from SpeeChin.

Paralympic Winter Games Kick off Tomorrow

From page 1

Locker rooms, bathrooms and barrier- free guest rooms were all designed with slopes, round corners and low levels.

On the other hand, sci- tech facilitates the Paralympic Games in many ways. Smart phones can offer a barrier-free navigation service, while for the hearing impaired, the digital sign language interpreter system could help them enjoy the Games. In addition, the cable- stayed barrier - free elevator at the Badaling Great Wall Station drops around 80 meters, the first of its kind in China,

The lights, air conditioners and curtains in the Olympic villages (Paralympic villages) are controlled autonomously. Inductive sensing systems and voice prompt systems were also adopted to better satisfy the need of Paralympians.

Apart from guaranteeing the smooth and steady operation of barrier-free facilities, more attention will be given to detailed and humanized services, said Dong.

Major Progress of Innovation in 2021

From page 1

On the issue of key reform tasks driven by both sci- tech innovation and institutional innovation, good effects have been achieved regarding continuous advancement of these tasks.

China has also deepened sci- tech openness and cooperation with the idea of mutual benefit, strengthening the multi-level governmental and civil international sci-tech cooperation.

In 2022, the Ministry of Science and Technology will focus on the solid implementation of sci-tech policies, intensifying the building of national strategic sci- tech strength, strengthening the development of basic research and strategic high- tech, highlighting the principal role of enterprises in innovation, constructing a team of sci- tech talented person, optimizing the environment for sci-tech innovation, uplifting the level of sci-tech openness and cooperation, supporting and leading the high- quality development of the economy.

Dialogue with Foreign Expert

China: Democracy that Works Well

Editor's note:

The Two Sessions, the annual gathering of the nation's top legislature and political advisory body, will begin on March 4 this year. The events will provide an excellent opportunity for outsiders to witness democracy and the rule of law at work in China's political system. Several thoughtful foreign experts were invited to discuss what they saw and their connection with China. Their views highlighted a more open and inclusive China as well as the accomplishments China has made in recent years.

Mark Levine is receiving an interview with S&T Daily. (PHOTO: S&T DAILY)

Mark Levine is an American sociologist who moved to China in 2005 following nearly three decades in the United States as a volunteer labor/community organizer. Currently, he is a professor at Minzu University of China. As a long-standing friend of China and sociology scholar, Levine shared his perspectives on the Two Sessions, China's poverty alleviation efforts and the Winter Olympic Games Beijing 2022.

Based on his recent involvement in an activity related to the National People's Congress (NPC) , he told a story about three female NPC deputies to exemplify ordinary people's participation in the decision-making process, emphasizing that China's quality democracy depends on people getting involved, making themselves heard, and-more importantly, having their demands met.

He emphasized that, in contrast to legislators in the West who make a career out of politics, China's NPC deputies, like the examples he cited previously, work part-time and are made up of ordinary citizens from all walks of life, including film projectors, farmers, and bus drivers. He added that China is doing a much better job of taking care of the entire society, listening to the people, and unleashing their potential rather than serve a specific group from a distance. "It is wonderful to see deputies living and working in the communities they serve. However, what they have done has a direct effect on people's day-to-day lives," Levine explained.

Levine has conducted a fairly comprehensive study of China's poverty alleviation work. He outlined several of China's accomplishments and emphasized that the Communist Party of China's strategy is to stand with people and make their voices heard, ensuring that the gains from campaigns are sustained. At the same time, it fully demonstrates that People-centered philosophy is the fundamental driving force behind China's cause of poverty reduction.

Levine joked that he is not a fan of winter sports in reference to Beijing 2022. He was, however, fascinated by the television programs and clips that circulated on the internet. Throughout the process, science and technology innovation has been a defining feature of Beijing 2022. Levine lauded the sci-tech elements incorporated into Beijing 2022, saying, "I do not have any reason to say Beijing 2022 was not a success." What impresses him is China's ability to strike the ideal balance between hosting such a grand event and successfully containing the COVID-19. Additionally, he noted that "the event served as a platform to demonstrate mutual respect between Chinese people and foreign athletes."

Dailylife Myth Buster

Myth: Walk faster, live about 15 years longer?

Fact: Walking speed does not determine human lifespan.

Recently, many online articles have called on everyone to walk faster for the purpose of "longevity." The source of these voices comes from a study published in the Mayo Clinic Proceedings, a scientific publication for physicians published in the United States. An extensive study by British researchers has also revealed people who walk briskly are expected to live longer than those with who walk steadily.

The subjects of the study were 474,919 middle-aged and elderly people in the United Kingdom, with an average age of 58.2 years and an average body mass index (BMI) of 26.7 kg/㎡.

