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## Science, Technology and Education News from Taiwan Number 09 – September 2010

- **Nine Taiwanese universities have been placed among the top 500 in the world** this year by the Times Higher Education-QS World University Rankings (criteria: academic peer review, employer review, ratio of faculty to students, citations per faculty and ratio of international to local faculty, as well as ratio of international to local students): National Taiwan University (NTU) topping the list of local universities in 94th place (up from 95<sup>th</sup>). National Tsing Hua University (NTHU, 196th from last year's 223rd), National Cheng Kung University (283rd from 281st), National Yang Ming University (290th from 306th), National Chiao Tung University (327th from 389th), National Taiwan University of Science and Technology (370th from 351st) and three others that made the list for the first time -- National Central University (398th), National Sun Yat-Sen University (ranking not specified) and National Taiwan Normal University (not specified). Ben Sowter, head of the QS Intelligence Unit, attributed the rise in rankings to the universities' academic reputations, citations per faculty and the numbers of international faculty in the ranked universities. Sowter also said that Taiwanese universities' efforts to get more research papers published in international journals, increasing teaching resources and promoting international engagements for faculty are also factors that helped improve their ratings.
- As part of its policy of developing renewable energy and PV industry, the Ministry of Economic Affairs extended the Industrial Technical Research Institute's **budget on photovoltaic technologies** (PVTC) to strengthen the following technologies: polysilicon and amorphous silicon thin film (NT\$ 200 mio.), thin layer CIGS - copper/indium/gallium/selenium – (NT\$ 80 mio.) and building integrated photovoltaic (NT\$ 50 mio.). Taiwan has risen to 4<sup>th</sup> in the world in terms of production of photovoltaic cells, with a turnover of over NT\$ 100 bio.
- The National Science Council is to work with other government agencies to address **patent application issues** and seek ways to accelerate the development of the patent industry. It was noted that often legal restrictions appear to be curbing efforts to commercialize Taiwan's research and development capabilities.

### **Highlights of major news from the scientific world in Taiwan in September 2010:**

Co-development of 4G broadband wireless products with India – new software allows blind to “see” photos – researcher unveiled new visual surveillance technologies – Chiao Tung University unveiled a portable multi-channel brain-computer interface – a research team from Academia Sinica developed antibodies against the dengue fever virus – researchers have discovered a co-seismic effect in the ionosphere, which they say could help detect tsunamis earlier – breakthrough in cancer diagnosis, laboratory tests of iron and platinum (FePt) nanoparticles for dual modal CT/MRI molecular imaging, the first of its kind in the world, were conducted by a research team

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### **1. Taiwan, India to co-develop 4G broadband wireless products**

(China Post, 01 09 2010)

The Taiwan-based Institute for Information Industry (III) said that it would collaborate with India's Center of Excellence in Wireless and Information Technology (CEWIT) to develop 4G broadband wireless technologies and products. The III and CEWIT signed a three-year memorandum of understanding (MOU) focusing on R&D in Taipei Wednesday, marking the first cooperation agreement between the institutes.

Full article:

<http://www.chinapost.com.tw/asia/india/2010/09/02/271108/Taiwan-India.htm>

### **2. New software allows the blind to 'see' photos**

(Liberty Times, 02 09 2010)

National Chung Cheng University information engineering Master's student Peng Yu-hsuan has come up with a free software application for the blind that he calls the "Dark Angel". The package allows the visually impaired to "feel" a photograph using a cell phone camera and a touch screen, allowing them to appreciate the beauty of the world around them. The "Dark Angel", as the software is called, transmits a photograph via Bluetooth to a receiver on a tactile board. The image then takes on a three-dimensional form, so that users can feel it instead of seeing it. Peng says that the software takes flat images and transforms them into three-dimensional photographs.

Full article:

<http://www.taiwanheadlines.gov.tw/ct.asp?xItem=202081&CtNode=9>

### **3. Taiwan unveils new visual surveillance technologies**

(Central News Agency, 10 09 2010)

A group of Taiwanese researchers working under a government-sponsored research project unveiled new visual surveillance technologies that they said can identify illegal acts while still protecting individuals' privacy. Tsai Wen-hsiang, a professor at National Chiao Tung University, demonstrated a technology that can make human movements in designated areas disappear from surveillance footage to avoid privacy infringements. "Security cameras are everywhere now. For example, it will be a privacy concern if these cameras happen to shoot someone's window and someone in the window happens to be doing something private," he said at a press briefing. The technology can erase human activity in windows and other places from the footage, but "authorized people, such as the police, can access these hidden sections by using a password," the professor said. Tsai's technology can also put authentication codes in the footage to indicate altered areas if any exist. A total of 150 technologies have been launched under the project in the past seven years. More than 60 of the 150 technologies have been transferred to some 40 local companies. Other systems that have been introduced is one that can detect banned behavior (smoking, drinking, making cell phone calls, etc.) in public places. The technology can also be used to monitor the elderly at home in case they fall to the floor accidentally.

