Awnish K. Gupta

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Summary

Special interest in material science and condensed matter physics, synthesis, characterization and novel applications of low dimensional materials (Quantum dots (0-D), Nanotubes and Nanowires (1-D), Graphene (2-D)).

Objective

To obtain a full-time position where I can use my 8 years of research experience for product development (industrial applications) and can also satisfy my quest to learn new science.

Education

Ph. D. in Physics (Dec. 2008, expected) – The Pennsylvania State University, PA, USA 16802 (Aug. 2002- Present)

B. Tech. in Engineering Physics – Indian Institute of Technology (IIT) Bombay, INDIA 400053 (Aug. 1998-Aug. 2002)

Laboratory Skills

Synthesis/fabrication:

- Cleanroom trained, Chemical Vapor Deposition, Plasma enhanched Chemical Vapor Deposition, Electroplating, E-beam and thermal evaporation, Device fabrication (conventional Photolithography, Focused Ion Beam, Shadow Mask Lithography)

Characterization:

- I-V characteristics (low temperature, controlled environment, ambient), Thermo Gravimetric Analysis (TGA), Scanning Electron Microscopy, Field Emission SEM, Focused Ion beam SEM, Scanning Force Microscopy (MFM, C-AFM, NC-AFM, EFM), STM, Raman Spectroscopy, Thermoelectric Power (TEP), Photoluminescence , optical absorption (UV-Vis Lambda 900/950)

Computer Skills:

- Working knowledge of Linux, Unix and Windows operation systems, Plotting and analyzing software: IGOR, WIRE2, GNU plot, Mathematica, ORIGIN, Sigma plot, Excel.

Awards

Braddock Fellowship	(2002-2003)
Duncan Fellowship	(2004, 2005, 2006, 2007, 2008)

Research Experience

The Pennsylvania State University **Aug. 2003 – Present**
University Park, PA 16802
Graduate Student (Research Assistant)

- Developed a new chemical method for mass production of Graphene and Scrolls
- Studied RAMAN scattering of supported (on SiO_2, mica and gold) and unsupported n(1,2,3..) graphene layers
- Studied confinement effects of electrons and phonons on graphene.
- Built a Thermal Evaporator which includes designing and making evaporator components including feedthroughs and adding versatility to evaporate 2 metals simultaneously and change the angle of evaporation.
- Purification of arc-grown single walled carbon nanotubes (SWNTs)
- Growth of individual SWNTs (CVD) for device fabrication (density control, length control, diameter control)
- Remodeled Thermoelectric power measurement system which included the design and replacement of several electronic components (IC chips) and data acquisition software
- Nanomanipulation of nanowires, nanotubes and graphene
- Refer to publications for more detail

