N0.536

CHINA SCIENCE AND TECHNOLOGY

NEWSLETTER

The Ministry of Science and Technology
People's Republic of China

N0.536 January 30, 2009

IN THIS ISSUE

INTERNATIONAL COOPERATION

China-Russia Joint Research Center

CAO Jianlin, Chinese Vice-Minister of Science and Technology inaugurated on January 16, 2009 the Changchun China-Russia S&T Park, an international joint research center at the national level. Jointly established by Jilin provincial government, Chinese Academy of Sciences, Russian Academy of Sciences Siberian Branch, and New Siberian government, in collaboration with research institutes, universities, and industry, the new S&T park is designed to mix the modern industrial system with cultures.

Since its ground breaking in 2004, the new S&T Park has introduced a mixed collaboration mode for R&D and innovation activities, making it a desirable technology transfer platform for local S&T

businesses to develop abroad. Following a roadmap of government promotion plus industrial capital, and plus high tech support from both nations, the S&T park has strengthened basic research, applied research, and R&D activities in the area of photoelectronic information technology, petrochemical, novel functional materials, energy materials, integrated modern farming technology, and deep processing of agricultural products. At the same time, it has established a number of international research centers or China-Russian joint labs, and technology integration, innovation, and transfer platforms to spur up the high tech development in the province.

Single-Walled Semiconductor Nanotubes

Researchers at Duke University and Peking University have recently rolled out single-walled parallel nanotubes for semiconductor applications, realized the control of the parallel of carbon nanotubes and its conductance at the same time. The finding was published in the recent issue of journal *Nano Letters*.

The study team led by LIU Jie, a Chinese scientist at Duke University, and a research team headed by LI Yan of Peking University worked on the single-walled parallel nanotubes of super density, using a mixed carbon source made of methanol and ethanol, by taking advantage of the interactions between carbon nanotubes and quarts single crystal patterns. The efforts have resulted in single-walled parallel nanotubes for semiconductor applications with a content reaching 95%-98%, allowing the control of the parallel of carbon nanotubes and its conductance at the same time. The technique has found a solution to addressing the most difficult part of surface making of carbon nanotubes, making the massive production of single-walled parallel semiconductor nanotubes possible. The novel carbon nanotubes can be used to make high performance transistors and sensors.

China Builds Aircraft Components for Airbus

Airbus (China) plans to establish a joint venture with HAFEI Group to produce aircraft components using composite materials for Airbus A350XWB and A320. Both sides will invest to build a manufacturing center in Harbin to produce the said components. The new manufacturing center expects to become operational in September 2009, with the new factory being put into operation at the end of 2010.

RESEARCH AND DEVELOPMENT

Pig's Adult Stem Cells Produce Better Skins

A research team, headed by JIN Yan, Director of No. 4 Military Medical School Tissue Engineering Research Center, has created a pig based skin burn model to study the practicality of treating burn wounds using the artificial skins containing bone marrow stem cells. With the help of engineering

technology and biomedical theory, researchers developed the artificial skins containing both natura materials and pig's adult bone marrow stem cells. The new artificial skins produce natural skins, while the bone marrow stem cells split into different skin cells to narrow down the burn wounds. The new technique expects to find applications in treating burn wounds. Researchers believe that the new technique may also be used to repair damaged joints or bones, if they can find right frames and stem cells. The findings were published in the recent issue of journal *Artificial Organs*.

Superconductor Material Has New Properties

Prof. YUAN Huiqiu and his coworkers at Zhejiang University Dept. of Physics have recently found that iron based superconductor materials, such as barium-iron-arsenic, have an isotropic property in the low temperature upper critical magnetic field, indicating that the material has an upper critical magnetic field that is free from the impact of outside magnetic fields, entirely different from the phenomenon observed in a 2-D superconductor structure. The study also shows that though a crystal structure at a lower dimension is more desirable for the formation of high-temperature superconductors, it is not the sole factor contributing to the formation of such conductors. Researchers said that iron based superconductor materials have an electronic structure closer to the 3-D structure, though it is a 2-D crystal structure. The formation of iron based superconductors, therefore, can be explained by its unique electronic structure, indicating that it can be an important bridge to connect the low temperature heavy-fermion superconductors and high temperature cuprate superconductors. Researchers call for more study to understand the mechanism, as it is currently merely a new phenomenon.

The finding, published in the recent issue of journal *Nature*, was jointly completed by Zhejiang University, Los Alamos National Laboratory, and Chinese Academy of Sciences Institute of Physics, under the financing of the Chinese Ministry of Science and Technology, the Ministry of Education, the Chinese Academy of Sciences, and the National Natural Science Foundation.

