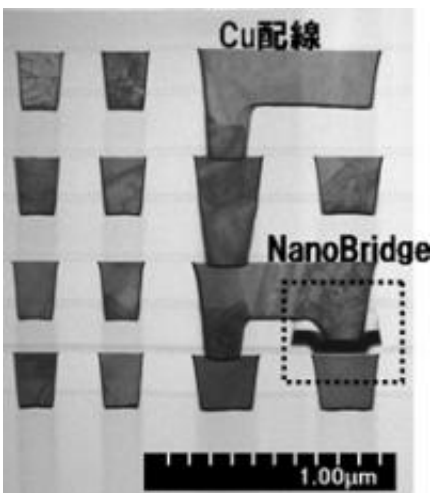


# NEC Integrates NanoBridge in the Cu Interconnects of Si LSI

December 14 2009

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NEC Corporation, in collaboration with the National Institute of Materials Science, today announced the successful integration of NanoBridge, a solid electrolyte non-volatile crossbar switch, in Cu interconnects placed on CMOS logic. This development enables the realization of high performance non-volatile programmable logic at a low cost.

NanoBridge technologies feature the following advantages:

1. The TaSiO/TiO<sub>2</sub>'s bilayer solid-electrolytes contribute to enhanced

durability against thermal diffusion and plasma treatments, which cause the oxidation of Cu electrodes and the diffusion of Cu into solid electrolytes during multilevel Cu interconnection processes. As a result, the process yield and the variability of NanoBridge's [electrical characteristics](#) have improved. Furthermore, the number of manufacturing processes are reduced when Cu interconnects are utilized as a metal ion source, which enables NanoBridge to be readily integrated with CMOS circuitry.

2. NanoBridge produces a highly scalable 4x4 crossbar switch, without the use of circuit selecting [transistors](#) used in conventional switches.

3. NanoBridge's size was reduced to 50nm, 1/4 the size of conventional technologies, which enables its adoption by 32nm-node CMOS logic. Furthermore, the new miniaturized NanoBridge is not impacted by increased ON resistance or performance degradation.

In recent years, the market for field programmable logic has been steadily growing. As a result, the time from development to market for electronic appliances has become increasingly important; programmable logic reduces both the time for development and costs. Until now, reducing the size of transistors enabled programmable logic to enhance the performance and multi-functionality of [electronic devices](#). However, in the near future, an inability to further reduce the size of transistors, as well as an increase in stand-by power from current leakage, will prevent greater transistor logic size reductions. Innovative new technologies are now required in order to enhance the performance of programmable logic.

NEC and the NIMS' jointly developed NanoBridge circuit reconfiguration switch is integrated with a logic block, reducing its chip area to a fraction of a conventional chip's, which results in lower costs, lower stand-by power consumption, and higher operation speed. The

nonvolatility of NanoBridge also contributes to low stand-by power consumption.

These technologies enable greater development efficiency and higher performance within a wide range of electrical products, including mobile devices and digital televisions.

NEC regards integrated NanoBridge technologies as essential to next generation, low-power consumption, programmable logic, and the company aims to drive their early implementation and to advance their future research and development.

NEC and the NIMS partially developed these technologies in cooperation with the Ministry of Education, Culture, Sports, Science, and Technology of Japan, as part of the ministry's Key-Technology Research Project for an "Atomic Switch Programmed Device."

NEC and the NIMS presented NanoBridge technologies at the International Electron Devices Meeting (IEDM) held in Baltimore.

Source: NEC

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