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“2010 National Science Council Review” now available online

The National Science Council (NSC) has compiled the ROC White Paper on Science and Technology (2011-2014) to give overall account of Taiwan's technology policies, technology research achievement of the industrial, governmental and academic sectors, and S&T development measures to help the government formulate policies and stay abreast of the trend of technology advancement and familiarize international and local communities with Taiwan's technology progress.

The Paper formulates eight development strategies addressing such aspects as academic research, the economy, human welfare, and the environment, and seeks to achieve the vision of transforming Taiwan into an “innovative global pioneer in green energy technology and intelligent living” by 2020. Moreover, cabinet has embarked on organizational re-engineering work in order to streamline the government's organization. According to the revised Organic Act, NSC will be merged with the National Science and Technology Center for Disaster Reduction and the Atomic Energy Council's nuclear safety control mission, establishing a Ministry of Science and Technology, which will bear responsibility for promotion of scientific and technological development, mid-stream basic academic research, and applied research. For more information regarding details of the White Paper please click:

<http://www.nsc.gov.tw/yearbook/99/index.html>

<http://www.nsc.gov.tw/yearbook/99/en/FlipViewerXpress.html>

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1. Taiwan breaks ground on mega innovation park

(Taiwan Today, 01.12.2011)

The groundbreaking ceremony for the Central Taiwan Innovation and Research Park in Nantou County was held 29 Nov, with ROC Premier Wu Den-yih and Minister of Economic Affairs Shih Yen-shiang among those in attendance. "When the park is finished in three years, it will focus on improving the nation's capabilities in smart robotics, greenhouse and botanical engineering, and creative industrial designs," said Shih. More than 50 research institutes, including the Industrial Technology Research Institute and the Institute for Information Industry, two of the most prestigious research institutes in Taiwan, have committed to setting up branches in the park, he added. "After completion, the park will connect with other R&D hotspots in neighboring counties to form an industrial and innovation corridor in Taiwan," Shih said. Premier Wu noted that construction on a software development park nearby is expected to kick off next May. "The two science parks and other industries in the same vicinity will eventually form a formidable industrial chain," he said. According to the Ministry of Economic Affairs, the innovation and research park will help advance the government's overall objective of nurturing six emerging industries—tourism, medicine and health care, biotechnology, green energy, culture and creativity, and high-end agriculture. The buildings in the park will be built on green architecture principles, the ministry said.



<http://taiwantoday.tw/ct.asp?xItem=181578&CtNode=413>

2. Discovery made in coral, algae symbiosis

(Taipei Times, 01.12.2011)

A research team from the National Museum of Marine Biology and Aquarium (NMMBA), in collaboration with five other research institutes, made a breakthrough with the discovery of a mechanism that influences symbiotic relations between algae and corals in the sea, helping to develop a new research field in the area of lipid bodies in corals. The achievement was published in the latest issue of *PROTEOMICS*, an international research journal, and is featured as the cover story. NMMBA deputy director Chen Chii-shiarn said the living mechanism that stimulates the growth of coral was unique because it is critical for the growth and productivity of the marine animal, but only when it is in a symbiotic condition with Symbiodinium, a kind of algae. Coral bleaching, which causes the death of corals, happens when Symbiodinium leaves the marine animal. Unlike the mechanism found in most animals where an infection from another biological being may cause illness or death, a coral's life depends on the symbiotic condition, Chen said. The research team, funded by the National Science Council, discovered that the lipid bodies in corals are unique organelles that are formed when symbiotic relations exist and can be an indicator of a coral's health. Chen said the area of lipid bodies in corals was under-researched and that studies in the past had been limited to thinking about the function of lipid bodies solely as a way to provide energy, but the team discovered that its functions include energy metabolism, cytoskeleton and intracellular trafficking, DNA repair and many others. Chen said if a database recording the various mechanisms of the endosymbiotic relationship between coral and Symbiodinium is established, then it may be possible to better monitor the health of corals, which would also improve understanding of the ocean's ecology and changes in the ocean's environment. Moreover, Chen said if the complicated mechanism in the symbiotic relationship between plant and animal cell biology, like the condition between coral and Symbiodinium, is further decoded, the research results could even be applied to food production or the medical field.

