


Chapter 23
Managing Risk

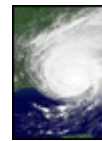
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New Technique May Simplify Nanotech Manufacturing

It can be hard to wrap your brain around the concept of nanotechnology, considering the scales involved are one millionth the size of a pinhead or one thousandth the size of a typical bacterium. But for scientists manufacturing these tiny devices, the hard part is actually sorting through nanowires and connecting them to microelectronics. A novel approach to nanotech manufacturing may help avoid this cumbersome step. According to a report published in the June 30 issue of *Applied Physics Letters*, researchers have successfully grown silicon nanowires directly on a sensor surface at room temperature.

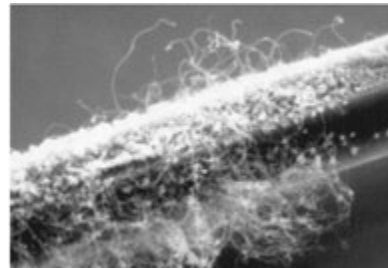


Image: COURTESY OF RON WILSON AND DANE CHRISTENSEN

Nanowire and nanotube production typically occurs in a furnace heated to between 600 and 1,000 degrees Celsius--temperatures that other electronic components cannot withstand. "One very big problem right now is figuring out how to assemble these nanowires or nanotubes onto a microchip in a way that is commercially feasible," notes Liwei Lin of the University of California at Berkeley. Lin and his colleagues developed a method that localizes the heating to the areas where they want the nanowires to grow by passing a current through specific sections of a microchip. They successfully manufactured silicon wires up to 10 microns long and between 30 and 80 nanometers in diameter. In addition, they produced carbon nanotubes five microns in length.

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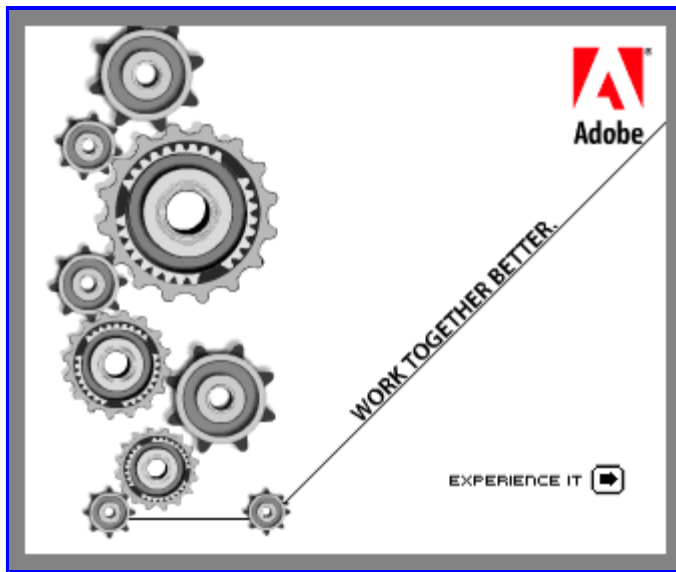
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Although sections of the chip surface reached 700 degrees C, the surrounding areas remained cool and the entire process was carried out at room temperature. "This is a unique approach," Lin says. "This method allows the production of an entire nano-based sensor in a process similar to creating computer chips. There would be no post-assembly required." --Sarah Graham

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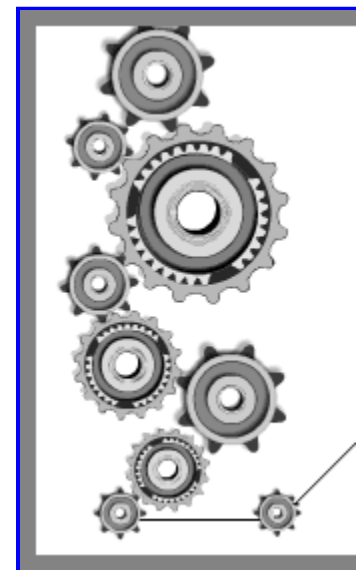
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