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IMEC introduces ultra-thin packaging for wearable electronics

IMEC has presented research on 3D integrated, wearable electronics using a flexible polyimide substrate and an embedded ultra-thin chip package for health monitoring.

By Gail Flower, Contributing Editor -- Electronic News, 3/12/2009

IMEC and its associate laboratory at Ghent University have presented a 3D integration process for creating flexible, wearable electronic systems less than 60- μ m thick.

Announced at the **Smart Systems Integration Conference** in Brussels this week, the researcher said that the goal is for these systems to be flexible, compact, biocompatible, and "smart" for health and lifestyle monitoring applications.

IMEC's polyimide-based flex circuit board integrates ICs thinned down to 25 μ m and packaged between two 20- μ m polyimide layers, resulting in a flexible UTCP (ultra-thin chip package), according to the researcher. Other components can be mounted both above and below the embedded chip for high-density integration, IMEC said, noting that the polyimide and metal areas are so thin that the whole package bends.

UTCP interposers solve the Known Good Die issue by providing a method for testing packaged thin dice before embedding. By using a fan-out UTCP technology, the interconnection pitch can be released from 100 μ m to lower than 300 μ m, therefore allowing standard flex substrate usage.

At the conference, IMEC researchers demonstrated prototypes of flexible wireless monitors for measuring heart rate and muscle activity. The system used a thinned TI microcontroller for the embedded UTCP with SMD (surface mount device) components on top and bottom, an AC/DC converter, an ultra-low power biopotential amplifier chip, and a radio transceiver.

Looking ahead, IMEC will hold its Technology Forum in June when it will also celebrate its 25th anniversary. At the Crown Plaza Hotel in Brussels, IMEC and R&D partners are set to discuss their vision for the future, with speakers including Martin van den Brink, executive VP marketing and technology of **ASML**; William Holt, senior VP, **Intel**; Takaeshi Uenoyama, executive officer, **Panasonic**; Jack sun, VP of R&D, **TSMC**; and Kinam Kim, president of memory R&D, **Samsung Electronics**.

The event is scheduled to wrap up with talks from IMEC's experts covering 10-nm devices, heterogeneous integration, semiconductor technology for the next generation, and conversion of renewable energy, wireless and optical communication, and human++ for merging biology and electronics. As part of the forum, Chris Van Hoof, program director for SIP systems and smart implants at IMEC, will discuss smart packaging technology for healthcare and once again review the progress on UTCP flexible packaging.

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