<http://www.taipeitimes.com/News/taiwan/archives/2011/12/01/2003519662>

3. New digital database puts Taiwan academic resources online

(Taiwan Today, 01.12.2011)

For scholars working on Taiwanese studies, turning the pages of musty journals and photocopying hard-to-find articles could soon become relics of the past, thanks to the launching 30 Nov of the digital database Taiwanese Academic Online. "TAO offers search and full text service for over 130,000 journal articles and more than 200 academic books," said Wang Jung-wen, founder of Taipei-based Yuan-liou Publishing Co. Ltd., the company in charge of the database. "It integrates the academic fields of Taiwan and Sinology studies, humanities and social sciences, biotechnology and medical care, green energy and environmental science, information and communication, and photonics and optoelectronics," he added. Ovid J.L. Tzeng, minister of the Council for Cultural Affairs, said TAO is a content provider as well as distributor. "We hope that through this service the world can come to better understand the academic achievements of Taiwan," he added. TAO is the first platform of its kind to have been approved by mainland China's General Administration of Press and Publication, according to Yuan-liou. This means that the database can be accessed by participating libraries in mainland China, including the National Library and the



Capital Normal University Library, both in Beijing. At the moment all the works in TAO are by Taiwanese writers, according to Wang. But starting next year publications by foreign scholars will be included in the database as well. In addition, Wang said, Yuan-liou has inked letters of intent for academic cooperation with National Central University in Taoyuan County, National Chiao Tung University and National Tsing Hua University in Hsinchu City, and National Yang-Ming University in Taipei City. These cooperative ventures will soon allow the database to grow much larger, Wang added.

<http://www.taiwantoday.tw/ct.asp?xItem=181650&ctNode=445>

4. Local institute unveils waterproof flexible screen

(Central News Agency, 01 12 2011)

The Industrial Technology Research Institute (ITRI) unveiled Thursday an ultra-thin waterproof rollable screen at a flexible display and electronics forum, offering the electronics industry a product that has a great resistance to water vapour, according to a senior ITRI official. The FlexUPD is a new 6-inch color screen with Active Matrix Organic Light-Emitting Diodes (AMOLEDs) that can even display in water, said Ho Chia-chung, deputy director of the ITRI's Electronics and Optoelectronics Research Laboratories. The 1-millimeter thick screen is expected to bring revolutionary advances in the development of flexible e-readers and cellphone screens, the ITRI said. The ITRI also introduced an interactive flexible touch panel that can be used in future mobile devices, Ho said. With the increasing popularity of smartphones, high-definition screens are expected to be the trend in the future, Ho stated. AMOLED panels, which have a faster reaction time and higher brightness, are also predicted to be widely used in the devices, said John Cheng, director of the ITRI's Display Technology Center. The ITRI is working on the commercialization of the FlexUPD, which won the Wall Street Journal's Technology Innovation Award in 2011, as well as reusable i2R e-Paper, one of the winners of the R&D100 Awards this year, Cheng noted. More than 20 items of flexible panel technology were on display at the forum in Taipei.

http://focustaiwan.tw/ShowNews/WebNews_Detail.aspx?Type=aTPS&ID=201112010043

5. Researchers Find Changes in Cell-Surface Compounds upon Differentiation of Stem Cells

(MEPO Forum, 05 12 2011)

A research team led by Dr. John YU, Distinguished Research Fellow at the Institute of Cellular and Organismic Biology (ICOB), Academia Sinica has discovered that glycosphingolipids on the surface of cells change composition when human embryonic stem cells differentiate into precursors of specialized cells such as neurons, or liver and pancreas cells. These findings, which contribute to the search for safe ways of using stem cells for regenerative medicine, were published in the online edition of the journal *Stem Cells* on November 16. Regeneration of damaged tissues is one of the holy grails in medical research, and embryonic stem cells, with their ability to renew themselves and differentiate into a diverse range of specialized cell-types, are considered a promising source for cell replacement therapies. Unfortunately, alongside their differentiation ability, embryonic stem cells also have a propensity to develop into tumors, a characteristic that currently presents a large obstacle to their clinical use. The team of researchers from Academia Sinica's ICOB, Genomics Research Center (GRC) and Institute of Biological Chemistry recently discovered that a type of compounds found on the surface of human embryonic stem cells, called glycosphingolipids, change composition as the cells differentiate into precursors of specialized cells such as neurons and liver cells. These findings suggest that glycosphingolipids might be suitable for use as markers of the state of differentiation of stem cells. Knowledge of the state of differentiation of these cells may allow researchers to develop a method by which to sort undifferentiated cells from those that are differentiated, and thus, perhaps allow removal of the undifferentiated cells most likely to form tumors, bringing safe regeneration of human cells or organs one step closer. The research entitled "[Changes in Glycosphingolipid Composition During Differentiation of Human Embryonic Stem Cells to Ectodermal or Endodermal Lineages](#)" can be found online on the *Stem Cells* website.

