Novel Method for Creation of Multi-wall Carbon Nanotubes as Super Efficient Electron Field Emitters in Flat Panel Displays and Electron Microscopes

Advantages
• Efficient and consistent method for carbon nanotube creation
• Stronger electron emitter with longer lifetime
• More efficient voltage conduction would significantly increase the brightness of any display

Invention
Methods and apparatus for creating a carbon nanotube core with graphitic coating, and methods for attaching a plural of carbon nanotubes to a metal wire.

Background
Carbon nanotubes have unique physical and mechanical properties, which make them extremely profitable materials, these include: incredible strength along the axis of the nanotube and high electrical/thermal conductivity. Carbon nanotubes (CNT) are finding increased use in commercial applications, such as computer memory devices, flat panel displays, nanoscaling machinery and manufacture of composite materials. The ability of carbon nanotubes to be strong electron field emitters makes them valuable in the areas of CRT and plasma flat panel displays, as well as electron sources for electron microscopy. Improved methods of synthesis and handling could increase the strength of the electron field emitted by a CNT. Using CNTs would have the following advantages over previous materials and methods: increased brightness, low energy spread (loss of energy and reduced crosstalk), greater emission current stability and longer lifetimes.

Researchers at UCF have created a novel method for the manufacture of multi-wall carbon nanotubes. These nanotubes are created with the help of a chemical vapor deposition and use of a focused ion beam. A nanotube core is coated with an outer graphitic layer and attached to various metal wires. These multi-wall CNTs have shown to be strong electron emitters with a low threshold voltage, high emission current per emitter and high damage threshold. Increased brightness is exhibited due to their ability to carry larger amounts of current. Lower threshold fields make it easier to extract electrons and significantly increase the lifetime of the CNT. All of these attributes make these CNT particularly attractive for use with flat panel displays. The synthesis and creation steps require minimum time, are reliable and controllable, thus reducing fabrication costs while maximizing yields.

Application
The invention provides a novel carbon nanotube with improved electron emission for use in flat panel displays and microscope applications. It would provide companies the ability to manufacture better, brighter flat panel displays for low fabrication costs. Additionally, longer lifetimes and lower voltage thresholds would enable electron microscope manufactures to produce products with improved capabilities and durability.

Lead Inventor
L. Chow Ph.D.

Selected References

Contact: John Miner; University of Central Florida; Office of Research and Commercialization, 12201 Research Parkway, Suite 202, Orlando, FL 32826-3246 Phone: (407) 822-1136; Fax: (407) 882-9010; jminer@mail.ucf.edu; UCF IP # 30584 & 30904