

## Leti Achieves Groundbreaking Discovery in Using Copper-based Catalysts to Synthesize Silicon Nanowire

*Project Demonstrates that Silicon Nanowire Synthesis can be CMOS-Compatible*

GRENOBLE, France – October 7, 2009 – Leti, the leading research and development institute focused on micro- and nano-technologies, announced today that it has broken new ground in the integration of nanotechnology with traditional complementary metal oxide semiconductor (CMOS) chip technology. CMOS is the most widely used technology for manufacturing silicon integrated circuits.

Leti researchers have demonstrated that the synthesis of silicon nanowire can be achieved at temperatures as low as 400 °C by using a copper-based catalyst and an unconventional preparation method. That is much lower than temperatures previously achieved for silicon nanowire synthesis using copper.

This technological breakthrough helps to bridge the gap between CMOS technology and the bottom-up growth of nanowires. It is expected to impact the IC markets by making it possible to add new non-digital functions – such as sensors and advanced photovoltaic architectures – to CMOS chip-making processes.

In a recently published *Nature Nanotechnology* article, Leti researchers explained that they achieved their breakthrough result by taking an approach transgressing a very well established axiom in nanowire growth. Previously, researchers have assumed that oxidized metals are not suitable for nanowire synthesis, so they usually have tried to remove the oxide. Leti achieved its industry-changing results by oxidizing the copper catalyst and using the high chemical activity of this oxide to reduce synthesis temperature of the nanowires. Leti's research shows that it is possible to grow silicon nanowires with a CMOS-compatible catalyst and at CMOS-compatible temperatures.

### **Independent thinking culture**

“At Leti, we aim to produce knowledge that is usable by industry. This nanowire breakthrough is a beautiful illustration of our mission because the project was bound by industrial constraints from the start,” said Leti CEO Laurent Malier. “Leti's unique ability to achieve these results stems from our long-term experience in industrial process development, and our broad range of complementary nano-characterization techniques. Leti's culture, which encourages independent thinking and the freedom to act upon it, was also a key component in this project.”

Semiconductor nanowires, which offer a variety of potential uses, have been a subject of basic research for about 10 years. On one hand, in chemistry and biology, the interest is related to nanowires' high surface-to-volume ratio, which makes them well-suited for the electrical detection of chemical or biological substances. Their high surface-to-volume ratio may also be an advantage in solar energy production. Nanowires' small mass, on the other hand, makes them interesting for mechanical mass detection.

All of these potential applications have already been demonstrated by basic research, and technologists are excited about applying them in new devices. One promising idea is to implement new functions such as sensing and energy production on top of integrated circuits. Until now, computing has relied on external power and user input. Nanowire technology has the potential to create computing devices that benefit from both internally generated energy production and direct environmental input.

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To view the article in Nature Nanotechnology, visit

<http://www.nature.com/nnano/journal/vaop/ncurrent/abs/nnano.2009.234.html>

### **About CEA-Leti:**

CEA is a French Research and Technology Organization, with activities in three main areas: Energy, Technologies for Information and Healthcare, and Defence and Security. Within CEA, the Laboratory for Electronics & Information Technology (CEA-Leti) works with companies in order to increase their competitiveness through technological innovation and transfers. Leti is focused on micro and nanotechnologies and their applications, from wireless devices and systems, to biology and healthcare or photonics. Nanoelectronics and Microsystems (MEMS) are at the core of its activities. As a major player in the MINATEC<sup>®</sup> excellence center, Leti operates 8,000-m<sup>2</sup> state-of-the-art clean rooms, on 24/7 mode, on 200mm and 300mm wafer standards. With 1,200 employees, Leti trains more than 150 Ph.D. students and hosts 200 assignees from partner companies. Strongly committed to the creation of value for the industry, Leti puts a strong emphasis on intellectual property and owns more than 1,400 patent families. In 2008, contractual income covered more than 75 percent of its budget, which totalled 205 M€. For more information, visit [www.leti.fr](http://www.leti.fr)

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