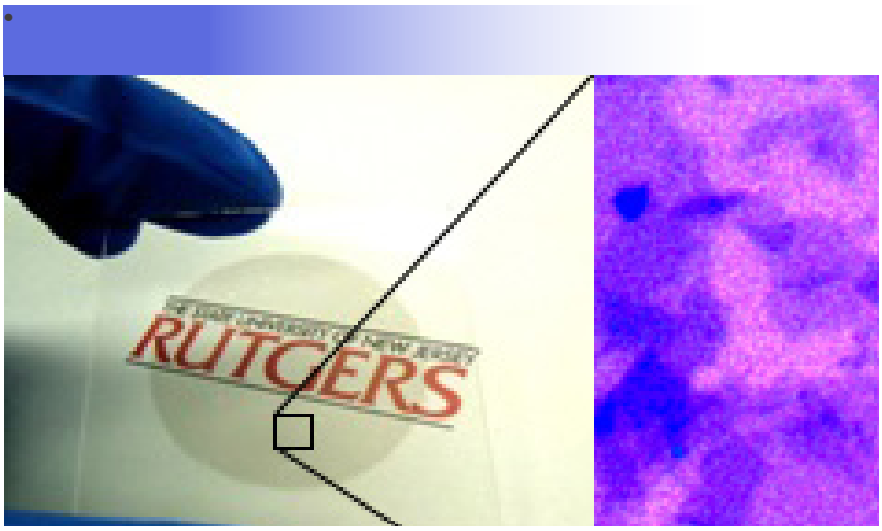
RUTGERS
THE STATE UNIVERSITY
OF NEW JERSEY

Contact: Yair Harel
Office of Technology Commercialization
Rutgers, The State University of New Jersey
3 Rutgers Plaza, ASB III, 3rd Floor
New Brunswick, NJ 08901
Cook Campus: 732.932.0115 x3006
email: harel@ocltt.rutgers.edu

Rutgers Inventor:
Manish Chhowalla, Ph.D.
Department of Materials Science and Engineering

Rutgers Technology #: 08-087



Cold Cathode Thin Film Field Emitters Based on Graphene/Polymer

Invention Summary: An extraordinarily simple method to deposit graphene cold cathodes for field emission has been invented. By dispersing the graphene in polystyrene and depositing the composite such that the sheets are somewhat vertically aligned leads to an increase in the field enhancement factor by ~ 1000. This allows electron emission to occur at low threshold voltage, making graphene an excellent candidate for field emission applications. More specifically, the ability to deposit field emitting graphene composite thin films from solution will allow large area deposition on inexpensive and flexible substrates which will open up exciting new applications. The quest for a thin film field emitter, which has still to be fulfilled, is perhaps a step closer with this demonstration of emission form a grapheme/polymer composite.

Market Applications: Large displays.

Advantages: Field emission displays require the emitting material to be deposited over large areas at low temperature. Up until now it has not been accomplished. The above technology will enable that.

Intellectual Property & Development Status: A provisional patent application has been filed.

Recent Publications :

- Goki Eda, H. Emrah Unalan, Nalin Rupesinghe, Gehan A. J. Amaratunga, and Manish Chhowalla "Field Emission From Graphene Based Composite Thin Films" Applied Physics Letters 93 233502 (2008).
- Husnu Emrah Unalan, Pritesh Hiralal, Daniel Kuo,Bhavin Parekh, Gehan Amaratunga and Manish Chhowalla "Flexible organic photovoltaics from zinc oxide nanowires grown on transparent and conducting single walled carbon nanotube thin films" Journal of Materials Chemistry 18 5909-5912 (2008).
- Giovanni Fanchini, Steve Miller, Bhavin Parek, Manish Chhowalla "Optical anisotropy in single walled carbon nanotube thin films: Implications for transparent and conducting electrodes in organic photovoltaics" Nano Letters (2008).
- Giovanni Fanchini, Varun Gupta, Adrian B. Mann, Manish Chhowalla "In Situ Monitoring of Structural Changes in Boron Carbide Under Electric Fields", Journal of the American Ceramic Society (2008).
- Goki Eda, Yun-Yue Lin, Steve Miller, Chun-Wei Chen, Wei-Fang Su, and Manish Chhowalla "Transparent and conducting electrodes for organic electronics from reduced graphene oxide" Applied Physics Letters 92 233305 (2008).