"Participants reporting a brisk walking pace had longer life expectancy across all levels of BMIs, ranging from 86.7 to 87.8 years in women and 85.2 to 86.8 years in men," the study shows "Subjects reporting a slow walking pace had shorter life expectancy, with the lowest being observed in slow walkers with a BMI less than 20 kg/㎡ (women: 72.4 years; men: 64.8 years)." It is worthy of noting that there was a less noticeable difference in life expectancy between brisk walkers and average-speed, or steady walkers.

The age difference has been used by some myth-creators. "The statement circulating on the Internet that 'those faster walkers live 15 to 20 years longer than those who have slow steps' is too exaggerated. The effect of pace on lifespan has been magnified,"Xu Kai, associate professor at the Nanjing Sport Institute, told the *Science and Technology Daily*, adding that this study can show that there is a certain relationship between walking speed and life expectancy, but walking fast may not necessarily lead to longevity. As the researchers stated in the study, as an observational study, no causal relationship can be inferred.

"A person's physical health is an important factor affecting longevity," said Xu, but there are many factors that influence physical health, including diet, mood and interpersonal relationships, and daily exercise is only one of the factors, he said.

Traditional Eastern Wisdom

Zhang Zhongjing: the Sage of Chinese Medicine

By BI Weizi

Eminent Chinese pharmacologist and physician, Zhang Zhongjing (150 – 219), was born in Nanyang, Henan province in the late Eastern Han Dynasty. He was hailed as the sage of Chinese medicine by later generations for his unsurpassed contributions to traditional Chinese medicine (TCM).

Zhang Zhongjing. (PHOTO:VCG)

Using previous medicinal literature such as *Huangdi Neijing* or *Yellow Emperor's Inner Classic*, collecting a wide range of medical prescriptions, and drawing on his own practical experience, Zhang wrote the legendary masterpiece *Shanghan Zabing Lun* or *Treatise on Cold Pathogenic and Miscellaneous Diseases*. It established the principle of "evidence-based treatment", which is the basic clinical principle and soul of TCM.

Evidence-based treatment is the process of applying theory, method, prescription and medicine to clinical practice. It includes two processes: the method of diagnosis and the determination of treatment based on the differentiation of symptoms and signs. Diagnosis is identifying a disease by physicians through the four diagnostic methods (inspection, auscultation and olfaction, inquiry and palpation) and eight principles (yin and yang, exterior and interior, cold and heat, deficiency and excess). This theory of treatment is to determine the corresponding treatment method according to the results of the identification.

However, shortly after the book was published, it was lost in the wars of the time. The version that people see today was collated by later physicians into two books, namely, *Shang Han Lun (On Cold Damage)* and *Jingui Yaolue (Essential Prescriptions of the Golden Coffer)*. The former mainly focused on a discourse on how to treat epidemic infectious diseases causing fevers prevalent during his era, and the latter was devoted to treatments on internal diseases.

The book spread overseas and was also highly respected in foreign medical circles, becoming an important textbook for study. Statistically, from the Jin Dynasty (266-420) to the present, more than a thousand Chinese and foreign scholars have compiled, annotated and studied *Shanghan Zabing Lun*. In addition, the development of medicine in Korea, Vietnam, Indonesia, Singapore, Mongolia and other countries have also been promoted to varying degrees.

International Cooperation the Way to Go

By BI Weizi

Professor Krister Holmberg. (COURTESY PHOTO)

Krister Holmberg is a Swedish chemist and professor of surface chemistry at Chalmers University of Technology, focuses on the behavior of surface active compounds in solution and at interfaces. For the active role he has played in the industrial applications of surface and colloid chemistry, Holmberg was bestowed with the Quancheng Friendship Award by the city of Jinan, Shandong province in 2019 and the Chinese Government Friendship Award in 2021. He spoke to *S&T Daily* recently about his work in China.

S&T Daily: Congratulations on your Chinese Government Friendship Award. What does this award mean to you and how does it motivate you to deepen your cooperation with China?

Holmberg: I'm very proud of the Friendship Award from the Chinese Government. I know it is a prestigious award and I'm not sure that I fully deserve it. I have interacted a lot with Chinese people during the last 10 years, initially with a well-known chemistry professor at the Chinese Academy of Sciences in Beijing and with a younger professor in Chengdu. The professor in Chengdu introduced me to the CEO of Shandong GiNZRE New Materials Company and during the last five years I have had a lot of interactions with that company. I have enjoyed that very much and the award stimulates me to interact even more with GiNZRE. I hope my experience from my career in Europe can be beneficial to the company.

S&T Daily: There is normally a lot to be done to put experiment results into real applications and improve production efficiency. What is the biggest challenge you've encountered during this process and how do you resolve it?

