



A researcher conducts an experiment in a semiconductor technology lab at North University of China.
WU JIA / FOR CHINA DAILY

Talented researchers deliver high-tech advances in Shanxi



Province seeks to cut its reliance on coal and contribute to nation's innovation

By YUAN SHENGGAO

Zhang Jing, a professor at Shanxi University in the provincial capital of Taiyuan, has a tight schedule every workday.

After giving lectures to students in the classroom, he continues his busy research in the laboratory.

The Shanxi University Photoelectronics Research Institute, where Zhang serves as chief, operates a key national lab for quantum optics and photon devices.

Zhang has led a number of provincial and State-level research programs with international influence in Shanxi. This quantum lab is a new force driving high-tech development in the province.

Zhang is not alone in scientific research in Shanxi. There is a talent pool of researchers who work for a number of high-tech labs and research institutions.

In the first quarter of this year, 14 laboratories in Shanxi were added to the lists of national and provincial key labs. It demonstrates a surge

of innovation capacity building in the province.

One such project is the laboratory for the research on clean and efficient utilization of coal-based energy resources in Taiyuan University of Technology.

The lab has a history of 36 years in coal-related research. Now it is focusing on how to converting coal into new energy resources, for example, hydrogen and gasoline as well as new materials such as graphene and synthetic chemicals. The lab is expected to play an important role in reducing pollution from coal, said Xie Kechang, its founder.

"Coal is the most important energy resource in China. However, it is also one of the largest sources of pollution," Xie said. "Promoting the clean and efficient use of coal is the only solution to this problem."

Coal can be turned into a clean energy resource if its utilization efficiency substantially improves, Xie said. "Technologies for the complete combustion of coal and the use of advanced sulfide and nitride recycling devices can significantly reduce emissions while improving the utilization rate of resources."

The scientist added that developing coal-based chemicals with clean production processes represents another important direction for the clean utilization of coal.

Also engaged in the study of efficient coal utilization similar to the TUT is a corporate research entity — the lab of Jinneng Holding in Datong.

Leaders of the company are preparing to apply for a national key lab status for its green and low-carbon

coal utilization lab. The lab is scheduled to implement more than 20 research projects during the 14th Five-Year Plan (2021-25).

While these coal research labs are trying to tap resources in the depths of the Earth, a lab owned by the Taiyuan-based North University of China is venturing into outer space.

The lab has carried out research for China's major astronautical exploration programs in recent years. This includes the moon-landing mission of the Chang'e 5 spaceship, the launch of Beidou communications satellites and the Mars exploration mission of the Tianwen 1 spaceship.

The NUC lab's research focuses on the design and production of flight data recorders, or black boxes, for collecting, recording and measuring key data and parameters of various space missions.

"In environments with high temperatures, high pressure and strong radiation, you cannot rely on radio devices for effective data transmission," said Zhang Huixin, head of the NUC lab. "Black boxes are the most reliable means for acquiring flight data."

But the safe recycling of black boxes is the most challenging task after space missions. The black boxes are always affected by unpredictable environments, according to Hu Haifeng, a researcher at the lab. "So the design and manufacturing of black boxes is a very demanding job."

However, the lab has fulfilled its mission by using its independently developed technologies, according to Zhang Guojun, deputy chief of the

lab. "You cannot buy the key technologies for space research from foreign countries. The only solution is independent development by our researchers in China."

Shanxi is promoting an innovation-driven strategy to help with its economic transformation. This involves reducing its reliance on the coal industry, fostering emerging and high-tech industries and upgrading traditional industries with high technologies.

The development of laboratories for key technologies will be of great significance to making this transformation possible, said Mei Dongliang, an official responsible for development of research platforms at the Shanxi Department of Science and Technology.

According to Mei, key national or provincial labs have been established for all 14 strategic emerging sectors in Shanxi. They include semiconductors, coal-based new materials, special metals and big data.

"There are 64 key provincial labs serving the 14 strategic emerging sectors and 39 key provincial labs for other industries," Mei said.

