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TODAY'S HEADLINES

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NANOELECTRONICS

RAPID ASSEMBLY

Method forms ordered, nanosized circuit elements on
multiple length scales

MITCH JACOBY

A solution-based method for assembling nanowire structures from the bottom up with spatial control on several length scales, ranging from nanometers to centimeters, has been demonstrated by scientists at [Harvard University](#). Researchers there have shown that large numbers of uniform and hierarchically ordered nanoscale circuit elements can be prepared simultaneously using a simple and adaptable technique.

Driven by potential benefits of ultra-high-density microelectronics, researchers have developed and studied various test devices, such as field-effect transistors and light-emitting diodes, that are based on nanometer-scale components. Although the studies have advanced the field toward the sophisticated logic and memory circuitry, in general, the tiny devices have been assembled one at a time because of the limitations of available fabrication methods.

Now, Harvard chemistry professor [Charles M. Lieber](#) and coworkers Dongmok Whang, Song Jin, and Yue Wu have shown that numerous basic circuit components can be constructed simultaneously using a straightforward procedure that controls the positions of nanowires or other building blocks and the devices constructed from them on multiple length scales [*Nano Lett.*, published online Aug. 5, <http://dx.doi.org/10.1021/nl0345062>].

In one demonstration, the Harvard group prepared ordered films of silicon nanowires using the Langmuir-Blodgett method, which provides control over the nanowire spacings on a length scale ranging from nanometers to micrometers. Then the team used layer-by-layer deposition methods and photolithography to construct arrays of crossed nanowire junctions, which serve as functional circuit components, forming a regular pattern across an area of several square centimeters.



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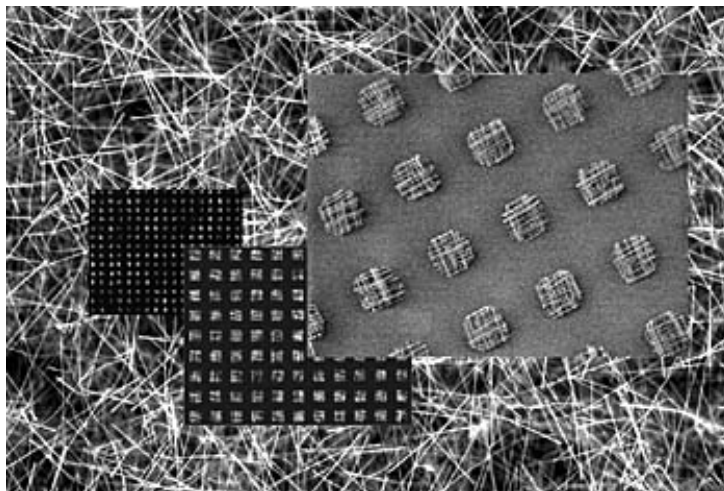
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ORDERLY Randomly oriented silicon nanowires (background) can be organized into centimeter-sized patterns of crossed nanowire arrays ($10\text{ }\mu\text{m} \times 10\text{ }\mu\text{m}$ in the large inset).

Courtesy of Harvard University

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