IMEC Develops Flexible System Integration Process

Researchers from IMEC and Ghent University have developed an integration process aimed at flexible systems with a thickness of <60 microns, using a conventional, low-cost flexible substrate. The researchers demonstrated a wearable heart monitor at the Smart Systems Integration Conference in Brussels, Belgium.

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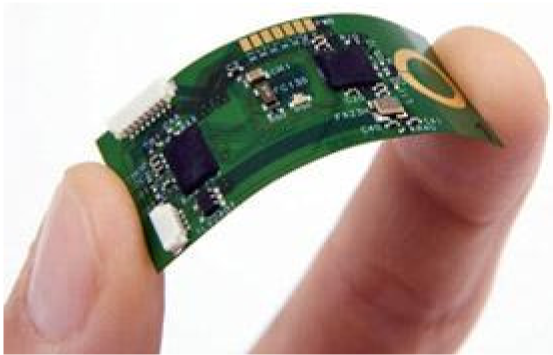
Applying ultrathin chip package (UTCP) technology, researchers from IMEC (Leuven, Belgium) and Ghent University (Ghent, Belgium) have developed a 3-D integration process aimed at wearable health monitors and other flexible systems.



IMEC researchers created a flexible heart monitor, using thinned die and flexible packaging.

In a presentation at the Smart Systems Integration Conference in Brussels, Belgium, the researchers described a process to create flexible systems with a thickness of <60 μm, using a conventional, low-cost flexible substrate. The chip is thinned down to 25 μm and attached to a flexible UTCP, which is embedded in a standard double-layer flexible PCB. Other components can be mounted above and below the embedded chip.

IMEC said the process uses UTCP interposers that solve the "known good die" issue by enabling testing of the packaged chips. Expensive substrates can be avoided by the fan-out UTCP technology, which relaxes the interconnection pitch from ~100 μm to >300 μm, compatible with standard flexible substrates.

IMEC demonstrated the integration technology with a prototype flexible wireless monitor that measures the heart rate with an electrocardiogram (ECG) and muscle activity with an electromyogram (EMG). The monitor includes an ultrathin microcontroller and analog-to-digital converter, a low-power biopotential amplifier, and a radio transceiver. "By thinning down the chips for UTCP embedding, they become mechanically flexible, resulting in an increased flexibility of the complete system, making it unobtrusive and comfortable to wear," the IMEC researchers reported.

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