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ITRI

TODAY



Pride of ITRI!

Two Green Eco-Friendly Display Technologies win R&D 100 Awards

ITRI has won the R&D 100 Awards for 4 consecutive years for its outstanding innovative R&D. This year, two eco-friendly technologies, namely, rewritable “i2R e-Paper” and new-type polarizer protective film “HyTAC”, have been selected as winners. This puts ITRI in the group with internationally reputed Intel, Dell, 3M and Hitachi as winners of R&D 100 Awards, and is also a testimonial to Taiwan’s R&D capacity and innovation capability internationally.

The R&D 100 Awards, often known as the Oscars of invention, is a highly acclaimed R&D international award. Each year a hundred commercialized technologies with far-reaching significance for human living are selected from thousands of innovative technologies around the globe. 2011 ushered in the 49th session of this award.

The two ITRI teams will be honored along with the other winners at the R&D 100 Award Banquet on October 13 in Orlando, Florida. [i](#)

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Future New Paper: Rewritable Electronic Paper i2R e-Paper

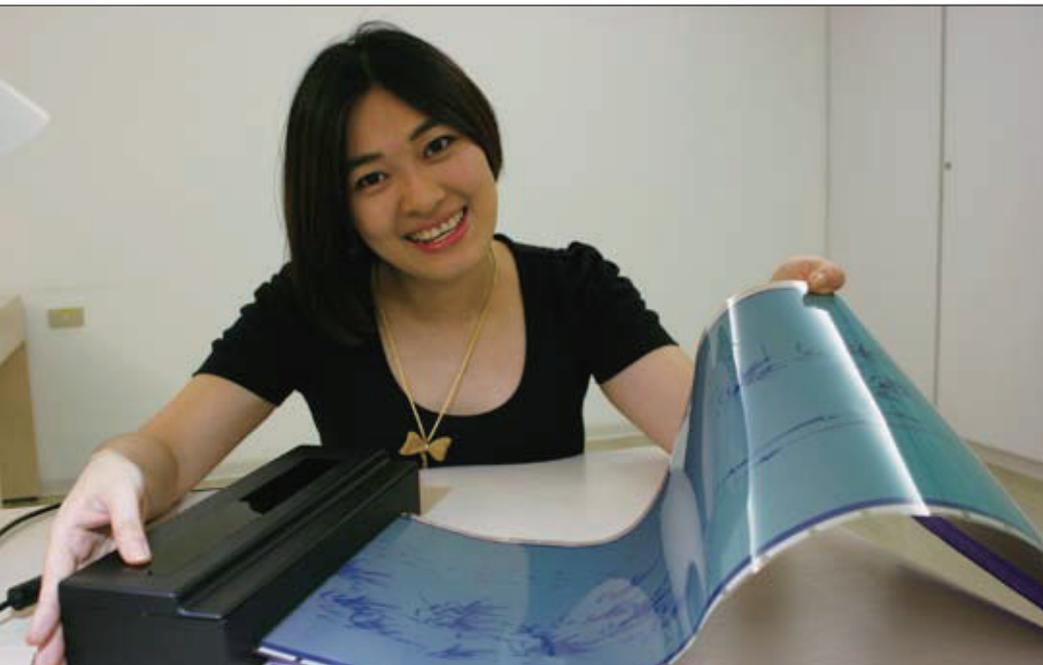
ITRI's rewritable electronic paper i2R e-Paper is an energy conserving display technology.

Source:ITRI

Dr. John Chen, General Director of ITRI's Display Technology Center, pointed out, "With support of the science and technology program of the Ministry of Economic Affairs, ITRI will pioneer innovative flexible display R&D in line with future requirements in applications for mobile intelligent living and green energy conserving display." Thanks to persistence of the interdisciplinary R&D teams and strong resolve of promoting industrialization of product technologies, ITRI has accomplished quite a number of breakthrough innovative achievements. The FlexUPD which in 2010 won first prize of the Wall Street Journal Technology Innovation Award as well as the R&D 100 Awards will make the future smart mobile devices light, thin and robust. This year ITRI was again honored with the R&D 100 Awards for its rewritable electronic paper i2R e-Paper.

