



## TECHNOLOGY AVAILABLE FOR LICENSING

### Directed Assembly of Carbon Nanotubes and Nanoparticles Using Nanotemplates with Nano-Trenches or Nanowires

Non-Provisional Patent Application #12/085,883

Inventors: Ahmed Busnaina, Nicol McGruer

#### Invention Details:

The invention is a technique based on DC electrophoresis that allows assembly of carbon nanotubes (CNTs) in a controlled and precise manner. It overcomes traditional difficulties in positioning and contacting carbon nanotubes for electric circuits in a controlled way at large scale. The proposed method can assemble carbon nanotubes on a large area in a very short time. Thick large area films are used in two different ways:

- The films can be attached to nanowires, making the wire resistance similar to that of the thick film
- The film is placed at the bottom of a trench that could be used for assembly of nanoelements

#### Benefits of the Invention:

The invention provides a functionalized nanotemplate that is useful for selectively assembling nanoelements across a large area.

#### Advantages

- Precise, controlled, and quick assembly of CNTs
- Controlled density
- Large-scale directed assembly

#### Applications

- Biosensors
- Memory devices
- Nanoelectronic devices
- Electronic circuits
- 3D assembly, next-generation nanotube interconnects
- Magnetic media

#### The Bottom Line:

The inventors have demonstrated successful nanoscale assembly and alignment of carbon nanotubes. They have shown that their nanotemplate is capable of guiding massive parallel assembly of nanoelements to fabricate a three-dimensional nanostructure. The nanoelements can also be transferred at a high rate from the template to a recipient substrate.

#### For More Information:

**Anthony N. Pirri, Ph.D.**

Division of Technology Transfer  
Northeastern University  
360 Huntington Ave, 960 RP  
Boston, MA 02115-5000

**Phone:** 617-373-8810

**Fax:** 617-373-8866

**Email:** a.pirri@neu.edu

or

**Ahmed Busnaina, Ph.D.**

Dept. of Mechanical & Industrial Engineering  
Northeastern University  
360 Huntington Avenue, 334 SN  
Boston, MA 02115-5000

**Phone:** 617-373-2992

**Fax:** 617-373-2921

**Email:** busnaina@coe.neu.edu