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World’s Largest Radio Telescope will be Built in Guizhou Province

The Five-hundred-meter Aperture Spherical radio Telescope (FAST), located in the Pingtang County of Qiannan, Guizhou Province, will be the largest radio telescope ever built in the world. It is able to detect weak electromagnetic waves from the edge of the universe. With a weight of up to tens of thousands of tons, the area of the aperture is about 25 times that of a standard football field.

In 1995, the Beijing Observatory made a joint effort with more than 20 universities in China to found the Large Radio Telescope China Promotion Committee. Based on Guizhou’s Karst topography, they proposed the construction of a Five-hundred-meter Aperture Spherical Radio Telescope (FAST). The FAST project would extend over a period of 13 years and be officially launched on July 10, 2007. On March 25, 2011, construction officially started and was expected to be completed in September 2016.

Prior to the FAST project, the 350-meter radio telescope named Arecibo in USA was the world’s largest. As a fixed telescope, Arecibo cannot be adjusted to observe a given target, which means that it can only scan a belt-shaped area in the air. Due to the rotation of the earth, it fails to observe a given target over a certain period of time. Given the distortion caused by gravity and wind, those traditional adjustable telescopes besides Arecibo can only have a diameter of 100 meters at most. Up to now, the only way to enhance the sensitivity of a radio telescope is to increase the area of the mirror that collects radio waves in the universe. In theory, the FAST telescope is capable of observing weak electromagnetic waves from the edge of the universe. Hence, Chinese scientists are confident that FAST, as the largest single-aperture telescope in the world, will maintain its leading position in the next two or three decades.

Tianhe-2 Fully Operational, with Guangzhou Being One of China’s National Supercomputing Centers

An Application Promotion Conference was held by the National Supercomputing Center in Guangzhou (NSCC-GZ) on June 29. Mr. Cao Jianlin, Vice Minister of Science and Technology, awarded the Center with plaques of “National Supercomputing Center in Guangzhou” and “China (Guangzhou) Computing Service Center”. It demonstrates that Guangzhou is now one of China’s national supercomputing hubs. Tianhe-2, currently the world’s fastest supercomputer, has been fully operational in the National Supercomputing Center in Guangzhou.

The National Supercomputing Center located in Guangzhou Higher Education Mega Center was sponsored by the 863 Program under the 12th Five-Year Plan with a total investment of 2.5 billion RMB. The project was initiated by the Government of Guangdong Province, the Guangzhou City Government, China’s National University of Defense Technology and Sun Yat-Sen University.

Tianhe-2, a supercomputer developed by China’s National University of Defense Technology is now located in the National Supercomputing Center in Guangzhou. Tianhe-2 has maintained its position as the world’s No.1 system according to the latest TOP500 list of the world’s most powerful supercomputers announced on June 23 at the 2014 International Supercomputing Conference in Leipzig, Germany. It is the fourth time the Tianhe series supercomputers top the list of the world’s supercomputers.

Currently, Tianhe-2 supercomputer has been
fully operational in the National Supercomputing Center in Guangzhou and is open to both domestic and international users. Its applications range from life science, material science, atmospheric science, geophysics, energy, the universe, and economics. It played an important role in large-scale genome assembly, gene sequencing, biomedicine, high-throughput drug screening, pollution control, hypersonic engine combustion simulation and a series of strategic science and engineering projects which are crucial to livelihood of human kind. Tianhe-2 also has many successful applications in smart city, e-government, cloud computing and information services etc.

Mainland’s First Indigenous GBAS Satellite Navigation Landing System

Mainland’s first indigenous GBAS satellite navigation landing system, developed by China Electronics Technology Group Corporation (CETC), is currently under installation and airworthiness certification in the Tianjin Binhai International Airport. The new system differs from the traditional instrument landing systems as it offers better flight path flexibilities and higher traffic throughputs. It also enables a safer and more efficient airport operation.

“Traditional landing systems can only guide a single airplane performing straight-line landing approach from one end of the runway. Other airplanes have to stay in the air waiting for their turns to land. The new system supports airplane landing at either end of the runway. It also enables multiple approach paths to the runway, including the curved approach which reduces landing waiting time and congestions in the parking apron. This results in higher airport throughput and on-schedule flight rate,” said Mr Li Yue, senior researcher of CETC.

