



## **PRESS RELEASE**

Contact: Jan Vardaman  
(512) 372-8887

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### **Fan-out WLP Panel Processing: Economic and Technical Challenges**

Fan-out wafer level packaging (FO-WLP) continues to show growth momentum with multiple parts found in Samsung's Galaxy phones and many packages expected in Apple's next iPhone. Under constant pressure to lower cost, a number of companies are researching large area panel processing. TechSearch has released new analysis that examines the economic and technical challenges with the panel approach. Challenges include:

- Managing warpage over a large area as feature size shrinks with materials that interact, especially with different process temperatures
- Die placement throughput over a large area
- Dielectric dispense methods optimized for panels
- Singulation and solder ball attach with large formats

Consortia including Fraunhofer IZM in Berlin, IME in Singapore, and ASMPT in Hong Kong have announced cooperative efforts to help address these challenges. Economic considerations are based on package size and include calculations for the number of panels required monthly with multiple suppliers. TechSearch International's analysis indicates that larger body sizes potentially have greater economic justification than part sizes of less than 5 mm x 5 mm.

There is no consensus on panel size and many equipment makers are reluctant to develop equipment solely for FO-WLP panel production. Typically, OSATs move equipment from one operation to another based on product demand, but with dedicated panel equipment, re-purposing of equipment is not possible. Investing in a panel process is a risky business for many OSATs that need to see a return on investment (ROI) in an era of increasing price pressures and potentially lower revenues. For many substrate manufacturers, there is no choice but to come up with a product to generate revenue where substrate sales have declined as a result of the switch to FO-WLP. FO-WLP is disruptive technology since thin-film metallization is used to replace the substrate to provide a thinner, lower profile package with high-density interconnect.

TechSearch International's new 34-page *Advanced Packaging Update* report with full references provides an updated forecast for FO-WLP in packages and reconstituted wafers, based on new plans for package adoption. Suppliers with panel R&D plans are discussed. The report also contains an analysis of trends in wearable electronics and package adoption as well as new battery technology developments. A set of 28 PowerPoint slides accompanies the report.

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