Full article:

<http://www.taiwanheadlines.gov.tw/ct.asp?xItem=202984&CtNode=9>

### **4. NCTU creates brain-computer interface**

(China Post, 15 09 2010)

The National Chiao Tung University (NCTU) unveiled a portable, multi-channel brain-computer interface by the name of "MINDO." A most mind-bending gadget, the MINDO is an intermix of the computer-generated image technology used in the 2009 sci-fi film Avatar and the wireless technology of the Nintendo Wii, a professor at NCTU said. As with most brain-computer interfaces (BCI), the device — which takes on a simple yet futuristic form that resembles a thick white headband worn as a visor — allows for a direct communication pathway to the brain, making it more or less a "mind reader." Detecting brainwaves, the BCI is aware of the user's state of consciousness and knows when you've dozed off. With the MINDO, users can target their thoughts and send messages to Bluetooth phones or the computer. It also allows people to play video games by way of "imagination" and may one day serve as an important tool for



quadriplegics and other physically disabled persons. A project planned by Taiwan, the U.S. and Germany, the MINDO is the brainchild and collaborative experimental product of five universities, three of which — NCTU, National Yang-Ming University and National Central University — are from Taiwan. Among them, NCTU received NT\$80 million in experiment funding from the American government — the most substantial sum the U.S. has ever invested in a Taiwan university — proving the international regard and recognition of the NCTU Institute of Cognitive Neuroscience. The MINDO weighs less than 200 grams and will prove to be useful under many different circumstances, including sounding off an alarm that reawakens drivers when they have dozed off.

Full article:

<http://www.chinapost.com.tw/taiwan/national/national-news/2010/09/15/272619/NCTU-creates.htm>

## **5. Researchers unveil dengue fever drug**

(Liberty Times, 17 09 2010)

A research team from Academia Sinica announced that it has developed type 2 monoclonal antibodies against the dengue fever virus. According to researcher Wu Han-chung, tests on the effectiveness of the 32 antibodies developed were conducted on laboratory mice. The results showed that mice injected with a dose of dengue virus more than 25 times the lethal amount had a survival rate of 70 % after being treated with six of these antibodies. For mice treated with one of these six, the rate of survival was as high as 90 %. The research team plans to begin human clinical trials in the near future. The team's research findings were among the results of 32 biotechnology research studies announced by Academia Sinica, the National Health Research Institutes and National Taiwan University. The announcements attracted more than 100 pharmaceutical manufacturers seeking to assess the feasibility of commercial applications of these findings. Academia Sinica researcher Konan Peck revealed that his research team has developed a method for detecting lung cancer tumor markers in the blood that has a success rate of 96 %. The method can be used to assess the effectiveness of chemotherapy treatment within only three days, and to monitor cancer relapse in patients, according to Peck. Chiu Ing-ming of the NHRI also reported on his team's research into nerve conduits, nerve stem cells and cell growth factors. The research included experiments on lab mice with sciatic nerve injuries. This could eventually lead to effective treatment of serious bone breaks through regeneration of nerve stem cells, Chiu said.

Full article:

<http://www.taiwantoday.tw/ct.asp?xItem=118511&ctNode=413>

## **6. Taiwan scientists find link between earth, ionospheric activity**

(Central News Agency, 21 09 2010)

Two researchers from National Central University in Jhongli, Taoyuan County have discovered a co-seismic effect in the ionosphere, which they say could help detect tsunamis earlier.

Liu Jann-yeng and Yen Horng-yuan, from the university's Department of Earth Science, said at a news conference in Taipei Tuesday that their research found earth tremors could prompt a similar movement in the ionosphere, which can be monitored on the ground.

The ionosphere consists of several ionized layers 80 km to 400 km above the surface of the Earth. An earth movement of eight meters will be magnified and transformed into a vibration across 80 km in the ionosphere, Liu said.

By monitoring the time, location and the vibration of the ionosphere, scientists may be able to determine the source of the earth movement, Liu said.

For example, he said, the research team used the data from the vibration in the ionosphere to pinpoint the epicenter of 7.3-magnitude earthquake that occurred in Taiwan on Sept. 21, 1999. The quake was centered 30 km northeast of Jiji in Nantou County.

Yen said the research has proved a correlation, called a co-seismic effect, between earthquakes and ionospheric vibrations and the latter may determine the source of the earth movement.