<http://web1.nsc.gov.tw/techwp.aspx?id=1001205001&ctunit=208&ctnode=287&mp=7>

6. Team led by Taiwanese astronomer discovers largest black holes

(Central News Agency, 06 12 2011)

A team of astronomers from the University of California, Berkeley, led by a Taiwanese, has found the largest black holes ever discovered -- each with a mass equivalent to 10 billion suns. The discovery of the black holes, at the centers of two galaxies more than 300 million light years from Earth, will be published in the names of Taiwanese astrophysicist Chung-Pei Ma and Nicholas McConnell, an American graduate student researcher at UC Berkeley.



These black holes are so large that their "event horizons" -- the region within which nothing can escape their pull, not even light -- are seven times greater than the entire solar system, according to a British Times report published 3 Dec. "We planned to find the biggest black hole in the Milky Way Galaxy, but had never thought they were so monstrously huge," said Ma, a professor of astronomy, during a telephone interview with the China Times daily. She said research done in the past showed that the bigger the galaxy, it seems, the bigger the black hole. Ma, a theoretical astrophysicist, is also on an overseas academic advisory panel of the Academia Sinica Institute of Astronomy and Astrophysics in Taipei. Her father Ma Chi-shen is a veteran journalist and her mother Huang Chao-heng a former member of the Control Yuan, Taiwan's top watch dog agency. Using telescopes at the Gemini and Keck observatories in Hawaii and at McDonald Observatory in Texas, Ma and McConnell obtained detailed spectra of the diffuse starlight at the centers of several massive elliptical galaxies. Each one is the brightest galaxy in its cluster, lying about 270 million light years from Earth, they found. So far, they have analyzed the orbital velocities of stars in two galaxies and calculated the central masses to be in the "quasar" range. (The dark remnants of some of the very bright galaxies are called quasars.) "The black holes we've discovered are the largest masses ever detected," Ma said to China Times. "Through this finding, we've also concluded that these massive black holes are at the center of the Milky Way Galaxy." "If there are any bigger black holes, we should be able to find them in the next year or two," she said. "I think we are probably reaching the high end now." The scientific report on the two new black holes is due to be published in the 8 Dec. issue of the British journal Nature.

http://focustaiwan.tw/ShowNews/WebNews_Detail.aspx?Type=aALL&ID=201112060010

7. Intel, Taiwan's institute to develop new memory technology

(Central News Agency, 06 12 2011)

Intel Corp. announced a research program with Taiwan's Industrial Technology Research (ITRI) that will focus on developing new memory technology to be used in mobile devices. The initial project of the NT\$452.7 million (US\$15 million) program will focus on super-fast energy-efficient memory technology for Ultrabook laptops, tablet computers and smartphones, as well as next-generation exascale computing and cloud mega-datacenters, according to Intel. "The accelerating evolution of computing creates exciting opportunities for Intel and Taiwan to jointly pursue technology innovations and explore new growth markets," Justin Rattner, Intel vice president and chief technology officer, said at a press briefing. He said that with a structural optimization in the 3-D IC (three-dimensional integrated circuit) technology, performance of memory chips can be improved significantly while making great power savings. In the five-year project, the U.S. chipmaker will provide funding and resources worth US\$5 million, with the ITRI and the Ministry of Economic Affairs (MOEA) offering matching funds and resources, said Wu Ming-ji, director-general of the Department of Industrial Technology under the MOEA. The ITRI will own the patents and license rights related to the new memory technology, and will use them to help Taiwanese firms when the technology is commercialized, probably in three years, he said. "We hope to help Taiwan's memory chip makers with this technology. They can improve their memory efficiency with the existing process instead of making huge investments in installing new processes," Wu said. Meanwhile, Intel also noted that day that the "Intel Scientist-in-Residence" program in Taiwan has been operating since July, with Wang Wen-hann, vice president of circuits and system research at Intel Labs, as the first Intel resident scientist. Wang has been working at the Intel-National Taiwan University (NTU) Connected Context Computing Center to help accelerate the development of new technology and identify new opportunities for research and business collaboration. The Intel-NTU center, established in January with National Taiwan University, is Intel's first research institute on machine-to-machine communication technology.