i2R e-Paper liquid crystal uses ITRI's leading cholesteric liquid crystal technology. It reflects the sur-

rounding natural light with memory function and does not consume power in maintaining display. For output, it utilizes the thermal writing head currently used in fax machine for refit, and uses the thermal mode for driving writing onto the cholesteric liquid crystal e-paper. The thermal writing head only requires temperature of 86°C and 37W power for writing. It is small, light and low power consuming without requirement for additional removal step. The user only needs to place the rewritable e-paper into the refit integration system to complete removal and writing in one step. It substantially leads internationally in terms of size, power consumption, writing temperature and function. Furthermore, i2R e-Paper is eco-friendly because its plastic PET substrate, high molecular liquid crystal material, nano pigment absorption layer material and silver electrode are all recyclable and conform to the environmental protection laws and decrees of various nations.



With the features of light weight, low production cost, rewritability, and less power consumption, i2R e-Paper technology will create business opportunities for advertising, architecture, and other fields.

Source:ITRI

The rewritable e-paper only requires heat to store or transmit images on the flexible cholesteric liquid crystal panel. This e-paper can achieve 300dpi high resolution with memory function. It does not consume electricity. To change any content, you can simply put the paper into a thermal writing device to complete at once image removing and writing step. It is both eco-friendly and rewritable for multiple times. At the same time, since the thermal writing head is small and consumes minimal electricity, it is unnecessary to carry out the image removing step.

Production cost is low and mass

production will be relatively easy. Recently, ITRI completed the Industrial Technology Development Program with 4 material manufacturers and 5 equipment operators, and also transferred this technology to Changchun Chemical Engineering for mass production. In the future, the technology may be used for producing digital books and pictorials without restriction on length, electronic bulletin boards, situational wall paper, large size digital bulletin boards and other innovative applications. It is expected to create new business opportunities for advertising, architecture and the cultural creative industry. 

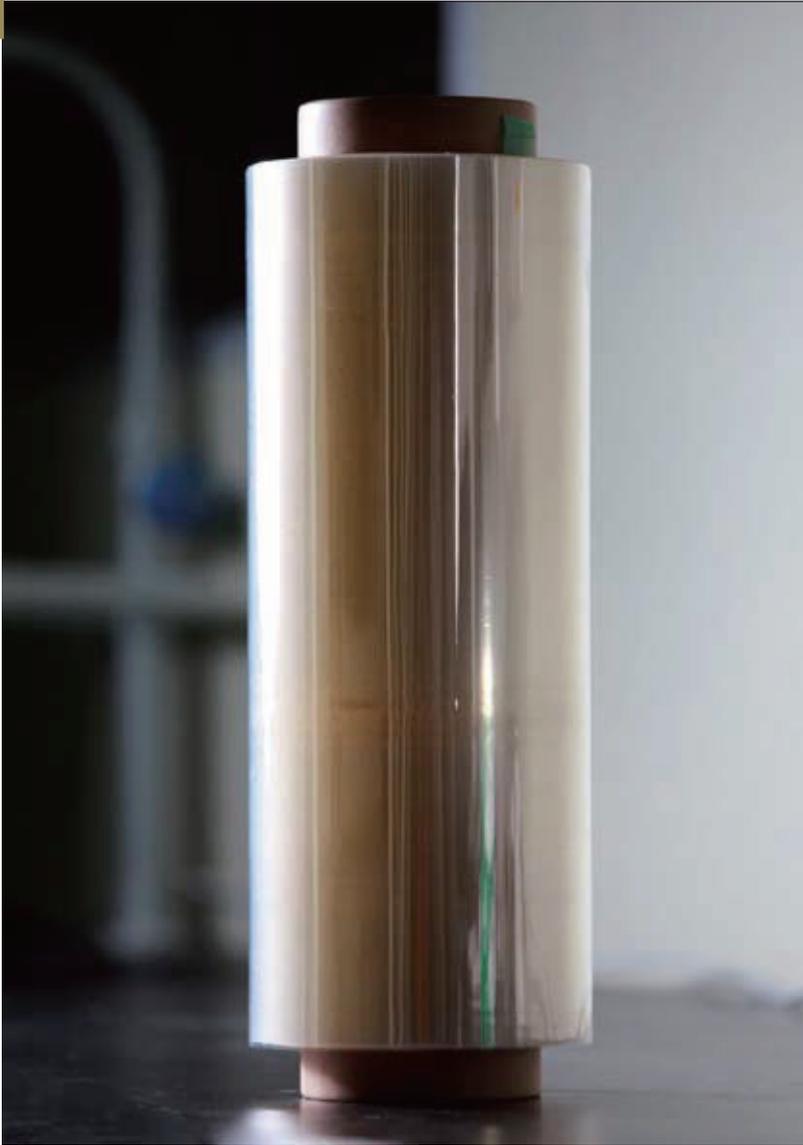
Green Eco-Friendly New-Type Polarizer Protective Film: HyTAC

