IEEE Sensors Council

Issue Number 15 July 2012

Past Issues:

M. Nurul Abedin, Newsletter Editor-In-Chief
John Vig, Web Editor Editor-In-Chief

IEEE Sensors Council Recent Present - Past Officials

Presidents:

(2012 – 2013)
VLADIMIR LUMELSKY

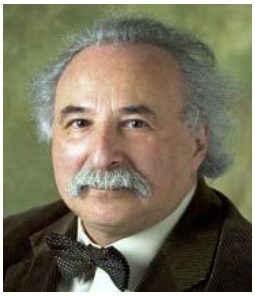
(2013 –2014)
H. TROY NAGLE (Elect)

(2011-2012)
CHRISTINA M. SCHOBER

(2010 – 2011)
MONA E. ZAGHLOUL

IEEE Sensors Journal Editors-In-Chief:

(2012 - 2015)
KRIKOR OZANYAN



(2009 - 2012)
EVGENY KATZ

(2003 - 2009)
H. TROY NAGLE

FOUNDING EIC
VLADIMIR LUMELSKY

Sensors Council News

- **IEEE Sensors Council Annual Four Different Category Awards:**
  - **Early Career GOLD Award,**

- **Technical Achievement Award,**
- **Meritorious Service Award, and**
- **IEEE Sensors Council Journal Best Paper Award.**

Nominations are due June 15th, 2013.

IEEE Sensors Council Upcoming AdCom Meeting Announcement

- **The IEEE Sensors Council AdCom meeting will be held in Taipei, Taiwan on October 27-28, 2012 in association with the IEEE SENSORS Conference. The meeting will be held at the Grand Hyatt Taipei.**

IEEE Sensors Council 2013 – 2014 AdCom Positions Opening

Call for Nominations – IEEE Sensors Council 2012 Elections

Nominations are being accepted for the following positions:

- Vice-President for Finances (2 year term, renewable once)
- Vice-President for Publications (2 year term, renewable once)
- Member-at-Large (2 year term)

The deadline for nominations is September 5, 2012.

For more information please see the Call for Nominations. For more information on the 1.5 minimum rule, please see the Application of 1.5 Rule inTechnical Activities OUs.

2012 Sensors Council Award Winners

- **The 2012 Award winners have been selected**
- **The award ceremony will be held in Taipei, Taiwan and the winners will be made available in the next issue on January 2013.**

2011 Sensors Council Award Winners

- **Technical Achievement Award: Thomas W. Kenny**
- **Meritorious Service Award: Thomas F. Wiener**
- **Gold Early Caree Award: Bhaskar Choubey**
- **Best Paper Award: Chuji Wang, Armstrong Mbi, and Mark Shepherd.**

For paper **"**A Study on Breath Acetone in Diabetic Patients Using a Cavity Ringdown Breath Analyzer: Exploring Correlations of Breath Acetone With Blood Glucose and Glycohemoglobin A1C", IEEE Sensors Journal, Vol. 10, No. 1, Jan. 2010.

- **Best Paper Runner-Up Award: Anuj Dhawan, Yan Du, Fei Ya, Michael D. Gerhold, Veena Misra, and Tuan Vo-Dinh.**

For paper **"**Methodologies for Developing Surface-Enhanced Raman Scattering (SERS) Substrates for Detection of Chemical and Biological Molecules ", IEEE Sensors Journal, Vol. 10, No. 3, March 2010.

2010 Sensors Council Award Winners

- **Technical Achievement Award: Brian Cunningham**
- **Meritorious Service Award: Michiel Vellekoop**
- **Gold Early Caree Award: Ville Viikari**
- **Best Paper Award: G.M. Hwang, L. Pang, E.H. Mullen, and Y. Fainman.**

For paper **"**Plasmonic Sensing of Biological Analysis Through Nanoholes", IEEE Sensors Journal, Vol. 8, No. 12, pp. 2074-2079, Dec. 2008.

- **Best Paper Runner-Up Award: L. Luan, R.D. Evans, N.M. Jokerst, and R.B. Fair**

For paper **"**Integrated Optical Sensor in a Digital Microfluidic Platform", IEEE Sensors Journal, Vol. 8, pp. 628-635, May-June 2008.

2009 Sensors Council Award Winners

- **Technical Achievement Award: Prof. Andrei M. Shkel**
- **Best Paper Award: Zhiwei Zou, SooHyun Lee, and Chong Ahn.**

For paper **"**A Polymer Microfluidic Chip With Interdigitated Electrodes Arrays for Simultaneous Dielectrophoretic Manipulation and Impedimetric Detection of Microparticles", IEEE Sensors Journal, Vol. 8, No. 5, MAY 2008.