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<http://www.taiwantoday.tw/ct.asp?xItem=181983&ctNode=445>

8. University team develops low-calorie, high-fiber chewy candy

(Liberty Times, 06 12 2011)

Chia Nan University of Pharmacy & Science has successfully developed Taiwan's first high-fiber chewy candy, which contains half the calories of regular candy, and is being marketed on the Internet as a healthy alternative. The university held a publicity campaign to launch the candy, featuring students, showgirls, handsome men and lovely ladies to help drum up interest and sales. The agar lime candy is the brainchild of students and instructors in the university's Food Technology Department; they spent over a year on the process, from research and development, to packaging, display, and the design of promotional activities, including an e-commerce website operated by a graduate from the university. Qiu Zhi-guang, the director of the department, said that their agar and lime fiber soft candy has only 14 calories per piece. It gives consumers a feeling of warmth, as well as a sense of health as it is not too sweet. In introducing the candy to the market on Tuesday afternoon, a number of people were invited to whoop up interest, including promotional dances performed by scantily dressed showgirls and bare-chested musclemen.



The showgirls, who said that this was their first experience with such a performance, were quite dedicated, and their efforts won them quite a bit of applause from the crowd. Meanwhile, the men also said that it was their first time walking around on campus without their shirts on. The chewy candy has gripped quite attention on the Ministry of Education-subsidized cyber shop, Chami, which once created a name for itself for selling a popular smoked chicken product.

<http://www.taiwanheadlines.gov.tw/ct.asp?xItem=247402&ctNode=8>

9. Taiwan Legislature greenlights new human subject research law

(Taiwan Today, 12 12 2011)

Taiwan's Legislative Yuan passed a new act governing the use of human subjects in research Dec. 9, offering better protection of the rights of subjects while promoting scientific research and academic freedom. The law makes ethical principles for conducting research involving human participants legally binding. Past practice was governed by a 2002 directive on the sampling of human subjects and the Guidelines for Human Research promulgated by the Department of Health in 2007, both of them nonbinding. "Passage of the law will go a long way for the promotion of academic freedom and the protection of subjects in research," said Democratic Progressive Party Legislator Huang Sue-ying, who pushed for the law in collaboration with legislators across party lines. According to the act's preamble, legislation was needed because "the rights of research subjects tend to be neglected and thus impinged upon, due to such factors as differential access to information and conflicts of interest between subjects and researchers." Under the new act, a research project involving human beings can proceed only after the research plan has been approved by an ethical review committee set up by the research institute. The ethical review panel must comprise at least five disinterested persons, with at least two-fifths from outside the institution, and neither gender exceeding two-thirds of the members. Annual reviews of approved research are required, and the committee may suspend a project in which irregularities affecting the rights or safety of participants are discovered until improvements are made, or cancel it outright. Members of the review committee will face a fine from NT\$60,000 (US\$1,982) to NT\$600,000 if they contravene legal procedure during review or are found to be involved in the research project. The law stipulates that informed consent must be obtained from targeted adult subjects. Parental consent is required for child participants, and for research on corpses pre-death permission or the consent of relatives is needed. Failure to obtain informed consent, as well as data obtained through force or inducement, will result in a penalty of up to NT\$500,000. Research involving human subjects is defined by the act as obtaining, investigating, analyzing or applying human samples or data from individuals in studies of behavioral ecology, physiology, psychology, genetics and medicine.

