Curriculum Vitae

YUVAL E. YAISH

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Personal Data

Marital Status:	Married + 3 children
Office Address:	Department of Electrical Engineering Technion—Israel Institute of Technology, Haifa, Israel
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Academic Degrees

1994–2001	Ph.D. in Physics	Technion—Israel Institute of Technology.
1989–1992	M.Sc. in Physics	Tel-Aviv University (*magna cum laude).*
1986–1989	B.Sc. in Physics	Tel-Aviv University (*cum laude).*

Academic Experience

2005–Present	Assistant Professor, Dept. of Electrical Engineering Technion—Israel Institute of Technology.
2004–2005	Research Associate, Physics Dept. Cornell University.
2001–2004	Post Doctorate Associate, Physics Dept. Cornell University.

Teaching Experience

Introduction to molecular electronics - Graduate level (course that I have developed).

Introduction to semi-conductors - Under Graduate level.

Physics – Mechanics - Under Graduate level.

Physics – Electricity and magnetism - Under Graduate level.

Introduction of semi-conductors physics - Under Graduate level.

Introduction to nano-electronics - Graduate level (course that I have developed).

Micro-electronics process course - Under Graduate level..

Research Interests

Nano-Electro-Mechanical Systems based on Carbon nanotubes and Graphene.

Chemical and Biological sensors operating down to the single molecules regime.

Research Grants

MOIT (MAGNET) – Printing Electronics (2014–2017), (US$200,000), YY.

Elbit – Thermal Sink based on Forests of Carbon Nanotubes (2014–2015), (US$250,000), YY.

MAFAT – NEMS based on Carbon Nanotubes and Graphene (2012–2013), (US$100,000), YY.

MOD – Graphene Electronics and Mechanics (2012–2013), (US$170,000), YY.

MAFAT – Forest and Yarns based on Carbon Nanotubes (2011–2012), (US$200,000), YY.

MOIT (MAGNET) – Nanotubes Empowerment Solutions (2009–2014), (US$400,000), YY.

MAFAT – Nanochaff based on Carbon Nanotubes (2008–2009), (US$100,000), YY.

MOIT (MAGNET) – Low Power Electronics based on Silicon Nanowires and Carbon Nanotubes (2007–2011), (US$375,000), YY.

AFRL – Ultra-Sensitive Mass Sensors based on Suspended Carbon Nanotubes (2007–2008), (US$25,000), YY.

MAFAT – Nano Electro Mechanical System based on Carbon Nanotubes (2007–2008), (US$100,000), YY.

MOIT (NOFAR) – Single Electron Transistor with Nanoparticles (2007–2008), (US$100,000), YY, Efrat Lifshitz, Alon Hoffman.

ISF – Electron-Phonon Coupling in Suspended Carbon Nanotubes (2006–2009), (US$200,000), YY.

MOST – Ultra-Sensitive Mass Sensors based on Suspended Nanomechanical Beams and Carbon Nanotubes (2006–2008), (US$300,000), YY, Eyal Buks, Ron Lifshitz.

MAFAT – Quantum Phenomena in Silicon Nanowires and Carbon Nanotubes (2006–2007), (US$100,000), YY, Alon Hoffman, Shay Lifshitz.

MAFAT – Nano Electro Mechanical System based on Carbon Nanotubes (2005–2006), (US$50,000), YY.

Honors and Awards

2005 Alon Fellowship

1992 Teaching Assistant Prize.

1991 Shenkar Award of Excellence.

1988 Dean Award of Excellence.

LIST OF PUBLICATIONS

Refereed Papers in Professional Journals

1. P. Pine, Y. E. Yaish, J. Adler, "Vibrational analysis of thermal oscillations of single-walled carbon nanotubes under axial strain", Physical Review B, **89**, 115405 (2014).
2. A. Katsman, M. Beregovsky, Y. E. Yaish, "Formation and Evolution of Nickel Silicides in Silicon Nanowires", Nano Studies, **8**, 139 (2013).
3. E. M. Hajaj, O. Shtempluk, A. Razin, V. Kochetkov, and Y. E. Yaish, "Chemical Potential of Inhomogeneous Single Layer Graphene", Physical Review B, **88**, 045128 (2013).
4. A. Katsman, M. Beregovsky, and Y. E. Yaish, "Evolution of Nickel Silicide Intrusions in Silicon Nanowires during Thermal Cycling", Journal of Applied Physics, **113**, 084305 (2013).
5. Y. Pascal-Levy, E. Shifman, M. Pal-Chowdhury, E. Hajaj, O.Shtempluk, A. Razin, V. Kochetkov, and Y. E. Yaish, "Gate-Induced Modification of Water Adsorption on the Gate Dielectric of Carbon Nanotube Field-Effect Transistors", ChemPhysChem, **13**, 4202 (2012).
6. M. Beregovsky, A. Katsman, E. M. Hajaj, and Y. E. Yaish, "Diffusion Formation of Nickel Silicide Contacts in SiNWs", Solid State Electronics, **80**, 110 (2012).
7. Y. Pascal-Levy, E. Shifman, I. Sivan, I. Kalifa, M. Pal-Chowdhury, O. Shtempluk, A. Razin, V. Kochetkov, and Y. E. Yaish, "Water Assisted Gate Induced Temporal Surface Charge Distribution Probed by Electrostatic Force Microscopy", Journal of Applied Physics, **112**, 084329 (2012).
8. Y. Pascal-Levy, E. Shifman, M. Pal-Chowdhury, I. Kalifa, T.Rabkin, O. Shtempluk, A. Razin, V. Kochetkov, and Y. E. Yaish, "Water Assisted Mobile Charge Induced Screening and Origin of Hysteresis in Carbon Nanotube Field-Effect Transistors", Physical Review B, **86**, 115444 (2012).
9. O. Shirak, O. Shtempluk, V. Kochetkov, G. Bahir, and Y. E. Yaish, "High Performance Horizontal Gate All Around Silicon nanowire Field Effect Transistor", Nanotechnology, **23**, 395202 (2012).
10. P. Pine, Y. E. Yaish, J. Adler, "The affect of boundary conditions on the vibrations of armchair, zigzag and chiral single walled carbon nanotubes", Journal of Applied Physics, **110**, 124311 (2011).
11. A. Katsman, Y. E. Yaish, M. Beregovsky, "From Contact to Diffusion Controlled Growth of Nickel Silicides in Silicon Nanowires", Defect and Diffusion Forum, **323-325**, 427 (2011).
12. P. Pine, Y. E. Yaish, J. Adler, "Thermal oscillations of structurally distinct single-walled carbon nanotubes", Physical Review B, **84**, 245409 (2011).
13. P. Pine, Y. E. Yaish, J. Adler, "Simulation and Vibrational Analysis of Thermal Oscillations of Single Walled Carboo Nanotubes", Physical Review B, **83**, 155410 (2011).
14. Y. E. Yaish, M. Beregovsky, A. Katsman, "Kinetics of Nickel Silicides Growth in Silicon Nanowires: From Linear to Square Root Growth", Journal of Applied Physics, **109**, 094303 (2011).
15. N. Yom-Tov, C. Saguy, A. Bolker, R. Kalish, Y. E. Yaish, "Accurate carrier-type determination of Non-Homogenously Doped Diamond", Journal of Applied Physics, **108** (4), 043711 (2010).
16. A. Katsman, Y. E. Yaish, E. Rabkin, and M. Beregovsky, "Surface diffusion controlled of Nickel Silicides in Silicon Nanowires", Journal of Electronic material, **39**, 365 (2010).