Holmberg: I totally agree that taking results from university research into industrially useful processes or products is not easy. I think that one must consider the possible industrial applications already when starting a university project. If one carries out a chemical reaction, for example, it is important that the starting materials are environmentally benign and not too expensive. The process should also not be too complicated. Environmental considerations are becoming more and more important, and one must not start a project in small scale that cannot be scaled up at a later stage because of environmental concerns.

S&T Daily: Now that the international community has been paying more attention to environmental protection and carbon emission cut, how would you help China achieve its dual carbon goals through your research?

Holmberg: I totally agree that environmental concerns are very important and will be even more important in the future. Energy is closely related to the environment. The world is heading for green energy sources such as solar cells, windmills and hydroelectric power. I know China is in the forefront of all three. But it will be a long way until we are there and energy from fossil sources will continue to play a big role for a long time, probably the whole century. It is then important to cut down on coal and to use more oil and gas instead. Oil and gas are much more environmentally benign than coal. My role at the company GiNZRE is to help develop chemical solutions that will improve the yield of oil from oil fields. China has many large oil fields. Some of these are relatively old and annual production is declining. By injecting small amounts of specific chemicals into the oil reservoir, the yield can be improved. The improved oil production is good for the environment because it makes it possible to replace coal by oil.

S&T Daily: What suggestions do you have for China to increase its involvement in international cooperation?

Holmberg: I have interacted with Chinese scientists over several decades. During this period, I have seen how Chinese science has developed and grown in importance on the international scene. China is nowadays a very big player when looking at both the number of scientific publications and impact of publications. However, China is still lagging behind Europe and the U.S. when it comes to Nobel prizes. I'm involved in the selection of the Nobel prize in Chemistry and I can see that China still has some way to go. Judging from my many visits to the Chinese Academy of Sciences (CAS) in Beijing and also from visits to other CAS facilities, as well as to universities around the country, I would say that Chinese science would benefit from a stronger influx of young scientists, such as PhD students, postdocs and assistant professors, from abroad. A constant influx of young, talented people with a different background is essential in today's highly competitive academic world. I once had the pleasure to sit next to Liu He, the vice premier of China, at a banquet in Beijing and we discussed this matter. Liu, who had himself been a student at Harvard, said he totally agreed with my views that Chinese universities should find ways to accomplish this.

Together for the Future

Letter to the Editor

By Irina Andreeva

The success of the Winter Olympic Games Beijing 2022 amidst the severe challenges of the global COVID-19 pandemic, demonstrates the power of the Olympic Games to unite the world in overcoming difficulties and building a better future for humanity, shows the power of collective solidarity and the core values and vision of leading international sporting events. The slogan of Beijing 2022, "Together for the Future", also reflects the world's common desire to work together for a better tomorrow.

The opening ceremony of Beijing 2022 was a celebration of sport, peace, and uniting people of the world. Beijing 2022 was held during extremely tough times. Facing the global pandemic, Winter Olympic personnel from all participating countries and regions were tested for COVID-19 many times, along with various preventive measures against the virus being taken. China created excellent conditions for the Winter Olympic athletes and staff, and the safety and convenience of the sports venues have received wide acclaim.

Despite the strict anti-pandemic measures, China showed the highest level of welcome, warmly receiving Winter Olympic guests from all over the world. Athletes were impressed with the smart technologies applied at the Games, such as the high-tech service robots, the Chinese New Year's atmosphere in the rooms and the wide variety of delicious food. The Games were also blessed with pleasant weather every day, and the athletes joked that perhaps Chinese had used high technology to dispel all the dark clouds.

Professor Irina Andreeva. (COURTESY PHOTO)

China has been incredibly successful in the fight against the pandemic. Despite having a large population, incidents of coronavirus cases are lower than the rest of the world, thanks to the measures taken by the Chinese Government to prevent the pandemic and the active cooperation of Chinese people. As a foreigner living in China, I witnessed first-hand the top-down efforts of the Chinese people to fight the coronavirus and felt the warmth, kindness and optimism of the Chinese people. I believe China is a very safe country to live in.

As a Russian, I am overjoyed that Russian experts who were involved in the organization of the Sochi Winter Olympics also participated in the construction of Beijing 2022 venues, such as the design and building of the freestyle ski and snowboarding tracks. Although I could not support the Russian and Chinese athletes from the stands, I was glad to see that Russian President Vladimir Putin was able to be present at Beijing 2022, calling it "an important event of world significance".

The pandemic has caused many changes in China, but it has not prevented the hard-working and brave Chinese people from pursuing the Olympic spirit. Beijing 2022 continues the tradition of the Olympics as an event of sport, peace and unity, showing that spirit of unity and solidarity between the Chinese people and the people of the world in their efforts to build a community with a shared future for mankind.

Irina Andreeva is a Russian professor at the School of European Studies in Tianjin Foreign Studies University.