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**Science, Technology and Education News from Taiwan
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Introduction of science-related institutions in Taiwan (part 2)

[The Electronics and Optoelectronics Research Laboratories \(EOL\)](#)

Technology advances in electronics and optoelectronics have played significant roles in the industrial development in Taiwan. Both sectors of the industry in Taiwan currently account for notable portions of the respective industries worldwide. The Electronics and Optoelectronics Research Laboratories of the Industrial Technology Research Institute (EOL/ITRI) has shown excellent standing as a strong support of both industries. <http://itri.org.tw/eng/EOL/>

[Mechanical and Systems Research Laboratories \(MSL\)](#)

Mechanical industry is the focus of national technological development programs in the history of Taiwan industry development and has accomplished with pride remarkable result, a significant position in global mechanical industry. There exists an inseparable relationship between ITRI Mechanical and Systems Research Laboratories (MSL) and the achievement of Taiwan mechanical industry. <http://itri.org.tw/eng/MSL/>

[Material & Chemical Research Laboratories \(MCL\)](#)

With the industrial demand and value chain as a core, Material & Chemical Research Laboratories not only combine the power of domestic and foreign academies, but also strengthen collaboration with industry, develop specialty chemicals and materials as well as select appropriate business model to establish a start-up based on technologies from Material & Chemical Research Laboratories, which features the structure of international industry for specialty chemicals and materials and the enterprise system. <http://itri.org.tw/eng/MCL/>

[Information and Communications Research Laboratories \(ICL\)](#)

ICL--Your Trustworthy Technology and Business Partner!
With truly multidisciplinary capabilities, over 800 talented researchers and engineers—1/5 of them have doctoral degrees and 3/5 of them are masters—and certifications by ISO9001 and CMMI (level 4), the Information and Communications Research Labs (ICL) at ITRI is a globally recognized ICT powerhouse and your trustworthy ally! <http://itri.org.tw/eng/ICL/>

[Taiwan Institute of Economic Research](#)

Taiwan Institute of Economic Research (TIER) was established in 1976 as the first private independent research institute in Taiwan. The purposes of the Institute are to actively engage in research on domestic and foreign macroeconomics and industrial economics, to provide consultations for government and businesses, and to promote Taiwan's economic development. <http://english.tier.org.tw/>

[Taiwan Construction Research Institute](#)

Taiwan Construction Research Institute (TCRI) is a non-profit organization that aims to promote advanced construction ideas and technology. It strives to improve the construction standards in Taiwan. TCRI also plays the key coordination role between foreign and local construction agencies. <http://www.tcric.org.tw/English/default.htm>

[Development Center for Biotechnology](#)

The Development Center for Biotechnology (DCB), partially supported by the Government, is an autonomous, non-profit research and development organization established in March 1984 for the purpose of promoting and upgrading biotechnology industry in Taiwan. <http://www.dcb.org.tw/en.html>

[Asian Vegetable Research & Development Center](#)

The Asian Vegetable Research and Development Center was established in 1971 to help improve the nutrition, health, and incomes of families in developing countries. The Center's goal is to develop environmentally safe and sustainable vegetable production technologies that can be adapted by national agricultural research systems. <http://www.avrdc.org/>

[National Health Research Institutes](#)

The National Health Research Institutes (NHRI) is a non-profit foundation established by the government in 1995. Being an autonomous research organization under the supervision of the Department of Health, the NHRI is dedicated to the enhancement of medical research and the improvement of health care in Taiwan. <http://english.nhri.org.tw/>

Source: NSC National Science Council

"ITRI Today" is a quarterly English publication reporting news from the Industrial Technology Research Institute (ITRI), including R&D results, cooperative agreements, and organizational developments, with the intent to familiarize international business, academic, and government communities with ITRI's organizational mission and accomplishments: <http://www.itri.org.tw/eng/publication/index.asp>



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1. Taiwan announces latest generation of wireless communications

(Central News Agency, 06 04 2011)

Taiwan's National Science Council (NSC) announced that it is working on the development of a high-speed wireless communication system that could have a data transfer rate equal to that of optical fiber. Since the project to develop the system kicked off in 2009, a research team led by National Tsing Hua University Professor Pan Ci-ling has come up with a system compatible with and comparable to optical fiber, with a transfer rate of 20 Gb/s. Titled the Radio over Fiber (RoF) Communication System, the technology can allow people to "download 10 high-definition movies within the time it takes to snap the fingers," said Pan. However, although the technology has the potential to boost transfer rates by 20-200 times, it is still encountering technical problems, according to the team. With mobile phones at 900 megahertz (MHz), Bluetooth gadgets at 2.4 gigahertz (GHz) and the latest WiMax technology at 3.5GHz, the new system moves toward the higher end of the electromagnetic spectrum of 100GHz.

