

A Scientist with Golden Touch

Dialogue

By XU Qingqun

The Ailao Mountains in Yunnan province in south China are a major gold belt but the gold is refractory or fine-particled and therefore challenging to extract using conventional cyanidation methods. Also, the concentrate itself contains a high volume of arsenic and sulfur, both toxic elements. Therefore, pre-treatment is required for efficient gold recovery.

Coming to China with her "secret weapon"

This is where Galina Sidyakina comes in with her "secret weapon".

Sidyakina is a renowned Russian scientist with numerous accolades. She had four significant aspirations when she embarked on her journey to China one decade ago.

Her dreams were to industrialize her laboratory's specialized research achievements, establish her own engineering research center, seamlessly integrate her global research teams, and most importantly, to see her research achievements fully realized in the industrial landscape of Yunnan.

In October 2023, she went to Yunnan to promote a special technology to process refractory gold concentrates. It integrates biotechnology, inorganic chemistry and metallurgy to create an eco-friendly alternative to traditional gold extraction methods.

The process begins with the bio-oxidation of refractory ores, where microorganisms break down harmful elements like sulfur and arsenic, exposing the gold particles. A patented bio-leaching



Dr. Galina Sidyakina. (COURTESY PHOTO)

solution then dissolves the gold, enabling easy extraction without environmental damage.

The technology has been successfully commercialized in collaboration with a Chinese company and has already been patented in China. She says her bio-leaching technology can generate substantial economic benefits. Her plan is to set up a plant in Yunnan to process gold.

According to a local expert, the plant will be the province's only facility using bio-oxidation technology for gold extraction and will transform Yunnan's gold processing capabilities. The projected annual gold production is 1.2 tons, with an estimated industrial output value of 550 million RMB.

Sidyakina emphasizes the project's

long-term vision, which is maximizing resource utilization, minimizing waste, and transforming resource advantages into industrial strengths. She also aims to develop a specialized technical team and cultivate local talent.

The environmental benefits will also be significant, she says, as this technology is a sustainable alternative to the toxic cyanidation method, reducing the environmental impact of gold mining. Sidyakina emphasizes balancing the economic and environmental benefits, adding that sustainable development should always be a priority.

Introducing the real China

This is not Sidyakina's first foray in China. She has been working with Chinese partners for a decade, spending two to three months each year

in the country. She has noted the significant progress in both China's economic growth and social welfare. From her perspective, China's rapid development comes from its rich cultural heritage and the industrious, creative, and resilient nature of its people.

"The Chinese not only strive for their own prosperity but also contribute positively to the world," she says, adding that the Belt and Road Initiative is an example of this. It has benefited not only China and its partner countries but the world at large.

Recently, she visited Beijing, Shandong, and Yunnan, accompanied by her grandson. She wanted to introduce him to the "real China", a country far removed from the portrayals by Western media. She says young people like her grandson should experience China firsthand, forming their own opinions based on what they see, hear and feel.

Like the many foreign experts drawn to China, she deeply appreciates the rich Chinese culture. She's particularly enamored with traditional Chinese medicine, having personally undergone acupuncture and cupping therapy, which she describes as "magical".

Sidyakina is also captivated by the cultural practice of square dancing, which is especially popular among the elderly. To her, it's a reflection of good health and a well-rounded lifestyle. In her opinion, China's robust social welfare system and its peaceful, stable society contribute to a high quality of life that deserves greater recognition on the global stage.

This article was edited and translated based on the Chinese version.

Expats Activity

Global Medical Cooperation Key for Public Health

By CHEN Chunyou

Global medical cooperation is crucial for facilitating the sharing of medical resources and expertise, especially in treating tumors and other serious illnesses. It also provides multi-disciplinary treatment plans for patients and helps tackle complicated diseases, Marc Shuman, emeritus chief of the Division of Hematology and Oncology at the University of California, San Francisco spoke via video at the inauguration ceremony of the Arion International MDT Medical Center.

The event, held in Beijing on August 8, marked a significant step forward for the center in providing world-class medical services by leveraging international medical talent, technology, and resources.

To date, the center, established under the cooperation program between the Arion Cancer Center based in Beijing and global digital health company MORE Health based in the U.S., has forged collaborative ties with medical institutions from the U.S., Singapore, and Japan.

By March 2024, it had dealt with about 100 tumor cases under cooperation between experts in China and abroad over the past three years, according to Xu Zhonghuang, dean of the Arion Cancer Center.

"Tumors are a global challenge, threatening human health everywhere," said Hu Lan, founder and CEO of the Amcare Healthcare Group. "The global demand for improved healthcare service is increasing. Some Chinese patients go abroad for medical treatment, but this often entails high costs, prolonged treatment cycles, and inadequate follow-up management upon their return."

"The treatment plan is vital to the survival chances for patients diagnosed with cancer. This collaboration seeks to develop better precise treatments that could be life-saving," Hu said.

Under this collaborative model, top medical experts domestically and globally will collaborate in real time through the full-term multidisciplinary management. Patients can receive diagnosis and treatment in China, and will only be transferred abroad if necessary.

This approach optimizes the process of seeking medical treatment overseas, and provides patients with comprehensive, personalized, and internationally aligned treatment plans that enhance cross-border medical efficiency and reduce financial burdens.

"The collaborative mode expands access to innovative and precise treatments worldwide, and improves the survival rates of patients," Hu said.



The inauguration ceremony of the Arion International MDT Medical Center is held in Beijing on August 8. (COURTESY PHOTO)

Why Are Green Mangroves Called 'Red Forests' in Chinese?

