

# Patterned, Dense, and High-Quality Single-Walled Carbon Nanotube Arrays

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## BRIEF DESCRIPTION

University researchers have developed an easy one-step approach to pattern uniform catalyst lines for the growth of dense, aligned parallel arrays of single-walled carbon nanotubes (SWNTs) on quartz wafers by using photolithography or polydimethylsiloxane (PDMS) stamp micro-contact printing ( $\mu$ CP).

## FULL DESCRIPTION

University researchers have developed an easy one-step approach to pattern uniform catalyst lines for the growth of dense, aligned parallel arrays of single-walled carbon nanotubes (SWNTs) on quartz wafers by using photolithography or polydimethylsiloxane (PDMS) stamp micro-contact printing ( $\mu$ CP). By directly doping a FeCl<sub>3</sub>/methanol solution into Shipley 1827 photoresist or polyvinylpyrrolidone (PVP), various catalyst lines can be well-patterned on a wafer scale. In addition, during the chemical vapor deposition (CVD) growth of SWNTs the polymer layers play a very important role in the formation of mono-dispersed nanoparticles. This universal and efficient method for the patterning growth of SWNTs arrays on a surface is compatible with the microelectronics industry, thus enabling of the fabrication highly integrated circuits of SWNTs.

Increasing the SWNT density enhances the electrical properties of the SWNTs by allowing for:

a larger current carrying capacity and, thus, larger power capability;  
improved impedance matching of device to a value closer to 50 $\Omega$ ; and  
reduction in the parasitic capacitance on a per-tube basis for devices such as an rf-field effect transistor (rf-FET).

## APPLICATIONS

This process can be widely used in the synthesis of SWNTs on various substrates including quartz wafers, silicon wafers and sapphire wafers. The resulting SWNTs can be used in high-frequency electronics and highly-integrated circuits

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## PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	8,945,502	02/03/2015	2008-647

## CONTACT

Edward Hsieh  
hsiehe5@uci.edu  
tel: 949-824-8428.



## OTHER INFORMATION

## KEYWORDS

nanotubes, SWNT

## CATEGORIZED AS

- » **Materials & Chemicals**
  - » Nanomaterials
  - » Other
- » **Nanotechnology**
  - » Materials
  - » Other

## RELATED CASES

2008-647-0

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5270 California Avenue / Irvine, CA  
92697-7700 / Tel: 949.824.2683



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