2008 Sensors Council Award Winners

- **Technical Achievement Award: Prof. Michael Shur**
- **Meritorious Service Award: Robert T. Bannon**
- **Best Paper Award: I. M. White, Hongying Zhu, J. Suter, N. M. Hanumegowda, H. Oveys, M. Zourob, and Xudong Fan.**

For paper "Refractometric Sensors for Lab-on-a-Chip Based on Optical Ring Resonators", IEEE Sensors Journal, Vol. 7, No.1, January 2007.

Sensor Technology

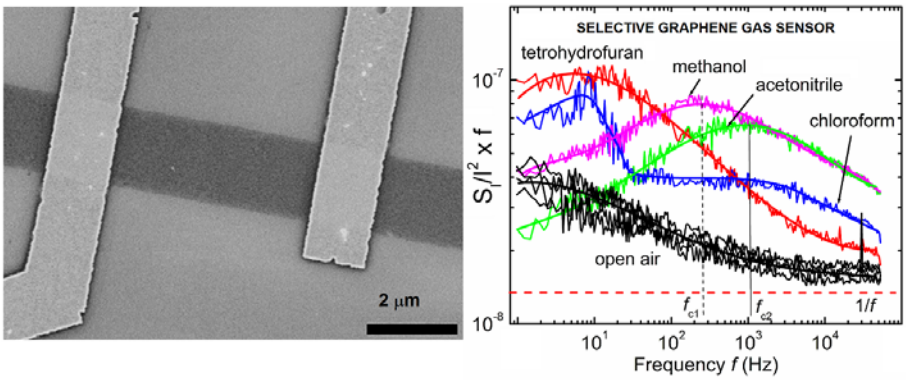
- **Noise in Pristine Graphen for Selective Gas Sensing:** S. Rumyantsev, G. Liu, M.S. Shur, R.A. Potyrailo and A.A. Balandin.

Extremely high surface-to-volume ratio of graphene, its high electrical conductivity, low thermal and 1/*f* noise, relatively low contact resistance, and ability to tune the conductivity by the gate make it a very promising choice for gas sensor applications. However, changes in graphene

resistivity and shift of its Dirac voltage are quite similar for different gases, making the sensing selectivity to be a serious problem.

RPI-UCR-GE group recently reported on new approach for selective gas sensing with a single pristine graphene devices using the low-frequency noise as a sensing parameter enhancing selectivity. [1] While the change in the electrical resistivity under a gas exposure can serve as a quantitative parameter to measure the gas concentration, the spectra of the low-frequency noise allow for discriminating between different gases.

Single layer graphene transistors were exposed to the laminar flow of methanol, ethanol, tetrahydrofuran, chloroform, acetonitrile, toluene, and methylene chloride vapors. While some vapors change the electrical resistance of graphene devices without changing their noise spectra, others introduce distinctive Lorentzian bulges with different characteristic frequencies f_c (see Fig.1). The frequency f_c of the vapor-induced Lorentzian noise and parameters proportional to the slope of the frequency spectrum in the certain range, in combination with resistivity changes serve as distinctive signatures for specific vapors enabling highly selective gas sensing with a single graphene device.



Scanning electron microscopy images of back-gated graphene devices used as selective gas sensors (left panel) and noise spectral density S_I/I^2 multiplied by frequency f versus frequency f for the device in open air and under the influence of different vapors (right panel)[1].

[1] S. Rumyantsev, G. Liu, M.S. Shur, R.A. Potyrailo and A.A. Balandin in the paper "Selective Gas Sensing with a Single Pristine Graphene" published in Nano Lett. 2012, 12, 2294−2298.

Sensor Conferences

- **IEEE SENSORS 2009: The 8th IEEE Conference on Sensors, Christchurch, New Zealand: Oct. 25th - 28th, 2009.**
- **IEEE SENSORS 2010: The 9th IEEE Conference on Sensors, Waikola, Hawaii: Nov. 1 – 4, 2010.**
- **IEEE SENSORS 2011: - The 10th IEEE Conference on Sensors, Limerick, Ireland: Oct. 28-31, 2011.**

- **IEEE SENSORS 2012: The 11th IEEE Conference on Sensors, Taipei International Convention Center, Taipei, Taiwan, Oct 28-31, 2012 (**http://www.ieee-sensors2012.org).
- **IEEE SENSORS 2013: The 12th IEEE Conference on Sensors, Baltimore, MD, USA, Nov. 3-6, 2013 (**http://www.ieee-sensors2013.org).