Chinese Academy of Sciences Developed Bionic Artificial Electronic Skin

Researcher Mr Zhang Ting and his team from Chinese Academy of Sciences’ Suzhou Institute of Nano-tech and Nano-bionics recently developed a new type of wearable flexible biomimetic tactile sensor, the bionic artificial electronic skin. The device can achieve real time monitor of pulse, heartbeat, and throat muscles vibration etc due to its high sensitivity and rapid detection of small forces. It has broad application prospects in the medical field. The research results have been published in the latest issue of Advanced Materials.

Flexible biomimetic sensors are flexible electronic devices that can implement the imitation of human senses of touch, smell, taste, hearing and vision etc. These devices have great potentials in consumer electronics, military, health care and other industries. With its development in recent years, flexible electronic devices that can be attachable, wearable, portable and collapsible have caught the attention of researchers from all over the world and have become one of the advanced research interests.

Based on the controllable preparation of carbon nanotube conductive films, Zhang and his team used low-cost silk instead of expensive and complex silicone template to obtain controllable preparation of flexible conductive films with micro and nano structures and flexible bionic electronic skin with high sensitivity, low detection limit and high stability.
Chinese Space Station Expected to be in Operation in 2020

China’s space station is expected to be in operation in 2020 with a “five-cabin” structure, among which the first cabin may be put into space around 2018 according to the project timeline of the manned space flight program, said Mr Hu Wenrui, Academician and researcher of Chinese Academy of Sciences during the Forum held by Shanghai Association for Science and Technology. In his report Space Station and Scientific Research, he introduced the International Space Station (ISS) which, currently in orbit and planned to shutdown in 2020, may postpone its retirement to 2024. Between 2020 and 2024, the Chinese space station, alongside with the ISS, will be the “twin stars” of manned space station. It may well be the only manned space laboratory in the world during that period.

It is understood that a series of manned spaceflight tests will be carried out in China before a space station is built at the altitude of several hundred kilometers. They include Tianggong 2 space laboratory which will be launched next year, the new generation Changzheng (Long March) 7 launcher and the Tianzhou cargo spaceship that will be launched soon. They will be connected to each other in a new space flight system. China will build its first space station with multiple-cabin-structure after technology verifications of the space station has been completed.

In the space station structure diagram shown by Hu, the main body of the space station will be in the shape of a “cross”. The core cabin stays in the middle, with one side being linked to the manned cabin and the other to the cargo cabin. The two wings are connected to a space laboratory cabin respectively. “Compared with the 450-ton ISS, ours is only 60-ton – it is not big but it is perfectly formed.”

Source: Sing Tao Globe
Date: June 24, 2014

Smart Supercapacitor Showing Battery Level through Pattern

Recently, a new type of smart supercapacitor electrode has been developed by Dr Zhao Zhigang’s research group at the Suzhou Institute of Nano-Tech and Nano-Bionics, Chinese Academy of Sciences. The smart supercapacitor can display information about changes in its energy storage status through the alternating changes of pattern and background colors. This research result has been published in the prestigious international journal, Nano letters, Issue 14.

Supercapacitors have been attracting vigorous research interest as promising means of electricity storage due to their high power densities, superhigh cyclic lives, and safe operation, which have shown high value and huge market potential in many areas such as transportation, electric power, communication, national defense, and consumer electronics. Currently, supercapacitors can function as a device for energy storage. Among many research directions, developing an innovative supercapacitor endowed with intelligent features is an exciting assumption, which represents an important way to bring the technology closer to real application. Hence scientists at the Institute raise the question: Is it possible to develop a supercapacitor which not only functions as a conventional energy storage device but also possesses the characteristics of being smart and interacts with humans without complicated circuit design, for example, one displays the energy information in the form of image or graphics?

Two commonly used electrochromic materials, W_{18}O_{49} and polyaniline (PANI), are employed as components in this smart supercapacitor electrode by Zhao’s research group. Just as neon signs on our modern streets display information through color contrast of visual graphics, a pattern has been designed on the capacitor electrode, with the metal-oxide W_{18}O_{49} and PANI constituting the pattern and background.
respectively, both of which store energy and simultaneously manifest color changes. The pattern color scheme can be employed as an immediate indicator of the energy level stored in the supercapacitor, bridging electrochromic behaviors with energy storage uses. The state of energy can be constantly and visually conveyed through recognizing variations in pattern color schemes during capacitive process.

