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NEWSLETTER

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SPECIAL ISSUE

National S&T Week Opened

A national science and technology week opened on May 14, 2011 in Beijing. LIU Yandong, State Councilor, attended the opening ceremony, and stressed that efforts shall be made to work on the scientific concept of development and changing the mode of economic

development, promoting S&T advancement and innovation, diffusion of proven technologies, and a coordinated sustainable economic and social development, and allowing the people to live a better and happy life.



An opening scene at the S&T Week.



LIU Yandong, Chinese State Councilor, spoke at the opening ceremony.



LIU Yandong and WAN Gang visited a demonstration scene.

Under the theme of "working together to build an innovative country", the science and technology week this year is designed to stage a range of popular science activities across the country for the duration of a week. WAN Gang, CPPCC Vice Chairman and Chinese Minister of Science and Technology, declared the opening of the national science and technology week, and a Beijing science and technology week that was opened on the same day.

Since its inception in 2001, ten rounds of science and technology week have been successfully staged with more than 500,000 themed popular science events, and the direct participation of 600 million person/time on a combined basis.

RESEARCH AND DEVELOPMENT

Hepatocytes from Induced Stem Cells

A study team, led by HUI Lijian of CAS Shanghai Institute for Biological Sciences, reported its findings on induced liver cells in the May 12 online issue of Nature, in an attempt to

prove that the stem cells other than the liver cells can be directly induced into liver cells, which creates a groundwork for treating liver diseases using the hepatocytes generated from a patient's own induced pluripotent stem cells.

Researchers found through experiments that transplanted iHep cells repopulate the livers of mice, and rescue almost half of the recipients from death by restoring liver functions. The study, remaining in the stage of animal testing, will be optimized for clinical applications in the coming years.

Gastric Cancer Invasion and Metastasis Hub Found

XUE Yingwei, Director of Gastrointestinal Surgery Division of Harbin Medical University No. 3 Clinical School, and coworkers found that Twist is the "hub" that regulates the invasion and metastasis of gastric cancer, when screening the Twist protein levels of four gastric cancer cell lines, in a gastric cancer formation and early signal study. Researchers believe that Twist is a helper contributing to the malignant behavior of gastric cancer.

In the 5-year exploration, XUE and coworkers consolidated the clinical data of gastric cancer evolution in a systematic manner, which revealed the ultimate cause of gastric cancer death. Researchers figured out a range of mechanisms that regulate the formation, invasion, and metastasis of gastric cancer cells, including cell implantation and lymph node metastasis. They established a technically proven mice model of gastric cancer, through which the role played by Twist in triggering up the formation and development of gastric cancer was confirmed, by measuring the genetic expression product of COX-2 in gastric cancer tissues. Meanwhile, they proved that the pathway of HGF (hepatocyte growth factor) and VEGF (vascular endothelial growth factor) is closely associated with the biological growth, adhesion, migration, and invasion of gastric cancer cells.

The study also found that as a marker of epithelial cells and a molecule associated with invasion and metastasis, Twist protein makes a hub to regulate the invasion and metastasis of gastric cancer. Using a range of advanced biological means, including present plasmids reconstruction, and small RNA fragments interference, researchers confirmed the positive role played by Twist protein in gastric cancer invasion and migration, in anti-drug-induced apoptosis, and in the cyclic variations of cells. The finding provides a new theoretical evidence for targeted therapy of advanced gastric cancer, and for containing the peritoneal metastasis of gastric cancer.

Novel Solar Cells

Not long ago, Prof. KANG Junyong and his research team at Xiamen University School of Physics and Electrical Engineering rolled out a novel type of solar cells. The solar cells, built

on two wide band gap semiconductor materials zinc oxide and zinc selenide, enjoy a greatly stabilized performance and extended life. The development marks the first application of a wide band gap semiconductor in the world. The finding was published in the recent issue of *Materials Chemistry*.

KANG and coworkers started in 2005 to work on the wide band gap semiconductor featured with stable physical and chemical properties, fine anti-radiation performance, and long life, especially its application in solar cells. Researchers found that there are two elements that regulate the success of "transformation": first, a technology that makes photocurrent generation possible, and second, a technology that can raise the absorption rate of the wide band gap semiconductors. Repeated experiments sorted out two wide band gap semiconductor materials: zinc oxide and zinc selenide, desirable for solar cell applications. They can form an order similar to the PN junction, allowing the current to flow.

Meanwhile, researchers changed the previous preparation technique, allowing the two materials to achieve coherent growth under a controlled condition, which forms up a new quantum structure with a significantly reduced effective band gap but an enhanced range of absorption of sunlight. They also changed the laminated film layers into coaxial lines in form, with each measuring only at 200nm. As a result, the absorption area is significantly increased, and so is the absorbance.

All-Weather Radar Mapping System

A multi-band and multi-polarization airborne interferometric synthetic aperture radar mapping system, developed by Chinese scientists based on their 3-year tireless efforts, has recently passed experts' acceptance check. The system landed breakthroughs in a range of core technologies, allowing complex terrain mapping free from the impacts of rain, snow, clouds, mountain ravines, and other inclement weather and geographical conditions. With the help of new system, Chinese scientists are able to collect high-resolution mapping data from an altitude as high as ten thousand meters under all weathers, monitoring China's geographical conditions in a timely manner.