The movement of the surface of the sea will cause similar ionospheric vibrations and by monitoring the latter, the source of the former could be identified, he said.

With the use of his theory, Liu said, he was able to work out the time and location of the 2004 Indian Ocean tsunami based on the ionospheric movement at the time.

The findings of the study could give forecasters about half an hour to an hour to issue a warning before a tsunami arrives, he said.



Yen said he was motivated to study the co-seismic effect between earthquakes and ionospheric movement after the 1999 earthquake, but when he first publicized his theory in 2005, it was greeted with skepticism. However, the perseverance of the research team bore fruit this year, when the prestigious Journal of Geophysical Research published the findings in August, he said. The journal, published by the American Geophysical Union, is devoted to reporting research on the physical, chemical, and biological processes that contribute to the understanding of the Earth, Sun, and solar system.

Full article:

<http://www.taiwanheadlines.gov.tw/ct.asp?xItem=204039&CfNode=9>

### **7. Local researchers unveil 'green' chicken fryer**

(China Post, 25 09 2010)

A Taiwanese research team introduced a thermal electricity generation technology that converts the heat used when frying chicken into "green" electricity.

Lee Jinn-shing, a research fellow at the Chung-Shan Institute of Science and Technology, said that the project uses a waste heat energy renewal system to harvest 20 percent of the thermoelectricity generated by cooking oil. The energy can then be used to power lights, radios, electric fans or electronic signage.

The system also lowers the temperature around the fryer to about 94 degrees Celsius — compared to oil temperatures of about 380 degrees — which could be a boon to fried chicken stall operators who often work for more than 10 hours a day under high temperature conditions.

After being put into mass production, the systems would cost only NT\$10,000 each and could generate a total of NT\$200 million in production value if widely used in the industry.

Meanwhile, the institute also unveiled a 270 cc beach buggy based on a similar concept that can save as much as 8 percent in fuel costs.

Lin Guang-yuan, a research team member, said that the beach buggy costs about NT\$500,000 and can travel at speeds up to 120 kilometers per hour. It is scheduled to be showcased at the 2010 Taipei International Invention Show & Technomart from Sept. 30 to Oct. 3.

Full article:

<http://www.chinapost.com.tw/taiwan/national/national-news/2010/09/25/273885/Local-researchers.htm>

### **8. Taiwan research body wins Wall Street Journal top tech award**

(Central News Agency, 27 09 2010)

Taiwan's top industrial research body, the Industrial Technology Research Institute (ITRI), has won the top honor at the 2010 Wall Street Journal Technology Innovation Awards, with its paper-thin flat panel display technology.

In addition to capturing the overall Gold award for its work in developing "high-quality displays made from materials that can be bent or folded," the institute also won the top place in the consumer electronics category with this new invention. Last year, the ITRI also topped the list in the consumer electronics category with a paper-thin flexible speaker, beating more than 500 competitors worldwide. The institute said that its innovative technology this year will pave the way for the development of thinner and foldable tablet computers, e-readers and large poster displays in the near future.

The technology also won the U.S. annual R&D 100 Awards, another major prize in the field, in July. The United States, South Korea and Japan have tried to make paper-thin displays by using plastic instead of glass, based on the reasoning that plastic can be folded and made thinner, said Lee Cheng-chung, a division director of the ITRI's Display Technology Center and head of the research project, in an interview with CNA Sunday. However, they were unable to remove the plastic panel from the base plate without damaging the panel, he noted. The institute, on the other hand, developed what it called a "de-bonding layer," which makes the separation easy, he added.

Full article:

[http://focustaiwan.tw/ShowNews/WebNews\\_Detail.aspx?Type=aECO&ID=201009270002](http://focustaiwan.tw/ShowNews/WebNews_Detail.aspx?Type=aECO&ID=201009270002)



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## 9. Taiwan researchers announce breakthrough in cancer diagnosis

(Central News Agency, 30 09 2010)

A Taiwan-developed technology could allow cancer patients to undergo same-day CT and MRI scans without the need to wait for the clearance of contrast agents, cutting diagnostic times in half, a pair of researchers announced. Laboratory tests of iron and platinum (FePt) nanoparticles for dual modal CT/MRI molecular imaging, the first of its kind in the world, was conducted by a research team led by Chen Chia-chun, a professor with Academia Sinica and National Taiwan Normal University in Taipei, and Shieh Dar-bin, a doctor and professor with National Cheng Kung University Medical Center in Tainan. The research was partly funded by the National Science Council. Results of in vitro and in vivo testing were carried in the September 29 issue of the Journal of the American Chemical Society as a cover story.

Full article:

<http://www.taiwanheadlines.gov.tw/ct.asp?xItem=204808&CtNode=9>