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Development of Long Nanotubes with High Conductivity Under Simplified Growth Processes

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OTHER INFORMATION

KEYWORDS

carbon nanotubes (CNTs),
in-situ electrical contact,
chemical vapor deposition (CVD)

CATEGORIZED AS

- » **Materials & Chemicals**
- » Composites
- » Nanomaterials
- » **Nanotechnology**
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BRIEF DESCRIPTION

A breakthrough in growing long single-walled carbon nanotubes (CNTs) with direct electrical contact and exceptional conductivity.

FULL DESCRIPTION

Researchers at UCI have developed a method of growing long, single-walled carbon nanotubes (CNTs), reaching lengths up to 0.7 centimeters — far longer than typical CNTs. Using a special chemical vapor deposition (CVD) process combined with pre-patterned metal layers, the method allows electrical connections to form naturally during the growth process itself. This eliminates the need for additional steps after growth to make the CNTs usable in devices. The resulting CNTs maintain excellent electrical performance, offering high conductivity and mobility, making them potentially suitable to be used for advanced electronic, sensing, and materials applications.

SUGGESTED USES

- » **Advanced Materials:** Lightweight, electrically conductive composites for aerospace, automotive, and defense; Transparent, flexible conductors for wearable electronics; Sensitive chemical and biological sensors leveraging CNT’s large surface area.
- » **Energy:** High-capacity electrodes for batteries with improved energy density and charging speed.
- » **Emerging Technologies:** Quantum computing components benefiting from long coherence lengths.

ADVANTAGES

- » Direct electrical contact to CNTs without the need for additional processing after growth.
- » In situ electrical contacts via a metal under-layer.
- » High conductivity throughout the full CNT length.
- » Growth flexibility in multiple directions relative to gas flow.
- » No fast heating or external electric fields required, enhancing scalability and manufacturability.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	7,645,482	01/12/2010	2005-778

RELATED MATERIALS

- » Shendong Li, Zhen Yu, Christopher Rutherglen, Peter J. Burke “Electrical Properties of 0.4cm long single-walled carbon nanotubes”, Nano Letters, 4(10), 2003-2007 (2004).