<http://www.taiwantoday.tw/ct.asp?xItem=182247&ctNode=445>

10. Taiwanese team to co-launch world's largest neutrino observatory (update)

(Central News Agency, 12 12 2011)

Taiwanese researchers will collaborate with their counterparts in several countries to launch the world's largest neutrino observatory in Antarctica in four years, a project that could help scientists better understand the origin of the universe, researchers said. The NT\$240 million (US\$7.9 million) observatory, which will cover an area of 100 square kilometers, will involve universities in the United States, Europe, Japan and Taiwan. When completed, it will be much larger than the IceCube observatory, currently the largest neutrino detector in the world, with an area of 1 square kilometer. This means that the new observatory will have a detection capacity 200 times that of the IceCube, the Taiwan research team said at a press conference in Taipei. "The observatory will enable scientists to detect higher-energy neutrinos from distant galaxies," said Huang Ming-huey, a professor and member of the team, which has around 10 members. "These neutrinos can tell us what happened in the early universe, and help us understand how the universe came into being," he said. Unlike the particles that make up light, radio waves and X-rays, neutrinos can penetrate anything, making it ideal for the observation of distant areas of the universe, said Huang. Radio antennas are buried 200 meters deep in the Antarctic ice sheet at an elevation of 3,000 meters to measure the radio-frequency radiation emitted during the interaction of the neutrinos deep in the ice sheet. The Taiwanese team, led by Professor Chen Pi-sin from National Taiwan University (NTU), will provide 10 of the 37 antenna stations that will form the hexagonal observatory, and will be responsible for the design and production of the antenna detectors. The installation of the first station began in early December, with six more expected to be completed within the next two years by the Taiwanese team, said Huang. Chen, who is currently in the Antarctic taking part in the installation of the station, told the media through a video conference that the project was being carried out at the Antarctic "because the ice here is 3,000 meters thick." He said ice is an ideal medium for the detection of neutrinos. However, he said the extremely cold weather has been the biggest challenge for the researchers. After the observatory is completed, the team will spend at least five to 10 years collecting data, said Chen. "We hope to make some discoveries," he added.



The Askaryan Radio Array observatory project began in 2009. Taiwan's government-operated National Science Council and NTU's Leung Center for Cosmology and Particle Astrophysics are co-funding the Taiwanese contribution to the project.

http://focustaiwan.tw/ShowNews/WebNews_Detail.aspx?Type=aALL&ID=201112120019
<http://taipeitimes.com/News/biz/archives/2011/12/13/2003520585>

11. Groundbreaking developments in Taiwan-Britain academic ties: 2011 International Workshop on Green Chemistry and Biomass Energy held in Taiwan

(Central News Agency, 12 12 2011)

Major developments have been witnessed in Taiwan-Britain academic ties. The 2011 International Workshop on Green Chemistry and Biomass Energy, jointly funded by the National Science Council, Taiwan and the Biotechnology and Biological Sciences Research Council, UK, and organized by the Bioresource Research Centre at the National Cheng Kung University, was held at the National Cheng Kung University on 3 November in Taiwan. Attended by more than 20 scientists from the UK, the States, Japan, Korea and Taiwan, discussion at the workshop centred on biomass energy, covering a range of topics, from taxonomy, genetics, biochemistry, bioinformatics, breeding, agriculture to engineering.

This is the second workshop of its kind, with the first one taking place two years ago. In addition to sustainable chemistry and issues related to biomass energy, a special topic was included in the workshop: the application of silver grass to biomass energy. Being one of the native countries of silver grass, Taiwan has received great attention and interest from the EU. After years of cooperation, much ground has been gained. As well as formal academic discussion at the workshop, a trip to Yangming Mountain and Penghu island was organised for scientists to observe the growth of silver grass in Taiwan. This engagement shall help the breeding of silver grass in the future.

Invited by National Science Council in Taiwan, Douglas Kell, chief executive of BBSRC, attended not only the workshop but several meetings with governmental bodies and academic research groups in Taiwan, in a hope that further bilateral partnerships can be established for the future development of biological sciences and biotechnology.

Progress has been achieved in other areas of research, too. In one such example, the Research Centre for Energy Technology and Strategy at Cheng Kung University and Aberystwyth University in the UK signed a Memorandum of Understanding (MoU) to pursue cooperation in energy research and development. The signing of the MoU was presided over by the vice chancellor of the Cheng Kung University and the chief executive of BBSRC.

Being at the forefront of national energy research, the Research Centre for Energy Technology and Strategy leads energy research in Taiwan. It organises and promotes research development of national energy technology, while also managing the southern office of National Science Technology Programme – Energy. In addition, it plays a key role in liaising energy research in Taiwan with the world. Moreover, it is the national contact point for the European Framework Programme (EU-FP). This coordinating role enables it to utilise the latest developments of energy research in the world.

