



**Flexible Printed Electronics Quarterly Workshop
"Smart Packaging Enhancing the Customer Experience"
June 2-3, 2010
The State Club at North Carolina State University
Raleigh, North Carolina**

Background:

At the FTA 2010 Flex Conference, a presentation by Dave Knox from the Center of Packaging Innovation at MeadWestvaco, entitled *Printed Electronics and Packaging Opportunities*, was very well received. The interest generated by this presentation was the motivation to hold a workshop on "Smart Packaging Enhancing the Customer Experience". The workshop was jointly hosted by MeadWestvaco and The Nonwovens Institute at North Carolina State University.

The objective of this workshop was to identify technical challenges, increasing the functionality of "smart packaging" without substantially increasing cost by utilizing flexible printed electronics. The morning session focused on presentations to identify the major factors impacting smart packaging performance, power requirements, and manufacturing costs by:

"Overview of the Centennial Campus at NCSU", Behnam Pourdeyhimi, Director of the NCRC

"Smart Packaging Market Overview", Harry Zervos, Technology Analyst, IDTechEx

"Case Study Review" Professor Behnam Pourdeyhimi

"The Nonwovens Institute at NCSU", Professor Behnam Pourdeyhimi,

"Printed Electronics and Smart Packaging Opportunities, Dave Knox, MeadWestvaco

"Smart Adherence Packaging for the Health Care Industry", John Musaus, MWV Healthcare

"Flexible Electronics & Path to Smart Packaging", Jim Stasiak, Hewlett Packard

"New Solar Inks and Applications: Organic Photovoltaics-The perfect power solution for e-paper displays", Mark Storch, Program Coordinator, Inks at Plextronics

A common issue of the workshop presentations and discussion was targeting the right level of functionality in a smart package without prohibitively increasing cost. To the extent that flexible electronics adds expense, how does that get assimilated in the supply chain?

A clear application for cost-effective, smart packaging is in health care, in which the cost of smart packaging can be reasonably incorporated into the price of the product. Value is clearly

added and understood by the consumer with respect to adherence to treatment, which ultimately lowers overall health care industry costs through reliable preventative treatment. Several innovative, smart packaging product concepts, wired to the internet for patient monitoring, were discussed.

An interesting discussion and demonstration involving nonwoven substrates to accommodate flexible electronics to enable smart fabrics and smart packaging was provided by Professor Behnam Pourdeyhimi.

Panel Discussion: "Do we need to add more functionality to packaging?"

The afternoon session involved a panel discussion addressing the challenges facing smart packaging innovation to increase performance without severely impacting cost.

Three key issues were addressed between panel members and the attendees:

1. When is performance "good enough" from a packaging perspective?
2. Graphics (displays) alone may not be sufficient to meet customer/ consumer needs. What increase in functionality is required and at what cost?
3. How can flexible, printed electronics address these issues and further the customer experience? What about disposability and environmental hazards?

Mike Londo from MeadWestvaco joined the morning presenters on the panel and brought an informative perspective on customer/consumer needs and tradeoffs. Customers include manufacturers of products as well as retailers who sell those products; product branding and shelf space differentiation to draw the customer to the product.

Other than health care and novelty packaging applications (which have limited volume potential to yield reasonable break even time and acceptable ROI business models), the smart packaging industry is just emerging and in search of the right technology, such as flexible printed electronics, to increase performance and functionality beyond graphics with the required form factors and cost/pricing structure. Another trend for smart packaging is providing more "active" functionality; examples include compensating for high temperature exposure by active cooling or indicating food spoilage by detecting bacteria leading to packaging color change.

Action: Bob Tulis closed the workshop by

1. reviewing the schedule and topics for the three remaining workshops this year
2. reminding all of the date for the next RFP cycle (November)
3. requesting attendees to help FTA identify priority, cross-cutting technologies for printed electronics that could benefit smart packaging