

Flexible Electronics – Accelerating to Manufacturing Advantech Attends 2017FLEX Conference

This year's FlexTech conference on flexible electronics was held at the Hyatt Regency Resort in Monterey, CA. Advantech attended to catch up on relevant developments, as well as to meet suppliers of equipment and processes in the industry. Below are a handful of things we learned and key takeaways...



"Printing, Placement and Packaging of Flexible Hybrid Electronics"

Mark Poliks, Prof. at Binghamton University, Technical Director for the Center of Advanced Microelectronics Manufacturing; James Watkins, Prof. at the University of Massachusetts, Amherst, and Director for the Center for Hierarchical Manufacturing, a NSF Center of Excellence

The focus of this course was on the state of the art of flexible electronics and the integration into full systems, specifically, there was extra focus was given on the advance of manufacturing techniques for Roll-to-Roll (R2R) processing. A major take away is given in the title already.

- "Flexible Hybrid Electronics" shows that to date, there is still not a fully integrated way of printed electronics manufacturing that includes higher order function devices such as integrated circuits and processors. However, manufacturing techniques approach the micron size device level, and with that approach the integration density achieved in the late 1970s.
- Dr. Watkins mentioned the 8086 processor as a prominent example, which uses micron size die patterns. With processing techniques such as direct lithographic exposure (including DLW) as well as Nano Imprint Lithography (NIL) paired with advances in directed ion etching techniques devices such as TFTs achieve higher integration density and with that it seems possible in the not too distant future to create logic devices using R2R processing techniques. This opens the door for large volume production of sensors, particular health monitoring sensors, "disposable electronics" and many other applications.
- Examples presented touched on the sensor aspect, as devices such as stress and fatigue monitors for humans (with military background) were shown. Online monitoring of blood sugar seems to make progress too, which would allow a departure from invasive testing for diabetes patients and provide a more constant observation of glucose levels in the blood.
- A challenge that remains is the creation of truly flexible electronics in the sense that it is also stretchable. Skin patches for example should allow for a certain amount of stretching for better applications.

FLEX Exhibition - Who We Met and What We Learned

A key focus of Advantech while in attendance was to investigate possible solutions for some of our current R2R processing projects and challenges. Here's a recap of some companies we connected with!

- **Carpe Diem Technologies:** Carpe Diem Technologies has created a tool set for R2R processing that might be of interest to ADVUS. A building block type setup allows to create R2R systems with different coating and processing steps included. Currently limited at 150 mm web width (with 300 mm web width in the works), the building blocks include unwind and rewind stations, coating stations with different coating techniques (slot die, gravure, flexo and others), resist applicators and pre-bake stations, laser direct imaging - as well as UV contact exposure using flexible photo plates made from either PET or Willow Glass and Nano Imprint Lithography. The DLW system also has high-speed alignment capability with alignment precision of 1um or less. Not included yet are developer stations for the resist as well as possibly liftoff stations. **Website:** www.carpediemtech.com
- **Micro Connex:** Micro Connex makes flexible circuits on different types of substrates employing a wide range of different coating and removal techniques, including laser etching. Currently, they provide line resolutions to about 25um, but are working on finer resolutions as well. **Website:** www.microconnex.com
- **ENrG:** This company has developed a flexible ceramic substrate based on Yttrium-Zirconium-Oxide, as well as Aluminum Oxides. Their 20um thick substrate can be bent to about 1/4", and can be exposed to temperatures as high as 1,200C. These substrates would allow to use RTA as an annealing step on flexibles. The product is still in development, so the area prices are still rather high, but the goal is to push this technology towards lower costs comparable to, or lower than, flexible glass. **Website:** www.enrg-inc.com
- **NovaCentrix:** Meeting with NovaCentrix gave Advantech the chance to follow up on the results we have seen on our test samples so far. We were able to connect to the "High Brass" including Rick Larson, Stan Farnsworth and Charles Manson (CEO and President). All three reiterated that they are very interested in continuing to work with us to qualify flash anneal as a tool for production of Silicon based TFT.
- **Harper Corporation of America:** Harper is a provider of gravure rollers and smaller printing and proofing systems for the coating and printing industry. **Website:** www.harperimage.com
- **MicroChem:** MicroChem provides a line of chemicals for the MEMS and Electronics Industry.
- **E-Ink:** They had a full color e-paper on display that is planned to be released into the market by next year.
- **Emerson and Renwick:** E&R is building converting and vacuum coating equipment and started specializing towards the needs of the printed electronics community. They have a development center near Manchester, UK - and they have new developments in the area of NIL and RIE, offering alternative techniques to achieve high resolution patterning. For the NIL systems they have created registration systems with 0.1um positioning accuracy. **Website:** www.eandr.com

Contact us today to learn more about Advantech's role in flexible electronics!

412.706.5400