According to the statistics released by Elsevier, the world biggest publisher in science and medicine, Cheng Kung University produces a high volume of research paper on alternative energy, ranked as being top 19 in the world in its field. Such achievement offers a promising prospect for academic research and industrial development of alternative energy in Taiwan.

Complementing its partner's expertise, Aberystwyth University in the UK is a well-known research body in biological environment and agricultural sciences research. Specialising in genes of herbaceous plants, alternative energy and environmental issues, it has one of the biggest seed banks in the world.

<http://web1.nsc.gov.tw/techwp.aspx?id=1001202014&ctunit=208&ctnode=287&mp=7>

12. Engineers concoct unique gondola maintenance device

(Liberty Times, 14 12 2011)

A Taipei Rapid Transit Corp. (TRTC)-developed "transformer" used in the annual maintenance of the Maokong Gondola that started December 5 has attracted quite a lot of international attention for its ability to work in the steep mountain environment and winding terrain. The newly invented suspension unit contains existing equipment, including two sets of clips and two sets of hanging booms, as well as the most critical aspect of the device, the connector, which was concocted by the head of the maintenance division, Zhang Guo-bin, and his colleagues. The average-looking design was made especially with the topography of the area that the Maokong Gondola passes through in mind. Technicians from POMA, the French firm that built the gondola, said they were quite impressed with the technology. And a Vietnamese gondola company is sending workers to Taiwan to learn about the new gear. Shen Zhi-zang, the vice president of TRTC, remarked that most gondolas overseas run in a straight line and



generally have roads below them that facilitate access for maintenance. Maintenance of the clips, which keep the cables attached, in most cases can be dismantled under the support columns or by using special suspension equipment from helicopters. The construction of the Maokong Gondola, however, was quite a bit more complicated, as not only does it have to navigate two turns, but also it runs across steep mountains. Moreover, since each single wheel used to pull the cable weighs 2.4 tonnes, equivalent to two automobiles, moving them is quite difficult, and the company had to find easier alternatives. As a result, Zhang and his colleagues, based their ideas on the cable that transports gondolas to different stops, came up with a joint-like device that can be applied to a "dual clip suspension unit" that can bear 2.8 tons of weight, as well as being able to navigate 180-degree turns and move up and down the slopes. The device can also be moved up and down, or right and left quite flexibly. While it may sound quite complex, the research cost of the device was less than NT\$10,000. Most of all, it replaces the need to use helicopters in the maintenance effort. Shen remarked that this is the third annual maintenance of the Maokong Gondola, and the main motors and the circuiting wheels were replaced for the first time, including the replacement of the wheels on top of two of the support columns. The 94 wheels that span the entire line will be replaced in a major overhaul of the gondola in 2013.

<http://www.taiwanheadlines.gov.tw/ct.asp?xItem=248191&CtNode=9>

13. Project finds way to make solar cells 50 percent cheaper

(Taipei Times, 15 12 2011)

A joint project between industry and academics funded by the National Science Council has developed new techniques to improve the manufacturing process of GaAs (gallium arsenide) solar cells, which could cut costs by approximately half. The deputy director of the division of engineering and applied science at the council, Yuen Cheong-wing, told a press conference yesterday that the project started in December 2009. Some characteristics of solar cells that counted against them were their high production costs, as well as the energy spent and carbon dioxide emissions involved in their production. Producing highly efficient, low-cost solar cells in a way that minimizes material waste and carbon dioxide emissions were the objectives of the program, the council said. Project convener Horng Ray-hua, a professor at the Graduate Institute of Precision Engineering at National Chung Hsing University, said that in contrast with silicon wafer solar cells or thin-film solar cells, the III-V multi-junction solar cells (GaAs solar cells) showed very high conversion efficiency, at more than 40 percent. However, because of the relatively expensive cost of the III-V multi-junction solar cell, it is mainly used in artificial satellites or power plants, Horng said. He added that the GaAs substrate was necessary for epitaxial growth — the deposition of a crystalline overlayer on a crystalline substrate — of the cell. However, the GaAs substrate is expensive and prone to overheating when the cell is functioning, Horng said. The project's key achievement was developing a method to separate the GaAs substrate and the crystalline overlayer after the epitaxy process has been completed and the substrate replaced with a copper substrate, which is less expensive and has high thermal capacity. By enabling the replacement of GaAs substrate, the epitaxial growth time can be shortened, a heat-dissipation mirror can be added and the original GaAs substrate can be reused, cutting total production costs. The project has applied for five patents and the technology has been transferred to two companies that participated in the collaboration project, Horng said

