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Process R&D

IMEC 3D process produces flexible circuits under 60µm thick

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Belgian research organisation **IMEC** has revealed a 3D integration process that produces flexible circuits under 60µm thick.

"This ultra-thin chip package [UTCP] technology allows integrating complete systems in a conventional low-cost flex substrate," said IMEC. "This paves the way to low-cost, unobtrusive wearable electronics, for example for wearable health and comfort monitoring."

Working with its associated lab at **Ghent University**, engineers thinned down chips to 25µm and embedded them in a flexible thin package.

Next, the package was embedded in a standard double-layer flex PCB using standard production techniques.

"By thinning down the chips for UTCP embedding, they become mechanically flexible resulting in increased flexibility of the complete system, making it unobtrusive and comfortable to wear," said IMEC.

After embedding, other components can be mounted above and below the embedded chip.

"The integration process uses UTCP interposers which solve the 'known good die' issue by enabling easy testing of the packaged thin dies before embedding," said IMEC. "Expensive high-density flexible substrates can be avoided by the fan-out UTCP technology which relaxes the interconnection pitch from 100µm or lower to 300µm or more, compatible with standard flex substrates."

The technology was demonstrated with a prototype flexible wireless monitors that measure heart rate (electrocardiogram or ECG) and muscle activity (electromyogram or EMG).

The system consists of an embedded microcontroller and an embedded analog-to-digital convertor, plus a biopotential amplifier chip and a radio transceiver.

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