Science Outreach

By Staff Reporters

Mangroves, widely known as "coastal guardians" due to the critical role they play in coastal protection, are the woody vegetation communities growing in the intertidal zones of tropical and subtropical coasts, that constitute a rare and spectacular ecosystem at the boundary between land and sea. Despite their appearance being similar to common green forests, the question arises: why are they called "red forests" in Chinese?

Li Mei, associate researcher at the Research Institute of Tropical Forestry, Chinese Academy of Forestry, explains that the name does not stem from the color of their leaves or the overall appearance but from the tannins in the bark of mangrove plants. In mangrove forests, the foliage is mostly green, and the roots may exhibit a reddish hue. The bark

of mangrove plants often contains tannic acid, a substance that is colorless and transparent but turns red upon oxidation when exposed to air, and because of this the "red forest" name was given in Chinese.

While most organisms rely on freshwater for survival, mangroves thrive in coastal intertidal zones. According to Li, mangroves adapt to the highly saline marine environment through complex physiological mechanisms.

Mangroves manage salt within their bodies through salt excretion structures. They use salt glands located at the back of the leaves to excrete salt, store salt in specific cells, or form crystals in the leaves, allowing salt to be excreted with fallen leaves.

With specialized root structures such as prop roots, mangroves can obtain oxygen in underwater low-oxygen environments and anchor themselves firmly in loose sediment. Additionally, osmoregulation capabilities and a thick cuticle contribute to their adaptability to the highly saline marine environment.

Traditional Eastern Wisdom

Bell and Drum Towers: Echoing the Sound of History



The bell in the Bell Tower. (PHOTO: VCG)

By Staff Reporters

The Bell and Drum Towers, located at the northern tip of the Beijing Central Axis, which is on the UNESCO World Heritage List, play a significant role in the city planning of ancient Beijing.

The Bell and Drum Towers served as a timekeeper during the Yuan, Ming, and Qing dynasties. From 7 pm to 9 pm every night, the drums were beaten before the bell was rung. From 3 am to 5 am in the morning, the bell was rung before the drums were beaten. When the bell sounded at night, the city gates were closed to traffic. The morning bell rang to open the city gates.

The Drum Tower houses 25 drums, with one designated as the main drum and the remaining 24 corresponding to the 24 solar terms. Hanging from the Bell Tower is a massive timekeeping bell cast during the Yongle reign of the Ming Dynasty. The bell boasts a total height of 7.02 meters, a diameter of 3.4 meters, and weighs approximately 63 tons. It is China's heaviest and biggest surviving ancient bronze bell, and its sound is long and loud and travels dozens of kilometers.

How did ancient Chinese manage to cast such a colossal bronze bell? According to the book *Tiangong Kaiwu: Chinese Technology in the Seventeenth*

Century, the casting of large bells involved digging deep pits, constructing molds with lime and earth, and utilizing pit-shaping and multi-furnace casting techniques.

Given the weight of these bells and the absence of modern lifting equipment, workers would build slopes made of soil on both sides of the tower, reaching the same height as the tower itself. They would then manually pull the bell up the slope, and remove the mound after installing the bell. In winter, this technique would be assisted by watering the soil to form ice, which reduced friction and made it easier to drag the bells.

Success in High-efficiency Biochar Production

From page 1

"In order to find the optimal process parameters of biomass carbonization, various experiments have been done tens of thousands of times," said Dr. Zhang Xuefei of HFUT, a member of Xing's team.

Finally, the team developed solid solution partial pressure technology, which increased the carbon conversion rate to 60 percent, meaning that apart from the nearly 40 percent inherent water content of the biomass, almost all of the remaining components are carbonized.

Finding 'critical energy point'

The longer the carbonization process, the higher the energy consumption. Therefore, Xing's team was dedicated to shortening the biomass carbonization process from the natural process of billions of years to just a few hours.

In 2013, the team found that the quality of biochar was stable at the laboratory or on a small scale trial production. However, when the scale was expanded, the problem of uneven heat transfer and catalyst distribution of biomass appeared, affecting the carbonization time and causing energy consumption to soar.

After thousands of experiments, they used both experimental and numerical simulation methods to find the "critical energy point," so as to design the optimal catalyst, leading to controllable preparation of biochar.

More than two years later, the team ushered in a new breakthrough — and carbonization time was reduced to 12 hours.

Since then, through theoretical analysis and simulation calculation, the team continuously optimized the

process and gradually reduced the carbonization time to one hour.

Finally, the biomass carbonization process was reduced to 30 minutes, and the production process achieved almost zero emissions.

At the end of 2019, the world's first carbonization furnace with a daily output of 100 tons of biochar was completed, achieving the goal of preparing one ton of biochar in one furnace and an annual output of 5,000 tons of biochar.

From waste to treasure

The laboratory of Xing's team is actually an industrial workshop covering thousands of square meters, displaying carbonization furnaces developed by the team at various stages, as well as numerical control machine tools and other equipment.

"If you are committed to something,

you must stick to it," Xing said. Over 10 years of research, he led the team to winning many awards and published hundreds of high-level papers. After the efficient preparation of biochar, they plan to use biochar to prepare new carbon-based materials.

"Theoretically, all biomass can be used as a material for preparing biochar. Among them, agricultural and forestry waste is a more ideal biochar raw material. Straw, wood chips and even sludge are also treasure," said Xing, adding that waste can become "black gold."

At present, as Xing's team has successfully developed the ultrasonic biochar activation device, substantial progress has been made in using biochar to produce energy storage products, such as graphite materials and negative electrode materials for high-performance lithium batteries.