<http://www.taipeitimes.com/News/taiwan/archives/2011/12/15/2003520789>

14. Taiwanese researchers find way to quickly detect bacteria in blood

(Central News Agency, 20 12 2011)

Taiwanese researchers have developed a bio-nanotechnology platform that makes it possible to rapidly capture and detect bacteria in human blood samples without the need for time-consuming culture processes. "Detecting bacteria in clinical blood samples without using time-consuming culture processes will allow more rapid diagnoses," said Wang Yuh-lin, a distinguished research fellow at Academia Sinica and National Taiwan University (NTU) professor, who led the research team. According to Wang, conventional methods commonly require a sample preparation time ranging from days for fast growing bacteria to weeks for slow growing bacteria. The result was reported in the Nov. 15 issue of the journal Nature Communications. Liu Ting-yu, an assistant professor at NTU and a member of the team, said that "like every instrument that has its own distinct sound, every molecule has its specific spectrum, and scientists have used the feature to differentiate bacteria." He said that coating silver-nanoparticle arrays with the antibiotic vancomycin using a technology called surface-enhanced Raman spectroscopy (SERS) can lead to a 1,000-fold increase in bacteria capture compared with conventional approaches. Vancomycin was chosen because it is one of the strongest antibiotics available and captures nearly all forms of bacteria. Liu said the captured bacteria can then be concentrated in a special vancomycin coated module, while blood cells are excluded, making identification easier. The development could have wide-ranging benefits, with the top priority at present the detection of sepsis, a potentially deadly condition that is characterized by a whole-body inflammatory state and the presence of



known or suspected infection. Doctor Han Yin-yi of NTU Hospital said the technology would help obtain a much faster and more precise initial test result of the infection, reducing patient fatalities and the incidence of complications. Han said that once the technology becomes available, doctors will no longer have to engage in guesswork when prescribing drugs to patients, and antibiotic abuse will also be reduced.

http://focustaiwan.tw/ShowNews/WebNews_Detail.aspx?Type=aTPS&ID=201112200031

15. Meteorological satellites to be launched in 2015, 2017

(Central News Agency, 25 12 2011)

The launch date for FORMOSAT-5, a remote-sensing satellite, is scheduled for 2014, while 12 meteorological satellites under the FORMOSAT-7 program are scheduled to be launched in 2015 and 2017, the Hsinchu-based National Space Organization (NSO) said. The 12 satellites under the FORMOSAT-7 program, a joint venture between Taiwan and the United States, will be launched in two separate groups in 2015 and 2017 due to limited staff and testing facilities, said the NSO. NSO Deputy Director-General Yu Hsien-cheng said that as the organization is currently carrying out the FORMOSAT-5 program, it has no spare capacity for the testing of the 12 FORMOSAT-7 satellites. Six of the meteorological satellites under the FORMOSAT-7 program, designed for gathering weather information in low-latitude regions, will be launched in 2015, while six other high-latitude meteorological satellites will be launched in 2017, Yu said. A satellite designed and manufactured in Taiwan will also be launched in 2017, he continued. Taiwan will benefit from more accurate weather information once the FORMOSAT-7 satellites are orbiting, he said.

http://focustaiwan.tw/ShowNews/WebNews_Detail.aspx?Type=aALL&ID=201112250006

16. NCKU launches infectious disease research center

(Central News Agency, 26 12 2011)

National Cheng Kung University (NCKU) inaugurated a center to fight against infection disease. The new Center of Infectious Disease and Signaling Research will feature a strong team, with members such as Michael Lai, dubbed the father of the coronavirus, former National Science Council Deputy Minister Chang Wen-chang, and former Centers for Disease Control Director Su Jh-jen. Su said infectious diseases such as AIDS and tuberculosis have had a major impact on human health and the economy. "NCKU has in the past excelled in research on the enterovirus 71 and dengue fever. It will now make vaccines and medicines as the ultimate goal to fight against Taiwan's infectious disease," Su said. He noted that most emerging infectious diseases are triggered by mutant bacteria or viruses, but that only about 30 percent of the bacteria and viruses could be identified. He said the center will have Taiwan's only PLEX-ID device, which will facilitate the identification of bacteria and viruses. Lin Chyi-her, dean of NCKU's Medical College, said the center is a national unit but hopes to one day become a world-class research center.