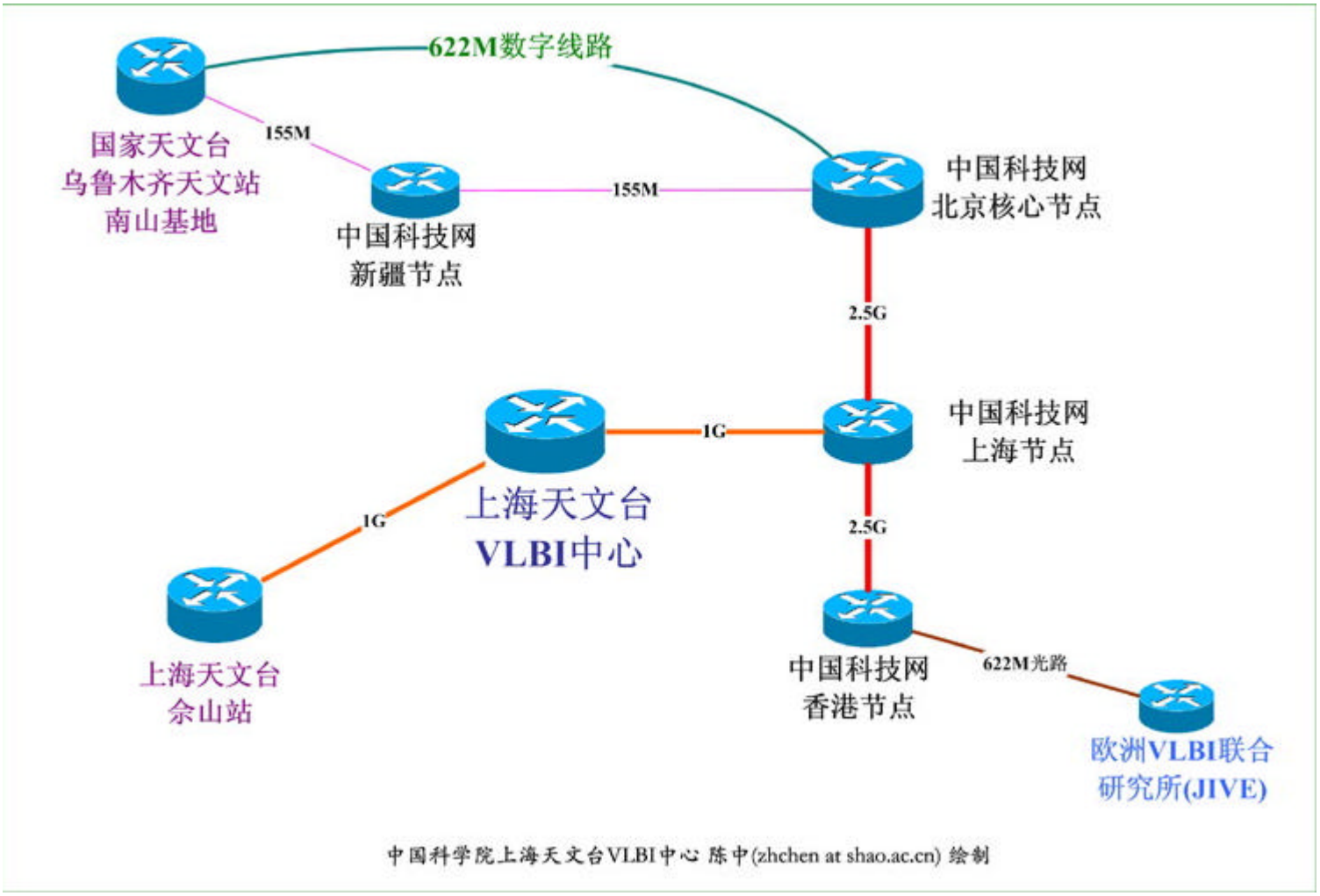
Novel Internet Structure Granted with Patents

QIAN Hualin, a research fellow at CAS Computer Network Information Center, has for the first time proposed a novel Internet structure that is able to address the unregulated networking and poor scalability of the existing Internet. He builds the novel Internet structure as a topological structure, allowing address space to be distributed by layer. The layer based structure can work as an IP router, resulting in a novel Internet structure with better performance, management, and control. The new Internet structure has recently passed the review of State Intellectual Property Office, and was granted with a national invention patent.

The project has been so far granted with five invention patents by State Intellectual Property Office, including the patents for IPv6 address space separation and integration, short connect telecommunication, IPv4 accessibility to the layer based switch network, and control techniques for the layer based switch network. Additionally, the project team has produced a range of other results,

including network protocols, standards, and associated algorithms, published a monograph named "the configuration of a layer based switch network", applied for two copyrights, and established an experimental platform for developing the prototype equipment for the new network. The said Internet structure will be deployed in the next generation Internet environment, and will soon get ready for commercial applications.

China's VLBI Runs Successfully between Two E-VLBI



China's VLBI made a successful test run between Shanghai Observatory Sheshan Station and National Astronomic Observatories Wulumuqi Nanshan Station on January 6, 2006, through China's science network at a speed of 256Mbps/station.