These key labs had commercialized 211 research results by the end of 2020, generating a total of 7.8 billion yuan (\$1.22 billion) in profit.

"More importantly, the labs have played a crucial role in supporting Shanxi's high-quality and innovation-driven development, making the province an important part of the national innovation system," Mei said.

Wu Jia contributed to this story.

Signature industries boost income of Datong residents

By YUAN SHENGGAO

Datong, a city in northern Shanxi, is using its local characteristic industries to boost rural development and improve people's livelihoods.

In the city's Yunzhou district, the day lily industry is one such sector bringing increasing revenues to farmers.

The flower of the plant is a popular food ingredient nationwide. It is especially popular in regions of eastern and southern China, like Fujian and Guangdong provinces.

On a morning during early June in Tongjiapu village, a major growing and planting area for the cash crop, farmers were busy working on their day lily plantations. They are irrigating, fertilizing and weeding.

When the farmers begin to harvest the flowers in late June, they will start to work even earlier in the morning as the flowers must be collected before sunrise when the blossoms are not yet fully open.

"But the labor is worthwhile as the flower is something growers can use to make a fortune," said Yang Qi, a local villager.

Yang has been an experienced day lily grower engaged in the industry for more than 20 years.

He is now the chief of Tangjiapu Village Economic Development, a local cooperative for the growing, production and sales of day lilies.



The modern dairy industry is one of the characteristic sectors to boost rural development in the city of Datong. LIU TONG / FOR CHINA DAILY

The cooperative operates more than 30 hectares of day lily farms and a processing factory in Tangjiapu.

"The cooperative's sales grew more than 100 percent in 2020 compared with the previous year," Yang said.

The entrepreneur added that the cooperative plans to expand its operations and extend its industrial chain by using a special government fund of 20 million yuan (\$3.13 million) and collaborating with a larger agricultural company in Datong.

The cooperative's latest plan is to establish a day lily industry park in Tangjiapu, creating an industrial chain that covers planting, processing, packaging, warehousing, logistics, research and development as well as rural tourism.

The day lily industry is currently a

major agricultural sector in Yunzhou, trailing only grain production.

According to the local government, day lily-related industries in Yunzhou district generated a total output value of 1.12 billion yuan in 2020, up 53.1 percent from previous years. The industries' expansion meant added per capita incomes of 4,100 yuan to residents engaged in such businesses.

Like Yunzhou, all of the nine counties and districts in Datong have their own characteristic industries to help with poverty alleviation and rural revitalization.

The county of Tianzhen, for instance, is using vocational training to help rural residents overcome poverty and increase their incomes.

Tianzhen's vocational training

focuses on one sector: training home service workers, or nannies.

The choice was made because of Tianzhen's large number of surplus laborers, especially those who are female. Statistics showed 26,000 female laborers in the county were waiting to find jobs a decade ago.

Local authorities began to launch home-service skill training some 10 years ago. To date, the county has trained more than 25,000 nannies, who have found jobs throughout the country.

Because of their background in skills training, "Tianzhen nannies" are now popular in big North China cities like Beijing and Tianjin. According to the county government, the home service workers have made a total annual income of more than 200 million yuan in recent years.

Cheng Meihua is one such woman who made a fortune after receiving vocational training.

"My six-member family used to live on a farmland of less than 0.4 hectares and the output and revenue from the land could hardly support our livelihood," Cheng said.

After receiving training in 2016, Cheng is now a skilled home-service worker. She earns more than 6,000 yuan a month, far more than the family's farming-generated income for an entire year.

Guo Yanjie contributed to this story.

Discovering fire throws light on prehistoric site

By YUAN SHENGGAO

Fire is so important to human civilization that Prometheus is regarded as one of the greatest legendary Greek heroes for being said to have stolen fire from heaven for humans.

Indeed, the evolution of the human being is closely related to the use of fire. And remains of fire use is a basic criterion for archaeologists to judge the level of civilization in prehistoric sites.

