PRINT Back Back twice

Printed TVs at your store soon? Q&A with Ian Chao of CDT

Chris Hall, DigiTimes.com, Taipei [Tuesday 16 August 2005]

The keenest competition in the global television market is the race for the next generation of flat-panel technology, and leading the charge is the UK-based Cambridge Display Technology (CDT), a pioneer of polymer-OLED (PLED) technology. A key benefit of PLED technology is the ability to deposit layers in the display using printing processes such as ink-jet printing. CDT is not alone. Last year, Seiko Epson demonstrated a 40-inch model based on printed PLED technology.

If development continues at the heady pace of the last two or three years, Ian Chao, general manager, Asia Business Development, CDT, thinks it's quite possible we could be seeing PLED TVs by 2007. DigiTimes.com spoke recently with Chao about the technology and the business angles involved in the potentially revolutionary technology of printable polymers.

This is the first part of a four-part interview. Part II will follow on 17 August, Part III on 18 August and Part IV on 19 August.

Q: One industry representative I spoke with seemed to think it would be quite some time before PLED displays could be printed commercially, but in your presentation at FPD Taiwan, in June, you stated that we would see printed PLED TVs by 2007. What makes you so optimistic?

A: About two years ago, ink-jet printing for displays really started to take off, and the reasons are, first, an ability to produce large-scale display panels, potentially up to Gen 7 or above. Second, PLED technology was able to move on from monochrome to full color, and when you are able to do full color, you definitely need ink-jet printing to enable RGB patterning. Ink-jet printing itself, the jetting head, the complete equipment, became available around two to three years ago.

At that time, about three years ago, we bought the printer company Litrex and started developing tools for the ink-jet printing of PLED displays. Philips also bought one production line from Litrex, with about five or six printers. Worldwide, Litrex has sold around 50 systems, over the past couple of years. Recently, Litrex has introduced Gen 4 and Gen 7 ink-jet systems, and the Gen 4 model has already been shipped for pilot-line PLED display production. Printer development has been on a fast track over the past couple of years.

Litrex was originally a graphics printer company. CDT invested in this operation because we believe that ink-jet printing is viable technology for the commercial production of PLEDs. While developing the print technology to the point where it would be commercially successful in the printing of PLEDs, we brought in another major equipment supply partner by selling 50% of Litrex to Ulvac of Japan. Ulvac is very strong in the LCD industry, with about US$2 billion revenue.

That became a win-win situation because Ulvac had the commercial practice; it had the infrastructure for sales and post-sales maintenance. Ulvac has a good engineering team and was able to develop systems, but after selling printers worldwide, creating an installed base, some customers inevitably required maintenance, and some also required a quality control

process. Ulvac has that capability. There was good synergy between Ulvac and ourselves.

Q: Are there any other companies making this kind of ink-jet printer?

A: In Japan there is Seiko Epson. Seiko is a CDT licensee and is very strong on the ink-jet printing side.

Last year, they demonstrated a 40-inch display. They tiled four 20-inch panels together to form a 40-inch substrate. Once they had tiled them together, they printed the display by ink-jet printing in one pass. In other words, they were printing using a Gen 5 ink-jet printer. They demonstrated a Gen 5 printing capability.

This also raises the question of production efficiency. Ink-jet printing is a linear process, so if you use a larger substrate, your output will be lower. So how are you going to accommodate that kind of change, an increase in the substrate size? First, you can equip the printer with more print heads. Our latest printers have eight or sixteen heads, as opposed to one. And previously one head had 128 nozzles, but our latest generation heads have 1,000 nozzles. These developments address the productivity issue when you move to a larger substrate.

Second, you can jet at much higher frequencies. You can jet at 3KHz, or you can jet at up to 8KHz or 9KHz. And when people are working with bigger substrates, they are targeting TV displays. For TV, the resolution is relatively low, so the drop size can be larger when compared with, say, a small panel at a higher resolution, when you have to deal with a very small pixel size. So this is good news for companies working on large substrate sizes for PLED TV.

Q: I understand that printing techniques can also be used for LCD applications. What would these be, typically?

A: Well, let's take color-filter production when you are using a photolithography process. If you end up with a missing pixel, you will have to scrap the whole substrate. At Gen 7 or Gen 6, the substrates are very expensive, and yield is very difficult to control, so people are trying to use ink-jet printing to repair missing pixels. So let's say there are several pixels missing certain colors. Manufacturers are developing the technique of jetting material into the pixel space, in an effort to repair the whole substrate. That has become an attractive option for LCD makers, and the technique has been attracting a lot of interest.

Q: With the jettable materials themselves, the soluble polymers, I understand there has been significant progress in achieving a full color range. How do you see CDT's progress with the polymer materials?

A: Actually we are delighted with the progress in this area. We recently announced our intention to form a joint venture with Sumitomo Chemical, and Sumitomo Chemical bought Dow Chemical's PLED materials division in early 2005. As a result, we are now looking at cooperation between companies who, in the past, worked independently, with no synergy between them and a lot of duplication of effort.

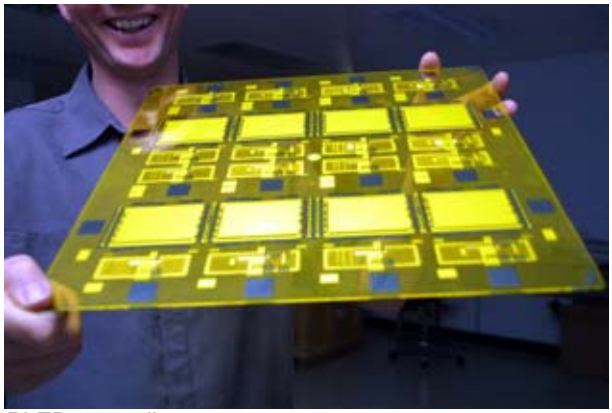
Since we first discussed the JV, we have reviewed the work at Michigan, where Dow Chemical is located, and we have discovered that, in a lot of areas, we can now try different techniques, different models, different structures. I think with this kind of synergy, with more brains working together in key areas such as the lifetime of the materials, progress is faster.

Besides, Sumitomo is very strong in polymer technology. Sumitomo has been working with polymer technology since the late 1980s. When CDT came out with our earliest fundamental polymer IP, a patent for conjugated polymers, Sumitomo came out with their own IP just a few months later. So Sumitomo has a very strong R&D capability in materials development, and we are expecting materials development will move even faster now, compared with what has been achieved over the last 18 months.

The rapidly accelerating progress in this technology will be covered in the next part of this four-part interview. Part II will follow on 17 August, Part III on 18 August and Part IV on 19 August.

Ian Chao, general manager, Asia Business Development, CDT
Photo: Company

Gen 7 printer, from Litrex
Photo: Company



PLED test cells
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