Researchers started the real-time e-VLBI experiment between the two stations in the afternoon of January 6, 2009. Both Sheshan Station and Nashan Station have maintained a steady transmission of observational data of 3C345 (64MHz for bandwidth and 2 bits for sampling) at a speed of

256Mbps/station during the 50-minute observation. The speed is eight times the one rendered by the VLBI sub-system aboard Chang è I satellite. VLBI center received and processed real-time data using a high speed program, and analyzed the observational results. The 50-minute observation has produced clear and stable stripes, demonstrating China ś high speed e-VLBI capability and its future applications in Phase II moon probe project, astronomical observations, and e-science.

Plasma Ignition for Power Plant Boiler

Thanks to their 3-year efforts, researchers of the University of Science and Technology of China, Anhui Energy Group, and Anhui Tenglong Electric have jointly rolled out a plasma ignition system for power plant boilers. The new system is able to instantly ignite coal dust in the combustor, and release combustible gas, taking advantage of the high temperature flames produced by large power plasma arc. With the help of the combustor, the flame is boosted into the boiler for plasma ignition. Comparing with the conventional systems, the new system enjoys numerous merits, including a simplified ignition structure, stable plasma arcs, a longer electrode life, and raised thermal efficiency. The cathode has reached a work life of 200 hours in the test ignition of No. 5 boiler of Hefei Power Plant, or 4 times that of regular commercial cathode. The progressive flame booster developed in line with fluid dynamics is desirable for industrial applications, with enlarged application scope and raised reliability. It will not exceed the desired temperature, and will not sinter either, with stable progressive combustion.

A 168-hour test run shows that the new ignition system consumed only one fourth the energy consumed by an oil ignition system. In addition, plasma ignition allows the operation of dust remover at the same time, greatly reduced the emission of particulate matters. The new technology will save more fuel oil, and produce fine economic returns and social benefits.

NEWS BRIEFS

Satellite Telecommunication for China ś Polar Stations

January 22, 2009 witnessed the official operation of the satellite telecommunication system at China ś Zhongshan Station in the Antarctica. Researchers at the station are now able to access to Internet through the system. The telecommunication system is designed to address Internet access, telephone, and real-time scientific data transmission needs at China ś Zhongshan Station and Great Wall Station in the Antarctica. The system transmits signals from the Antarctica to Shanghai ground receiving station via Intelsat, before connecting to China Polar Study Center through a dedicated line. The system, equipped with the functions of Internet surfing, voice, facsimile, and real-time data transmission, will greatly enhance China ś capability of sending scientific data back to the homeland, and raise the output of scientific expedition. Meanwhile, it will greatly improve the life quality of people working there, allowing them to be connected to homeland all the time.

Polar Resources Sharing

Chinese Ministry of Science and Technology has invested some RMB ten million to raise China's overall level of polar studies. Thanks to 3-year concerted efforts of research institutes involved in the project, China Polar Study Center has established a platform to share the polar specimens. The platform is made up of five standard specimen banks and one polar specimen information sharing network. They are for polar rocks and minerals, polar biological specimens, polar sediments, polar meteoroids, and polar snow and ice.

A special team has been set up to consolidate, categorize, and study the rich specimens collected from the Antarctica. All the information has been published on the polar resources information sharing network, facilitating the study in the area. China plans to share the physical specimens in the future when the management of these specimens becomes well regulated.

Two Chinese Technologies Become International Standards

Two technologies, developed by Prof. YU Lu and her coworkers at Zhejiang University School of Information Science and Engineering Science, have become part of the international standards for digital audio-video coding. The said two technologies have already been bought by domestic telecommunication vendors.

YU and his team started to work on the two technologies in 2002. During the period of 2005-2007, ISO and IEC jointly initiated the preparation of the technical standards for video coding, or ISO／IEC 23002. YU and his team prepared Part II for the standard. The patented conversion technology with raised precision and reduced complexity goes along with the solutions provided by Qualcomm and IBM, and became the only core technical solution for the standard. ITU, ISO, and IEC jointly prepared ISO／IEC14496-10 with a raised compression rate, image quality, and fine network adaptability during the period of 2005-2008. The color filter technology developed by YU and her team also became one of the core technologies used in the standard for its fine performance and simplified process ".

Remote Controlled Cole Mining

Core technologies for remote controlled coal mining, a key project under the National 863 Program, was officially launched on January 20, 2009 in Xi'an. The new technology will make real-time monitoring, failure diagnosis, and remote control of coal mining activities possible, and will provide core technologies for unmanned coal mining surface monitoring. According to a briefing, researchers have developed the core technologies for remote control of coal mining and digging processes, and associated equipment. The new technologies will allow a maximum remote control range between 500m and 1000m. With a budget worth RMB 24.34 million, the project will be completed in three years. It will raise China's coal mining equipment making capability to an internationally advanced level and improve coal mining safety in the country.

Comments or inquiries on editorial matters or Newsletter content should be directed to:

Department of International Cooperation, MOST 15B, Fuxing Road， Beijing 100862, PR China Tel: (8610)58881360 Fax: (8610) 58881364

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