<http://www.taiwanheadlines.gov.tw/ct.asp?xItem=221943&CtNode=9>

<http://www.taiwantoday.tw/ct.asp?xItem=158924&ctNode=445>

2. Genes highly relevant to lung cancer identified: hospital

(Central News Agency, 08 04 2011)

A local hospital is now one step closer to developing a better way to detect lung cancer at early stages. In the near future, five cubic centimeters of blood will be enough to tell if a person has a high risk of getting lung cancer, said Perng Wann-cheng, the lead researcher at Tri-Service General Hospital. In a four-year study involving 442 people, of which 283 were healthy and 159 suffered lung cancer, the team found that the prevalence of the disease is highly correlated with the behavior of six genes. The genes cannot be disclosed at present because the hospital is undertaking large-scale clinical trials that are required for its patent application. The study was a long-term, collaborative effort between National Taiwan University, National Health Research Institutes, and Academia Sinica, the nation's top research institute.

http://focustaiwan.tw/ShowNews/WebNews_Detail.aspx?Type=aLIV&ID=201104080024

3. New palpation method introduced for appendicitis diagnosis

(Central News Agency, 14 04 2011)

A new method of abdominal palpation introduced by a local gynecologist is expected to help doctors diagnose pelvic inflammatory diseases in women more effectively. Ou Ming-cheh, who developed the Abdominal Palpation with Ou MC manipulation (APOM) method, said that physicians often have difficulty differentiating between appendicitis, diverticulitis, acute gastritis, and pelvic inflammation, using traditional abdominal palpation (AP) techniques. The newly developed APOM suggests that doctors imagine an upside-down trapezoid in the lower abdominal area before beginning palpation, said Ou. The two vertical lines that would align with the pelvis bones could thus assist doctors in precisely locating the pain and making a quicker diagnosis. In a three-year study that involved 113 women who were rushed to the emergency room with acute abdominal pain, APOM was found to be a better method for diagnosing pelvic organ diseases. The findings were published in the American Journal of Emergency Medicine on February 25, 2011.

<http://www.taiwanheadlines.gov.tw/ct.asp?xItem=222737&CtNode=9>

4. Taiwan, US to jointly develop next-generation PET technology

(Central News Agency, 14 04 2011)

Taiwan's National Cheng Kung University (NCKU) announced a cooperation plan with a U.S. laboratory and manufacturer to jointly develop next-generation positron emission tomography (PET) technology that will significantly advance the diagnosis of breast cancer. Under the terms of the project with the Brookhaven National Laboratory (BNL) and Aurora Imaging Technology Inc., the new PET technology will be used in combination with magnetic resonance imaging (MRI) to create the world's most progressive breast cancer diagnosis system, said NCKU officials. According to Gene-Jack Wang, chairman of BNL's Medical Department, the new PET/MRI system will be able to accurately identify breast cancer tumors when they are only 0.2 cm in size. Existing technology is unable to identify such tumors until they reach 4 cm.

The time required for an accurate diagnosis will also be shortened from 30 minutes to within 5 minutes, NCKU said.



Young Ming-shing, a professor at NCKU's Department of Electrical Engineering who is the project coordinator, said the team hopes to complete the development of the technology and transfer it to Aurora for commercial production within five years.

<http://www.taiwanheadlines.gov.tw/ct.asp?xItem=222725&CtNode=9>
<http://web1.nsc.gov.tw/techwp.aspx?id=1000423008&ctunit=208&ctnode=287&mp=7>

5. Taiwan develops revolutionary heart-attack drug

(Taiwan Today 21 04 2011)

A clot-busting drug that treats heart attacks using a combination of stem cells and nanomaterial was unveiled by the National Science Council. "The medication is based upon a blend of proprietary nanomaterial with growth factors and stem cells," project leader Yeh Chen-sheng said. "It is administered by direct injection into the heart." Yeh, a professor of chemistry at Tainan-based National Cheng Kung University, said the drug targets vascular congestions and clears clogged carotid arteries. "The nanomaterial carrying the growth factors and stem cells then dissolves and is metabolized by the kidney," he added. According to Yeh, existing medication often fails to work as it has been diluted below effective levels before reaching the heart. "Direct injection overcomes this issue, with preliminary testing on lab mice showing heart functions increasing by 50 percent without any significant side effects," he said. "The next step is to conduct trials with intravenous injections and then run lab tests on larger animals." The drug was developed under the auspices of a three-year NSC project commencing 2010.

