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Singapore claims sub-threshold IC record

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SINGAPORE — In what could enable next-generation, ultra-low power devices, the National University of Singapore (NUS) claims to have broken the world's sub-threshold swing record for semiconductor technology.

NUS has devised a CMOS-compatible technology called L-shaped impact-ionization MOS (IMOS) or simply IMOS. Stanford University pioneered IMOS technology, but NUS claims to have made a new and major breakthrough in the arena.

Based on silicon-germanium (SiGe), NUS' technology enables a transistor with a sub-threshold on/off swing of only 4.5 milli-Volts per decade, said Yee-Chia Yeo, assistant professor of the Department of Electrical and Computer Engineering at NSU.

This device is said to have a gate length of about 100-nm. NUS has also developed a separate device with a gate length of 60-nm, which is world's smallest IMOS part, Yeo claimed.

The technology could enable the next wave of ultra-low power devices with sharp on/off swings. Today's mainstream devices have sub-threshold on/off swings of 80 milli-Volts per decade, Yeo said. Some products go as low as 60 milli-Volts per decade, he said.

IMOS not only enables lower leakage devices, but the technology "scales down supply voltage without sacrificing the on and off state leakage," he said in an interview at the Global Entropolis Singapore conference here on Tuesday (September 27).

NUS, along with Singapore's Institute of Microelectronics (IME), will provide more details about the technology in a paper at IEDM. The event is planned for Dec. 5-7 in Washington, D.C.

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