This study, combining the storage function of the conventional supercapacitors and the visualization from electrochromism, makes the new supercapacitor “smart”. It also opens up a new path for the future development of supercapacitors.

Chinese Bathyscaphe Manipulator
Completed Functional Test at 7000m under Water

Aviation Industry Corporation of China’s Nanjing Electromechanical has always been a leading manufacturer of electrohydraulic servo valves in China. In December 2013, the 7000m client-server servo electrohydraulic manipulator listed in the National 863 Program “Working Tools, Generic Components, and Operation Skills of Bathyscaphe”, developed by Chinese Academy of Sciences’ Shenyang Automation Institute and Nanjing Electromechanical, has completed the functional test at 7000m under water. During the entire test, the manipulator performed steadily and stably, correctly finishing scheduled tasks and meeting research requirements. This demonstrates that Nanjing Electromechanical has expanded its professional skills and products to deep-sea detection area with international standards.

SMIC Collaborated with Qualcomm to Enhance 28-nano Wafer Fabrication Technology

Recently, Semiconductor Manufacturing International Co., Ltd (SMIC) and Qualcomm jointly announced that SMIC would maintain a close collaborative tie with Qualcomm Technology, a subsidiary of Qualcomm, in the field of 28nm process technology and wafer fabrication service so as to manufacture the Qualcomm Snapdragon processor in China. Qualcomm Technology is highly regarded as one of the major waferless semiconductor suppliers and the leader in 3G, 4G and next-generation wireless technology. The processor is designed for mobile terminal devices. The collaboration will enhance the maturity and production capacity of 28nm process in SMIC.

Prior to this collaborative project, SMIC had already provided support of fabrication process for Qualcomm Technology in the field of power management as well as wireless and connected products of integrated circuit. The new collaboration on 28nm process technology and wafer fabrication will enable SMIC to further strengthen the strategic partnership with Qualcomm Technology and also present new 28nm design and products for the growing industry of mobile communication. In future, SMIC will extend the technology to 3DIC and RF front-end wafer fabrication.
China Launched Sixth Arctic Expedition

On July 18, the research vessel Xue Long (Snow Dragon) arrived at the Bering Sea and began observation and sampling at the first sampling station during the expedition. This also marked the launch of China’s sixth Arctic Expedition.

The team released the "CTD" system, weighing more than 200 kilograms, into the sea for observation. The system is a large-scale equipment which automatically measures and records seawater temperature, salinity (conductivity), pressure, and dissolved oxygen concentration. It consists of 24 ten-liter sampling tanks and certain instruments for testing. Whenever the sampling tanks are lowered to a certain level of depth in water, they would automatically collect seawater for analysis. Computers in the laboratory on board would receive and display real-time analytical data.

It took more than three hours to complete this task. The "CTD" system was lowered to a seabed more than 3,000 meters deep. It carried out the turbulence observations, 150-meter seawater in-situ filtration, and large volume seawater sampling.

In the next ten days or so, the expedition team would investigate 36 other sampling stations at the Bering Sea to conduct comprehensive observation and sampling in oceanology, chemistry, biology, geology, hydrology, and meteorology. During this period, the expedition team would install a set of anchored air-sea flux oceanographic buoy.

Source: China Science and Technology Network, Science and Technology Daily
Date: July 20, 2014

State Council Issued New Energy Vehicle Development Guidelines

The State Council issued a document entitled “Guiding Opinions on Popularizing the Adoption of New Energy Vehicles” on July 21.

The “Guiding Opinions” calls for 25 specific policy initiatives on six measures, clearly stating that the development of new energy vehicles should be focused on purely electricity-driven strategies, namely pure electric vehicles, plug-in hybrid electric vehicles and fuel cell vehicles. Addressing major problems that occurred during the promotion of new energy vehicles, the “Guiding Opinions” has made new suggestions on several aspects ranging from product catalog, entering quality to technology innovation.

The “Guiding Opinions” specifically proposes the formulation of national and professional standards for new energy vehicles and recommends that their charging facilities do away with regional protectionism.

It also suggests formulating entering policies for the new energy vehicle industry so as to encourage business models with market lending and technology innovation to enter the market as well as to encourage investment on charging facilities infrastructure.

