Fabrication of Suspended Carbon Micro and Nano-scale Structures

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BACKGROUND

Recent attention has focused on high aspect ratio carbon micro-electromechanical (C-MEMS) because of the many applications possible, such as micro-electrodes in electromechanical sensors and miniaturized energy storage/energy conversion devices. Further, suspended micro/nano carbon structures exhibit a wide electrochemical stability window which makes them interesting for integration in mechanical, electrical, and electromechanical measurements. One of the biggest advantages of suspended micro/nano carbon structures is the high surface to volume ratio.

Yet, microfabrication of C-MEMS structures using current processing technology, such as focus ion beam (FIB) and reactive ion etching (RIE) tends to be time consuming and expensive. Low feature resolution, and poor repeatability of the carbon composition as well as the widely varying properties of the resulting devices limits the application of screen printing of commercial carbon inks for C-MEMS.

TECHNOLOGY DESCRIPTION

University researchers have developed a fabrication process which creates high aspect ratio (> 10:1) carbon posts, carbon suspended bridges and wires, ribbons, self-organizing bunches of carbon posts, and carbon plates supported by carbon beams or posts, using a novel ultra-violet (UV)/electron beam lithography and pyrolysis method. Potential problems such as oxygen sensitivity is negated by this process, while ensuring accuracy and reproducibility.

APPLICATIONS

The nanostructeres suspended onto microstructured C-MEMS act as a great integrated bridge between the microworld and the nanoworld. The proposed use is interconnects for micro and nanoelectronics. The suspended nanowires can act as great chemical or mechanical sensors. The larger suspended microstructures can effectively be used to fabricate microchannels for microfluidic applications. They can also form small filters used for separation routines such as cell sorting assays.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	7,682,659	03/23/2010	2005-168

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OTHER INFORMATION

CATEGORIZED AS

- » **Medical**
  - » Diagnostics
- » **Nanotechnology**
  - » Electronics
  - » Other
- » **Sensors & Instrumentation**
  - » Biosensors

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