Dr. Tsung-Tsan Su, General Director of ITRI's Material and Chemical Research Laboratories, said, "ITRI has been conducting research to develop the new-type polarizer protective film HyTAC since 2003. Led by

project leader Tzong-Ming Lee, the team has made the materials used in LCD display more eco-friendly with excellent transparency and stability."

This technology used a unique organic and inorganic nano material

FEATURE



ITRI's use of epoxy/nano-silica hybrid materials technology has made the new-type polarizer protective film HyTAC greener and eco-friendly with excellent transparency and stability.

Source:ITRI

hybrid technology. The highly transparent optical film with low-toxic manufacturing processes not only conforms to the trend of environmental protection but can also replace using TAC film for the current polarizers. It is a critical material autonomously researched and developed in Taiwan. It will enhance the competitive edge of Taiwan's LCD display industry and become a widely used upstream material for display.

The polarizer is a critical component of LCDs. The structure of current polarizers has PVA film with polariz-

ing function bonded on both sides with the TAC film which is highly transparent and humidity permeable. Presently, the manufacturing process of TAC protective film used in polarizers uses dichloromethane solvent. It requires expensive processing equipment to ensure no leakage and residue in the production process, and this makes up an exceedingly high proportion of the production cost. Therefore, ITRI successfully researched and developed HyTAC as a substitute for the conventional TAC film by using epoxy/nano-silica hybrid material technology. It does not require using dichloromethane solvent and can reduce cost for exhaust recycling equipment by 2/3. It conforms to the trend of environmental protection while boasting superior zero retardation optical property which makes it suitable for use in the new generation IPS mode LCD.

With extensive market application potential, this technology has currently been transferred to the relevant domestic manufacturers for mass production process development. The LCD display material technology will bring forth a new wave of market development opportunities.

In the preceding 3 years, ITRI won R&D 100 Awards for On-Chip AC LED lighting technology, high safety lithium battery SToba, eco-friendly fire retardant material REDDEX, regional 2D/3D switching 3-dimensional display, multi-purpose flexible electronic substrate technology and other innovations. Thanks to international endorsement of ITRI's technology R&D, ITRI made it again this year. **i**



Due to its low-toxic manufacturing processes, the HyTAC does not require using dichloromethane solvent and can reduce cost for exhaust recycling equipment by 2/3.

Source:ITRI



Technical Terminology

Cholesteric Liquid Crystal

Cholesteric liquid crystal is not cholesterol generally referred to in biomedicine but liquid crystal with a structure similar to cholesterol molecules. Cholesteric liquid crystal is a type of reflective display, meaning it utilizes light source from the external environment to display images and does not require backlight. At the same time, it boasts double stability feature with image display even after power off and is exceedingly energy conserving. The cholesteric liquid crystal can also produce red, green and blue colors by adding different pitch spherical composite ion-exchangers to form colorful display. It is one of the promising future display materials for color e-book. [i](#)



R&D 100 Awards

The R&D 100 Awards is often referred to as the Oscars of Invention (Chicago Tribune) and is a highly sought after international award. It commenced in 1963 and is now in its 49th year. It is an important indicator in appraisal of new technology on the market. Examples of past R&D 100 award winners include the facsimile machine in 1975, liquid crystal display in 1980, Kodak film CD in 1991, Nicoderm quit-smoking sticker in 1992, Taxol anti-cancer drug in 1993, lab chip in 1996, and high definition TV in 1998. These innovations have great impact on future human living and have become an indispensable part of our daily lives. [i](#)