Selected Publications

1. **A. K. Gupta,** T. J, Russin and P. C. Eklund, " *Dispersive Raman Scattering from n=1-4 Graphene Layers*" (in preparation for publication)
2. J. Wu, **A. K. Gupta** and P. C. Eklund, " *Giant Non-Linear Raman Scattering from Short GaP Nanowires*" (in preparation for publication)
3. H. R. Gutierrez, **A. K. Gupta**, H. Romero, P. Joshi, S. Tadigadapa and P. C. Eklund, " *Electrical Characterization of Multi-Probe Graphene Devices Prepared by Chemical Free Technique*" (in preparation for publication)
4. **A. K. Gupta**, C. Nisoli, T. J. Russin, V. H. Crespi and P. C. Eklund, " *Curvature-Induced D-Band Raman Scattering in Graphene*" (submitted to **Phys. Rev. Lett.)**
5. **A. K. Gupta,** T. J. Russin, H. R. Gutierrez and P. C. Eklund," *Probing Edge Defects in Graphene via Raman Scattering"*(accepted for publication in **ACS Nano**)
6. **A. K. Gupta,** X. Wang, X. Li, H. J. Dai and P. C. Eklund, " *Polarized Raman Scattering from Narrow Graphene NanoRibbons*" (submitted to **Nano Lett.**)
7. **A. K. Gupta**, Y. Tang, T. J. Russin, V. H. Crespi and P. C. Eklund," *Raman Scattering from Incommensurately Stacked Graphene Bi-Layer*" (submitted to **Nano Lett.**)
8. U. J. Kim, G. R. Gutierrez, **A. K. Gupta** and P. C. Eklund, " *Raman Scattering Study of the Thermal Conversion of Bundled Carbon Nanotubes into Graphitic Ribbons*" **Carbon** 46 (5), 729-740 (2008)
9. **A. Gupta**, G. Chen, P. Joshi, S. Tadigadapa, P. C. Eklund, *" High Frequency raman scattering from n-graphene layers", **Nano Letters**, Vol. 6, No.12, 2667-2673* (2006)
10. A. Goyal, S. Tadigadapa, **A. Gupta**, P.C. Eklund, "*Use of Single Wall Carbon Nanotubes (SWNTs) to Increase the Quality Factor of an AT-cut micromachined Quartz Resonator*", **App. Phys. Lett.**, 87, 204102, 2005.
11. A. Goyal, S. Tadigadapa, **A. Gupta**, P.C. Eklund, "*Improvement in Q-factor of AT-Cut Quartz Crystal Resonators using Single Wall Carbon Nanotubes (SWNTs)*", Proceedings of 2005 **IEEE** International Ultrasonics Symposium, Sep. 18-21, 2005, Rotterdam, Netherlands.
12. A. Goyal, S. Tadigadapa, **A. Gupta**, P.C. Eklund, "*Micromachined Quartz Resonator Functionalized with Single Wall Carbon Nanotubes (SWNTs) for Sensing Applications*", Proceedings of **IEEE** Sensors 2005, the 4th IEEE Conference on Sensors, Oct. 31- Nov. 3, 2005, Irvine, California.
13. P. Joshi, N. Duarte, A. Goyal, **A. Gupta**, S. Tadigadapa, P.C. Eklund, "*Improvement of the Elastic Modulus of Micromachined Structures using Carbon Nanotubes*", **MRS** Proceedings, Volume 875, O1.5, MRS Spring Meeting, March 28 – April 1, 2005, San Francisco, USA.

Selected Conference Presentations

1. **A. K. Gupta**, T. J. Russin and P. C. Eklund,*" Temperature-Dependent Raman Scattering from n (n=1,2,3…) Graphene Layers*" MRS Spring Meeting, March 24 – 28, San Francisco, CA (2008)
2. **A. K. Gupta**, Y. Tang, T. J. Russin, V. H. Crespi and P. C. Eklund," *Raman Scattering from Incommensurately Stacked Bi-Layer Graphene*" MRS Spring Meeting, March 24 – 28**,** San Francisco, CA (2008)
3. **A. K. Gupta**, Y. Tang, T. Russin, V. H. Crespi and P. C. Eklund "*Incommensuratey Stacked Graphene Bi-Layer: A Raman Study*" APS Meeting. March 10- 14, New Orleans, LA (2008)
4. **A. K. Gupta**, and P. C. Eklund "*Dispersive Raman Scattering from n=1-4 Graphene Layer System*" APS Meeting. March 10- 14, New Orleans, LA (2008)
5. **A. K. Gupta**, H. R. Gutierrez and P. C. Eklund "*Probing Edge Defects in n=1,2.. Graphene Layer System via Raman Scattering*" APS Meeting. March 10- 14, New Orleans, LA (2008)
6. **A. K. Gupta**, T. Russin and P. C. Eklund " A*nharmonic Effects in Raman Scattering from Few-Layer Graphene Systems "* APS Meeting. March 10- 14, New Orleans, LA (2008)
7. **A. K. Gupta**, T. J. Russin, P. Joshi, H. R. Gutierrez, G. Chen and P. C. Eklund "*Phonons in n-Graphene Layers*", PASI (Novel Materials for Micro- and Nano Electronics) Renaca, Chile (2007)
8. **A. Gupta**, G. Chen, P. Joshi, S. Tadigadapa, P. C. Eklund "*A Non-Destructive Technique (RAMAN) to Count Number of Layers of Graphene in nGL Films*" in Pan-American Advanced Studies Institute, June 18 – June 30, Costa Rica (2006)
9. **A. Gupta**, P.C. Eklund, P. Joshi, S. Tadigadapa, "*Raman Scattering fromFfew Layered Graphene Films*", in APS meeting, March 13- 17, Baltimore, MD.(2006)

*** For a complete list of publications and conference presentations, please visit**
http://www.personal.psu.edu/akg139/publications.html