The “Guiding Opinions” also states the need for national science programs regarding new energy saving systems, fuel cells, driving systems, vehicle control and information systems, charging, testing and consolidating technology strengths to perfect new science and technology infrastructure, strengthen R&D to meet market needs, improve new cutting-edge energy vehicle technologies and products, increase investment on R&D and testing, and to encourage collaborative development to spearhead major breakthroughs on key technologies. It also suggests improving product quality, reducing energy consumption, and accelerating the construction of new energy vehicles technology innovation system.

Source: China Science and Technology Network, Science and Technology Daily
Date: July 22, 2014
China Developed High Power
Ultralow Temperature Heat Recovery Power Generation Device

On July 21, the 712th Research Institute of the China Shipbuilding Industry Corporation (CSIC) reported that the Institute had successfully developed China’s most powerful ultralow temperature heat recovery power generation device with a heat recovery rate of 18% and above. The Institute owns complete independent intellectual property rights, demonstrating that China has the ability to design and manufacture ultralow temperature heat recovery power generation devices with 200-1000kW and has become one of the few countries that master the core technologies.

The ultralow temperature heat recovery power generation device uses an organic compound with low boiling point as medium, turning hot water, vapor, low-temperature smoke and other low-grade heat sources into high temperature, high pressure gas phase materials through circulating conversion, continuously generating high quality power and reducing pollution. The device can be applied extensively to the heat recovery of high energy-consuming industries such as cement, glass and ceramic. It can effectively generate power from hot water of over 70 °C or smoke of over 100 °C. It has the advantages of efficiently converting high heat to electricity, high degree of automation, occupying little space and having low maintenance cost etc. An expert points out that if waste heat from all over the country were recovered, the power generated per year would be several times that of the power generated from the Three Gorges Project.

Source: China Science and Technology Network, Science and Technology Daily
Date: July 22, 2014

China Plans to Build 120 Biomass Fired Boiler Demonstration Sites

The National Energy Administration and the Ministry of Environmental Protection have issued a notice to build biomass fired boiler demonstration sites in order to develop biomass heat generation, construct urban renewable energy system and prevent air pollution.

According to the notice, 120 biomass fired boiler demonstration sites will be constructed between 2014 and 2015 across the country, especially in regions such as Beijing-Tianjin-Hebei-Shandong, Yangtze River Delta, and Pearl River Delta that have serious air pollution problems and heavy burden of reducing coal consumption. The total investment is around five billion RMB.

The notice points out that a new distributed renewable energy industry, characterized by low carbon, shall be built through the construction of demonstration sites. It shall contain collection and transport of biomass raw materials, production of fuels, construction of biomass fired boilers and heat generation services. The biomass fired boiler heat generation market shall be expanded with newly developed enterprises. Upon completion of the demonstration sites, the output value shall be increased to eight billion RMB.

Source: China High-Tech Industry Herald
Date: July 22, 2014

The Ministry of Environmental Protection Launched Project on Environmentally Sound Management of Electronic Waste

On July 1, Beijing officially launched the full demonstration project on "Reduction of persistent organic compounds (POPs) and persistent toxic compounds (PTCs) in electronic waste
through Environmentally Sound Management (ESM)). The project was a 48-month joint project between the United Nations Development Program (UNDP) and the Ministry of Environmental Protection’s Foreign Economic Cooperation Office. It will analyze the entire life-cycle of electronic products, improve policy standards, strengthen regulatory capacities, and carry out demonstrations about eco-design, recycling system and disposal technology. It will also reduce emissions of POPs and PTCs, which are of global concerns, by improving China’s ESM system and technological standards of electronic waste treatments.

The pilot project will be held in Hubei Province, Jiangsu Province and Tianjin Municipality. It is expected to bring a 50% increase in the disposal and recycling capacity of formal recycling enterprises through the demonstration of model disposal and recycling systems. The achievement will be introduced nationwide to refine the management policy of e-waste disposal, publish relevant technological guidelines and procedures, develop treatment technology of waste printed circuit boards (PCBs), evaluate crashing technology of waste non-printed circuit board, complete the demonstration of pyrogenic processes of PCBs, assess the risk of recycling the low value-added non-metallic materials produced in the dismantling process, formulate promotion strategies, and train technicians. Upon completion of the project, the ESM with an annual treatment capacity of 5,000 tons of brominated flame retardants coated plastics and 5,000 tons of CRT glass are expected.

Source: China Science and Technology Network, Science and Technology Daily
Date: July 2, 2014