Sensor Books (www.amazon.com)

1. Noise in Semiconductor Devices: Modeling and Simulation (Springer Series in Advanced Microelectronics) [Paperback]. Fabrizio Bonani (Author), Giovanni Ghione (Author). Publisher: Springer; 2001 edition (July 31, 2012).
2. Semiconductor Devices: Physics and Technology [Hardcover], Simon M. Sze (Author), Ming-Kwei Lee (Author), Publisher: Wiley; 3 edition (May 15, 2012).
3. Semiconductors: From Book to Breadboard [Paperback], Kevin McGowan (Author), Publisher: Delmar Cengage Learning; 1 edition (August 17, 2011).
4. Semiconductor Research: Experimental Techniques (Springer Series in Materials Science) [Hardcover], Amalia Patane (Editor), Naci Balkan (Editor), Publisher: Springer; 2012 edition (April 12, 2012).
5. Terahertz Techniques (Springer Series in Optical Sciences) [Hardcover], Erik Bründermann (Author), Heinz-Wilhelm Hübers (Author), Maurice FitzGerald Kimmitt (Author), Publisher: Springer; 2012 edition (May 31, 2012).
6. Terahertz Physics [Hardcover], R. A. Lewis (Author), Publisher: Cambridge University Press (October 31, 2012).
7. Terahertz Imaging for Biomedical Applications: Pattern Recognition and Tomographic Reconstruction [Hardcover], Xiaoxia Yin (Author), Brian W.-H. Ng (Author), Derek Abbott (Author), Publisher: Springer; 2012 edition (March 23, 2012).
8. Physics and Applications of Terahertz Radiation (Springer Series in Optical Sciences) [Hardcover], Matteo Perenzoni (Editor), Douglas J. Paul (Editor), Publisher: Springer; 2012 edition (September 28, 2012).
9. Acoustics: Sound Fields and Transducers [Hardcover], Leo L. Beranek (Author), Tim Mellow (Author), Publisher: Academic Press; 1 edition (August 15, 2012).
10. Basic Transport Phenomena in Biomedical Engineering,Third Edition [Hardcover], Ronald L. Fournier (Author), Publisher: CRC Press; 3 edition (August 26, 2011).
11. Introduction to Biomedical Engineering Technology, Second Edition [Hardcover], Laurence Street (Author), Publisher: CRC Press; 2 edition (October 6, 2011).
12. The Minipig in Biomedical Research [Hardcover], Peter A. McAnulty (Editor), Anthony D. Dayan (Editor), Niels-Christian Ganderup (Editor), Kenneth L. Hastings (Editor), Publisher: CRC Press; 1 edition (December 19, 2011).
13. Signals and Systems for Bioengineers, Second Edition: A MATLAB-Based Introduction (Biomedical Engineering) [Hardcover], John Semmlow (Author), Publisher: Academic Press; 2 edition (October 6, 2011).

14. Apodized Fiber Bragg Grating Strain Sensor: Investigation of performance Analysis of various apodization profiles for unchirped FBG Strain sensor [Paperback], Khurram Shahzad Khalid (Author), Muhammad Zafrullah (Author), Muhammad Aleem Mirza (Author), Publisher: LAP LAMBERT Academic Publishing (March 20, 2012).
15. Crosstalk Analysis of a FBG-OC based OADM for WDM System: Crosstalk of a Fiber Bragg Grating-optical circulator based Optical Add-Drop Multiplexer considering 5,8 and 16 channels [Paperback], Nahian Chowdhury (Author), Mahmud Taihan (Author), Shahid Jaman (Author), Publisher: LAP LAMBERT Academic Publishing (May 16, 2012).
16. Highly sensitive fiber Bragg grating biosensors. [Paperback], Christopher J Stanford (Author), Publisher: ProQuest, UMI Dissertation Publishing (May 4, 2012).
17. Low coherence interferometry: Applications to component metrology and high spatial resolution fiber Bragg grating sensors. [Paperback], Robert Joseph Espejo (Author), Publisher: ProQuest, UMI Dissertation Publishing (May 25, 2012).
18. Advances in Infrared Photodetectors, Volume 84 (Semiconductors & Semimetals) [Hardcover], Chennupati Jagadish (Editor), Sarath Gunapala (Editor), David Rhiger (Editor), Publisher: Academic Press; 1 edition (June 15, 2011).
19. One-Dimensional Nanostructures: Principles and Applications [Hardcover], Tianyou Zhai (Author), Jiannian Yao (Author), Publisher: Wiley; 1 edition (October 30, 2012).
20. Semiconductor Nanostructures for Optoelectronic Devices: Processing, Characterization and Applications (NanoScience and Technology) [Hardcover], Gyu-Chul Yi (Editor), Publisher: Springer; 2012 edition (January 16, 2012).