<http://www.taiwantoday.tw/ct.asp?xItem=160982&ctNode=445>
<http://www.taipeitimes.com/News/taiwan/archives/2011/04/21/2003501309>

6. Academia Sinica Researchers Discover Positive Feedback Loop in the Arabidopsis Circadian Clock

(MEPO Forum 21 04 2011)

The circadian clock in many organisms generates a 24-hour oscillation in biochemical, physiological, or behavioral processes to anticipate diurnal changes in the environment. The 24-hour oscillation is generated by a negative feedback loop mechanism. A current model indicates that the Arabidopsis central oscillator is composed of several negative feedback loops. However, it remains unclear whether additional forms of feedback loops in the central oscillator of Arabidopsis exist. A recently published research work by Dr. Shu-Hsing WU's lab in the Institute of Plant and Microbial Biology, Academia Sinica, indicates the presence of a positive feedback loop within the Arabidopsis circadian clock (The Plant Cell 23: 486-498, February, 2011; website at: <http://www.plantcell.org/content/early/2011/02/23/tpc.110.081661.abstract>). Within this positive feedback loop, LWD1 could associate with the promoter of PRR9 and directly activate PRR9 expression. Transcriptional activity of LWD1 also depends on functional PRR9. In contrast to the function of negative feedback loops in building the 24-hour oscillation, a positive feedback loop likely functions to stabilize the circadian system. The newly discovered positive feedback loop in the Arabidopsis circadian system offers new initiatives in the future characterization of this complex network.

<http://web1.nsc.gov.tw/techwp.aspx?id=1000420007&ctunit=208&ctnode=287&mp=7>

7. First Taiwanese Recipient of SEBM Distinguished Scientist Award

(MEPO Forum 21 04 2011)

Dr. Nan-Shan CHANG, Professor and Chair of the Institute of Molecular Medicine at National Cheng Kung University (NCKU), Tainan, Taiwan, is one of the 9 recipients of the 2011 Distinguished Scientist Award by the US-based Society for Experimental Biology and Medicine (SEBM).

<http://web1.nsc.gov.tw/techwp.aspx?id=1000420005&ctunit=208&ctnode=287&mp=7>

8. Taiwan releases its first aerial photography drone

(Central News Agency, 22 04 2011)

A local company has unveiled Taiwan's first indigenous unmanned vehicle for aerial photography, hoping to break into a market that so far has been monopolized by imported products. The AI Rider, a system based on a six-rotor unmanned aerial vehicle weighing about 1,450 grams, is highly competitive because of its price and after-sales



service, including training that is more easily available to domestic customers, said Clark Lin, vice president of Gang Yu Corp. The remote-controlled aerial photography vehicle is said to be entirely developed in Taiwan and made with domestic components. It can carry a payload, such as a video camera, of up to 400 grams, and can climb to an altitude of 550 meters. It can withstand a sustained wind speed of up to 10 meters per second, or an instantaneous wind speed of no more than 15 meters per second. With a fully-charged battery, the drone can fly up to 13 minutes with a 250-gram payload, and can reach a 750-meter radius from its handler.

<http://www.taiwanheadlines.gov.tw/ct.asp?xItem=223467&CtNode=9>

9. NCKU and NRC Made Innovative Cancer Diagnostic and Treatment Discoveries

(MEPO Forum 27 04 2011)

A Taiwanese research team led by Prof. Dar-Bin SHIEH of Institute of Oral Medicine in Medical College at National Cheng Kung University (NCKU) has partnered with a research group led by Dr. Dennis WHITEFIELD from National Research Council (NRC) of Canada to develop innovative cancer diagnostic and treatment technologies. According to Prof. Dar-Bin SHIEH, the transnational team, which consists of 7 professors from universities and Academia Sinica in Taiwan and 4 scientists from National Research Council of Canada has participated in the research project for nearly 6 years. Compared to traditional nano-contrast agents that can only show the tumor's location roughly, an improved nano-contrast agent developed in the first 3 years of the project can precisely locate cancer cells through X-ray computed tomography and nuclear magnetic resonance imaging and reveal the genetic expression profiles of the cancer cells. This research achievement has been published in a 2010 issue of internationally renowned Journal of the American Chemical Society (JACS) as its cover story.

