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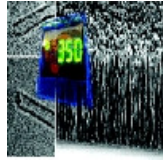
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Low temperature nanotube CVD brings applications closer

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Wednesday, 09 August 2006



By Dr Mike Cooke

Researchers at the University of Cambridge have successfully grown nanotubes (M. Cantoro et al. "Catalytic chemical vapor deposition of single-wall carbon nanotubes at low temperatures", Nano Letters 6, 1107-1112, 2006) at the lower temperatures needed for full integration into present complementary metal-oxide semiconductor (CMOS) technology (350°C). Carbon nanotubes have mechanical and electronic properties that make them attractive for new-generation electronics.

Up to now, nanotube growth has been carried out at high temperatures, and growth below 500 °C was believed impossible. Inter-metal dielectrics are damaged when heated beyond 400-450 °C.

The researchers report surface-bound growth of single-wall carbon nanotubes (SWNTs) by catalytic chemical vapor deposition from undiluted C₂H₂. Ammonia (NH₃) or hydrogen (H₂) are used to facilitate the nanostructuring and activation of the sub-nanometer Fe and Al/Fe/Al multilayer catalyst films prior to growth, enabling the SWNT nucleation at lower temperatures. The team believes that carbon nanotube growth is governed by the catalyst surface without the necessity of catalyst liquefaction (making lower temperature growth possible). These findings extend to the catalytic growth of other nanostructures in general it is believed.

The group of researchers at the Department of Engineering at the University of Cambridge is led by Mirco Cantoro, Stephan Hofmann, Andrea Ferrari and John Robertson, in collaboration with colleagues at the Cambridge Hitachi Laboratory and the Department of Materials Science, University of Cambridge.

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