http://focustaiwan.tw/ShowNews/WebNews_Detail.aspx?Type=aALL&ID=201112260034

17. Seven researchers win government science & technology awards

(Central News Agency, 28 12 2011)

Seven Taiwanese researchers received government awards on from Vice Premier Sean Chen in recognition of their achievements in the areas of science and technology. Chen handed out the 2011 Award for Outstanding Contributions in Science and Technology to the researchers, who worked on four different research projects, at a ceremony in Taipei. "What they did is beyond technology," Chen said. "Their efforts were made out of concern for the country's people and for society." The projects that won the award organized by the National Science Council were a 2009 A/H1N1 flu virus vaccine, a new method of interferon treatment for chronic hepatitis B sufferers, a seismic evaluation and retrofit strategies for school buildings, and an automatic virtual metrology system to improve the quality control of high-tech products. The vaccine invented by Ho Mei-shang, an expert in the prevention of epidemics, helped alleviate the problems facing Taiwan when the A/H1N1 virus broke out worldwide in 2009. Kao Jia-hong, who is dedicated to researching the treatment of liver-related diseases, said he launched his project to identify chronic hepatitis B sufferers suitable for interferon treatment as liver disease is a major health problem in Taiwan. The research will help reduce the likelihood that chronic hepatitis B sufferers will develop liver cancer, Kao said. Cheng Fan-tien won the award for his formula to predict the rate of flawed products based on an automatic virtual metrology system. His design has been applied to products in the semiconductor, panel manufacturing and solar energy industries. Companies utilizing the method include Taiwan Semiconductor Manufacturing Co. and Chimei Innolux Corp. "The greatest sense of achievement comes when companies are willing to use your invention," Cheng said. Hwang Shyh-Jiann, who led a four-member team to come up with a seismic evaluation and retrofit



strategies for school buildings, said their project has proven successful in reducing the incidence of collapsed structures in the event of earthquakes.

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18. Taiwan Scientists Develop Bio-nanotechnology Platform to Capture and Detect Bacteria in Blood Samples without Using Time-Consuming Culture Processes

(MEPO Forum, 28 12 2011)

A research team led by Dr. Yuh-Lin WANG, Distinguished Research Fellow at the Institute of Atomic and Molecular Sciences (IAMS), Academia Sinica, and Professor at the Department of Physics at National Taiwan University, has developed a fast bio-nanotechnology platform to capture and detect bacteria in human blood samples. This detection technology, which does not require labelling or culture of bacteria, was reported in the November 15, 2011 issue of the journal *Nature Communications*. Detecting bacteria in clinical blood samples without using time-consuming culture processes would allow much more rapid diagnoses. Conventional biological assays commonly require a sample preparation time ranging from days for fast growing bacteria to weeks for slow growing bacteria. Using culture-free detection methods would speed up the process, but require the capture and analysis of bacteria from body fluids, which usually have a complicated composition. A team of researchers from the IAMS, National Taiwan University and National Yang-Ming University has found that coating silver-nanoparticle arrays with the antibiotic vancomycin (Van) using technology called surface-enhanced Raman spectroscopy (SERS) can provide label-free analysis of bacteria leading to a 1,000-fold increase in bacteria capture, without introducing significant spectral interference. Bacteria from human blood can be concentrated onto a designated minuscule Van-coated area while blood cells are excluded. Furthermore, a Van-coated substrate produced noticeably distinct SERS spectra of Van-susceptible and Van-resistant bacteria (*Enterococcus*), indicating the potential of this technology for use in bacterial drug-resistance tests. These results represent a critical step towards the creation of SERS-based multifunctional biochips for rapid culture- and label-free detection and drug-resistance testing of microorganisms in clinical samples.

<http://web1.nsc.gov.tw/techwp.aspx?id=1001221071&ctunit=208&ctnode=287&mp=7>