A site of prehistoric human activities in Xihoudu village in Ruicheng county, Shanxi province, might point to the earliest evidence of intentional use of fire by humans.

The Xihoudu site by the Yellow River was discovered in the early 1960s by a team led by renowned archaeologist Jia Lanpo.

Jia's findings include animal fossils and stone tools such as cutting and grinding tools, as well as deer horns and other animal bones with cutting marks. The dating technology of that time revealed that they were made by humans 1.8 million years ago.

Wang Jian, another famed Chinese archaeologist, discovered more evidence of the intentional use of fire — scorch marks of fire on animal bones, which might also be another world's first in terms of discovery.

In a book jointly published by Jia and Wang in 1978, Xihoudu is

supposed to be the relic site for the earliest Chinese civilization.

To help archaeological enthusiasts and tourists understand the value of the site, a museum has been built in Xihoudu.

Parts of the discovered items and replicas are now displayed in a 380-square-meter showroom at the museum.

The museum has also hired a group of skilled tour guides to help visitors recognize and study the evidence of human activities on the remains.

At the museum, visitors can also experience life in prehistoric times through the use of modern technology such as multimedia and augmented reality.

The exhibition features a section for a number of top Chinese archaeologists, including Jia Lanpo, Wang Jian and Wang Yiren, who contributed to the discovery of the site.

Wang Yiren is the youngest among the three. He continued his studies based on the discoveries of his two predecessors.

His new research has led to even greater excitement in archaeological circles: the latest carbon-14 dating technologies show that the history of the site could be more than 2.4 million years old, according to his essay published in a French periodical last November.

Li Shu contributed to this story.



A museum has been built at the Xihoudu archaeological site, where evidence is found for one of the earliest civilizations in China. XIAO YONGJIE / FOR CHINA DAILY

China-Europe trains put trade on fast track

By YUAN SHENGGAO

A train carrying 50 40-foot containers of cargo left the Zhongding Logistics Park in Jinzhong, Shanxi province, on June 2. Bound for Paris, it marked the debut of Shanxi-France freight train service.

The debut is just one part of the China-Europe freight train service from this North China province, which includes several routes to different destinations.

The first Shanxi-France freight train carried more than 700 metric tons of commodities made locally. They include medical equipment, fitness facilities, tires and automobiles.

Covering a trip of about 11,000 kilometers via Mongolia, Russia, Belarus, Poland and Germany, the train is scheduled to arrive at Valenton railway terminal in Paris on June 22.

Wang Guoqing, a manager at Shanxi-Europe Logistics, which is responsible for the train's operations, said the medical supplies on the first Shanxi-France freight train will significantly help European countries fight the COVID-19 pandemic.

Shanxi began its China-Europe freight train services in February 2017. With trade between Shanxi and European countries growing, the operations have expanded to nine routes. The frequency has been increased from once a month to at least three times a week,

according to Zhou Zhifei, deputy general manager of Zhongding Logistics Park.

Statistics show that more than 70 freight trains left Zhongding for Europe so far in 2021, an increase of 48 percent from the same period last year.

To date, a total of 426 freight trains have traveled between Shanxi and Europe since 2017.

"We are planning for more train routes to destinations like Spain, Belgium and Denmark," Zhou said.

He said the China-Europe freight train service is an important channel for the export of Shanxi-made commodities. Shanxi's major exports to Europe include train wheel sets, stainless steel, machines, ceramics and textiles.

Timber is the staple commodity that Shanxi imported from Europe. According to Wang of Shanxi-Europe Logistics, about 100 trains returning from Europe this year will carry timber to Shanxi.

Shanxi also plans to extend its China-Europe freight train services to the rest of country through multimodal shipment routes.

In January, a land-sea transmodal shipment route from Zhongding Logistics Park to the Ningbo Zhoushan Port in East China's Zhejiang province was launched.

Wang Pei contributed to this story.



The first Shanxi-France freight train departs from Zhongding Logistics Park on June 2. LI ZHAOMIN / FOR CHINA DAILY