

Commercializing Flexible Substrates for Displays and Lighting - Challenges and Opportunities

Mark Auch*, Senthil Ramadas, Chua Soo Jin
*Institute of Materials Research and Engineering, Opto- and Electronic Systems Cluster,
3 Research Link, Singapore 117602, Singapore*

Substrates that are thin, flexible, lightweight and durable are fast becoming a crucial component of the printed electronics industry. The growth of the flexible substrate market is directly correlated to the development of the plastic electronics market, which is set to grow substantially within the next 4-5 years. The major market segments are identified as displays, RFID, signage, backplanes and TFPV. Future lighting will also be possible based on organic light emitting diodes which are essentially thin sheets of plastic-like material that could be applied directly to walls or ceilings to provide effective illumination. Coupled with roll-to-roll printing manufacturing processes, plastic substrate based devices can be manufactured in high volume at low cost

In view of the potential opportunities related to plastic electronics and barrier substrates, IMREs research group has been working on potentially commercialising moisture barrier coatings and permeation measurement systems, for which several patents have been filed. These commercialization efforts are supported by Singapore government agencies, including the Research Institutes, ETPL (the commercialisation arm of the RIs) and the Economic Development Board. For a successful commercialisation of flexible barrier substrates, several challenges have to be addressed.

The substrates' mechanical and barrier performance are the key properties, which need to be validated by internationally recognised standards and Companies. Manufacturers, planning to implement plastic substrates, need to modify current processes and tools to satisfy the process limits of the substrates like high temperature baking or wet chemical patterning/deposition.

Other factors include the slow adoption of production tools like Roll-to-roll, especially in the display industry, for which batch handling and processing of plastic substrates have to be implemented. Finding the right partners and working together to identify and address the challenges will be key factors for successful commercialisation of flexible barrier substrates.