<http://web1.nsc.gov.tw/techwp.aspx?id=1000423009&ctunit=208&ctnode=287&mp=7>

10. Scientists Show How Phosphorylation Modulates Daxx Selectively Binding to SUMO-1 over Other Paralogs and Its Implications in Stress-induced Apoptosis

(MEPO Forum 27 04 2011)

The Hsiu-Ming SHIH and Tai-Huang HUANG groups at the Institute of Biomedical Sciences, Academia Sinica, described the structural basis of Daxx SUMO-interacting motif (SIM) in complex with SUMO-1 and the molecular details of how phosphorylation of this SIM motif enhances Daxx selective binding toward SUMO-1 over SUMO-2/3 and its impacts on Daxx SUMO binding, sumoylation, and stress-induced apoptosis. These findings not only provide a previously undescribed paradigm for regulation of protein sumoylation, in which sumoylation is modulated by SIM phosphorylation, but also elucidate a role of Daxx in stress-induced apoptosis via its SIM phosphorylation. The study was published in the leading international journal, Molecular Cell, on 8 April 2011. This paper was highlighted in the journal by a leading expert of the field, Dr. Michael MATUNIS. In addition, the Faculty of 1000 also strongly recommended this paper as a must-read paper on 18 April 2011.

This work was supported by grants from Academia Sinica, the National Science Council, and National Health Research Institutes. The full-text of the study entitled "Structural and functional roles of Daxx SIM phosphorylation in SUMO paralog-selective binding and apoptosis modulation" is available at the Molecular Cell website at: [http://www.cell.com/molecular-cell/abstract/S1097-2765\(11\)00163-8](http://www.cell.com/molecular-cell/abstract/S1097-2765(11)00163-8).

<http://web1.nsc.gov.tw/techwp.aspx?id=1000426001&ctunit=208&ctnode=287&mp=7>

11. NCKU Landmark Project: Advancement of Enabling Micro/nano-fluidics Technology for Biomedical Applications

(MEPO Forum 27 04 2011)

An NCKU landmark project led by Professor Gwo-Bin LEE, Department of Engineering Science, reports the first flexible polymer devices for rapid separation and manipulation of micro-particles utilizing the ODEP technique. Biomedicine and optoelectronics are among the most potential research fields nowadays. In this landmark project, the team demonstrated several new fabrication techniques applications for the optically-induced dielectrophoresis (ODEP) platform, which combine the knowledge from these two fields. It is expected to open up a new era for microfluidic applications. The cost of the biochips using this technology can be relatively low and no complicated lithography and metal patterning process are needed, implying that a disposable system can be feasible. It is envisioned that the developed system can provide a revolutionary platform for biomedical applications and may



provide a user-friendly, flexible, and affordable tool for further biotechnology applications.

The optically-induced dielectrophoresis (ODEP) platform fabricated on amorphous silicon substrates or thin-film polymer-based glass substrates has been reported as a promising technique for particle/cell manipulation. The complicated fabrication process of micro-electrodes for generating DEP forces can be simplified by using "virtual" electrodes formed by light illumination. However, amorphous silicon is usually fabricated by plasma-enhanced chemical vapor deposition (PECVD), which is usually expensive and high-temperature process. Alternatively, photoconductive polymers can be spin-coated on ITO glass substrates at a low temperature. It also opens up a possibility to extend its applications on a polymer-based flexible substrate. Accordingly, this study develops a novel flexible polymer device coated with photoconductive polymers fabricated at a low-temperature for rapid separation of micro-particles with the incorporation of gravity effect. The fabrication process is compatible with the roll-to-roll process such that large-area, flexible polymer substrates can be adopted for this application if necessary.

<http://web1.nsc.gov.tw/techwp.aspx?id=1000427030&ctunit=208&ctnode=287&mp=7>

12. Endeavor launch to mark progress in Taiwan's space technology

(Taiwan Today, 28 04 2011)

The launch of U.S. space shuttle Endeavor scheduled for 29 April will mark a major breakthrough in Taiwan's participation in international space research programs. One of the main missions of the Endeavor on its 25th and final space flight will be to deliver a particle physics detector, which Taiwan has assisted in developing, to the International Space Station, said Jinchi Hao, a project director at the military-run Chungshan Institute of Science and Technology (CSIST). The detector, academically known as Alpha Magnetic Spectrometer - 02 (AMS-02), is a state-of-the-art device constructed to search the universe for dark matter and antimatter.

http://focustaiwan.tw/ShowNews/WebNews_Detail.aspx?Type=aECO&ID=201104280038
<http://www.taiwantoday.tw/ct.asp?xItem=162021&ctNode=445>

13. Taiwan, India schools sign agricultural research agreement

(Central News Agency, 01 05 2011)

President of National Chung Hsing University (NCHU) Shaw Jei-fu signed a student and faculty exchange agreement with the Indian Agricultural Universities Association (IAUA).

http://focustaiwan.tw/ShowNews/WebNews_Detail.aspx?Type=aALL&ID=201105010020