The airborne mapping system, developed by a group of institutions led by the Chinese Academy of Surveying and Mapping, is made up of a proprietary airborne SAR data acquisition system, workstations, and a ground data processing system, operated under technical standards. As a significant upbeat for enhancing China's SAR data acquisition and processing capability, the system has been successfully employed to map a mountainous area of 110,000 square kilometers in west China. Scientists have collected 1,200 square kilometer SAR image data of the Weinan District, part of Shaanxi Province, and completed the mapping at a scale of 1:10,000 and 1:50,000, respectively.

Simple But Effective Porous Material Preparation

A study team, led by Prof. WANG Yong at Nanjing University of Technology, has invented a new strategy to prepare the porous materials that have a pore size only one ten thousandth of hair. The confined swelling-induced pore generation strategy is extremely simple, and leads to pores with high regularity. The pore size can be regulated within a range of 10-50 nm by selecting the block copolymers with different chemical compositions, and by defining the immersion time and temperature in the liquid. The facial mask made of the materials can be as thin as a paper, enjoying an enhanced ventilation and bacteria blocking effect. The process also enjoys synergic advantages that include extreme simplicity, high pore regularity, and involvement of no chemical reactions, no weight loss, and reversibility. The finding was published in the April issue of *Advanced Materials*.

Better Nano-Lithography

Not long ago, CAS Academy of Opto-Electronics Microlithography Lab proposed for the first time a micro-structure margin based LSP super-resolution lithography technology. The technology borrows the margin of a micro-nano structure as the mask pattern, to effectively excite surface plasma. Meanwhile, it has obtained a less than 30-nm super-resolution lithography under regular I-line and G-line light sources.

In recent years, the development of surface plasma optics has made a new option available for the development of microlithography. Defining the desirable short wavelength for surface plasma, and a rational design of mask pattern and associated process parameters, may lead to a super-resolution nano-lithography. In this context, researchers propose to work on micro-structure margin based LSP super-resolution lithography. Theoretical studies have shown that the technology is able to produce a nano-structure with a size that is less than 1/10 the exposure wavelength. Researchers have also obtained from the experiment a lithography resolution exceeding the diffraction limit from a 365-nm light source. This creates a solid ground for building up the processing and preparation capability of China's information and nano-processing industry.

NEWS BRIEFS

Largest Biometric Database

Chinese Academy of Sciences Institute of Automation has recently created the largest multi-modal biometric database in the world. The database is made up of an iris image database having more than 10,000 samples, a near infrared face image database showing

facial expressions, a fingerprint database, a palm print database, and a gait database. It is reported that more than 3,000 research teams in 70 countries and regions have applied for the use of the database, which will, in turn, promote the development of biometric discipline for an enhanced international visibility.

In recent years, the Institute has worked on biometric identification technologies for complex environment, and landed major breakthroughs in changing from "men working for the machine" to "the machine working for men", by developing a range of key technologies for long-range, multi-modal, and wide area identification. At the same time, the face and iris recognition technology developed by the Institute has been successfully transferred for commercial applications in numerous areas, including mining safety, national security, military access control, prison management, disaster area residence management, family planning, students identity verification, banking authentication among many others.

3G Logging Software Publicized

PetroChina recently released the world's first third-generation logging software CIFLog in Beijing. The new computer program has for the first time realized the integration of all complex reservoir evaluation methods in a single software, covering all computer operating systems and languages available today.

According to a briefing, CIFLog is one of ten major national oil and gas development projects, or the only one referring to large software development. CIFLog has registered numerous "world firsts": the first Java-NetBeans based third-generation log processing and interpretation system; the first logging software applicable to three major operating systems, including Windows, Linux, and Unix; the first system offering reservoir evaluations for volcanic, carbonate, clastic rocks, and flooded low resistance layer; and the first integrated full-range program for both open hole log evaluation and post logging evaluation.

The software is designed to handle high-end logging data, including captured spectroscopy data, providing the interpretation of the logging derived from high-end domestic imaging equipment. Following the principle of "development along with applications", the project team has installed CIFLog in major domestic oilfields, including Daqing and Liaohe oil fields, and in some ten domestic universities, including China University of Petroleum, Peking University, and Tongji University, for handling more than ten thousand logs on a combined annual basis.

First Million-Volt Circuit Breaker in Operation

A Chinese made high-end million-volt circuit breaker has recently passed the full-range

test at the National Quality Supervision and Inspection Center for High Voltage Equipment. The powerful circuit breaker is designed mainly for a project that needs series compensation. The successful development of the technology, the first of its kind in the world, will enable China to develop a million-volt dual circuit breaker for a short circuit current of 63 thousand amperes (KA) or higher.

UHV series compensation makes an effective technical means to secure the safe, stable, and optimal operation of an ultra high voltage power grid. Adding a UHV series compensation system in a ultra high voltage power grid may significantly improve the transmission capacity of power grids, enhancing the system stability, improving the operating voltage and voltage distribution along the lines, and realizing the optimized resources distribution for a wider area.

Rooftop Solar Steam System

A rooftop solar high temperature steam system designed to accommodate industrial applications has recently called a success at the Huangming Sun Valley in Dezhou, Shandong. Applied with the state-of-the-art linear Fresnel reflection technology, the new system is able to provide industrial heat for a temperature from 100°C to 250°C. Meanwhile, Huangming has successfully applied the technology in high temperature power generation.

Designed with a linear Fresnel reflection concentrating technology featured with coated steel and a concentrating solar collector that can automatically track the Sun and collect solar energy, the system is able to produce high temperature and high pressure steam for industrial heating. The innovative system can be installed on the rooftop, saving both land resources and investment costs.

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