



## Improved Nanotube Film for Field Effect Transistors and More

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**WARF: P150242US01**

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**The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a more precise method to make semiconducting single-walled carbon nanotubes.**

### Overview

Semiconducting single-walled carbon nanotubes (s-SWCNTs) are key building blocks for nanoscale technologies given their interesting physical and chemical properties. They are especially promising for high speed, low power semiconductor electronics. One application is field effect transistors (FETs).

To make useful devices, s-SWCNTs must be formed into pure and well-organized films. While many techniques have been explored, a new and better approach is needed.

### The Invention

UW-Madison researchers have developed a more stable method to make high density s-SWCNT film with good nanotube alignment. The film can be incorporated in state-of-the-art FETs and other devices.

The new method is called continuous floating evaporative self-assembly (continuous FESA). In the process, a steady supply of s-SWCNT 'ink' (rather than small droplets) is applied over a partially submerged support layer, where it will form into film. This process avoids the surface tension problems associated with droplets.

### Applications

- Field effect transistors, displays, sensors, biosensors and heterojunction devices (e.g., solar cells)

### Key Benefits

- Steady and precise
- Readily scaled up
- High degree of nanotube alignment
- Exceptional purity
- Method selects s-SWCNTs without the need for subsequent sorting.
- Rapid and cost effective

### Stage of Development

This process was used to produce a film of highly pure (99.9 percent) aligned s-SWCNTs.

### Additional Information

#### For More Information About the Inventors

- [Michael Arnold](#)

- [Padma Gopalan](#)

**Related Technologies**

- [WARF reference number P140200US01 describes the researchers' alternative method, called dose-controlled FESA.](#)

**Related Intellectual Property**

- [View Continuation Patent in PDF format.](#)

**Publications**

- [Read a news story about this technology.](#)

**Tech Fields**

- [Semiconductors & Integrated Circuits : Components & materials](#)

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