17. J. S. Bunch, Y. Yaish, M. Brink, K. Bolotin, and P. L. McEuen, "Coulomb oscillations and Hall effect in quasi–2D graphite quantum dots Nano Lett. **5**, 287 (2005).

18. V. Sazonova, Y. Yaish, H. Ustunel, D. Roundy, T. A. Arias, and P. L. McEuen, "A tunable carbon nanotube electromechanical oscillator", Nature, **431**, 284 (2004).

19. E. D. Minot, Y. Yaish, V. Sazonova, and P. L. McEuen, "Determination of electron orbital magnetic moments in carbon nanotubes", Nature, **428**, 536 (2004).

20. J. Y. Park, S. Rosenblatt, Y. Yaish, V. Sazonova, H. Ustunel, S. Braig, T. A. Arias, P. W. Brouwer, and P. L. McEuen, "Electron-phonon scattering in metallic single-walled carbon nanotubes", Nano Lett. **4**, 517 (2004).

21. Y. Yaish, J. Y. Park, S. Rosenblatt, V. Sazonova, M. Brink, and P. L. McEuen, "Electrical nanoprobing of semiconducting carbon nanotubes using an atomic force microscope", Phys. Rev. Lett. **92** (2004).

22. J. W. Park, A. N. Pasupathy, J. I. Goldsmith, A. V. Soldatov, C. Chang, Y. Yaish, J. P. Sethna, H. D. Abruna, D. C. Ralph, and P. L. McEuen, "Wiring up single molecules Thin Solid Films" **438**, 457 (2003).

23. O. Prus, Y. Yaish, M. Reznikov, U. Sivan, and V. Pudalov, "Thermodynamic spin magnetization of strongly correlated two-dimensional electrons in a silicon inversion layer", Phys. Rev. B **67** (2003).

24. E. D. Minot, Y. Yaish, V. Sazonova, J. Y. Park, M. Brink, and P. L. McEuen, "Tuning carbon nanotube band gaps with strain", Phys. Rev. Lett. **90** (2003).

25. S. Rosenblatt, Y. Yaish, J. Park, J. Gore, V. Sazonova, and P. L. McEuen, "High performance electrolyte gated carbon nanotube transistors", Nano Lett. **2**, 869 (2002).

26. J. Park, A. N. Pasupathy, J. I. Goldsmith, C. Chang, Y. Yaish, J. R. Petta, M. Rinkoski, J. P. Sethna, H. D. Abruna, P. L. McEuen, and D. C. Ralph, "Coulomb blockade and the Kondo effect in single-atom transistors", Nature **417**, 722 (2002).

27. J. Y. Park, Y. Yaish, M. Brink, S. Rosenblatt, and P. L. McEuen, "Electrical cutting and nicking of carbon nanotubes using an atomic force microscope", Appl. Phys. Lett. **80**, 4446 (2002).

28. Y. Yaish, O. Prus, E. Buchstab, S. Shapira, G. Ben Yoseph, U. Sivan, and A. Stern, "Interband scattering and the "metallic phase" of two-dimensional holes in GaAs/AlGaAs", Phys. Rev. Lett. **84**, 4954 (2000).

Refereed Papers in Conference Proceedings

1. Yael Pascal-Levi, Evgeny Shifman, Manish Pal-Chowdhury, Itshak Kalifa, Ida Sivan, Tsvika Rabkin, and Yuval E. Yaish, "Origin of Hysteresis in Carbon Nanotube Field-Effect Transistors", MRS Proceedings, Boston, USA (2013).

2. P. Pine, Y. E. Yaish, J. Adler, "Simulations of nanosensors based on single walled carbon nanotubes", The Journal of Physics: Conference Series, **402**, 012002 (2012).

3. A. Katsman, M. Beregovsky, Y. E. Yaish, "Diffusion Instability and Tapering of Nickel Silicide Intrusions in Silicon Nanowires", MRS Proceedings, Boston, USA (2011).

4. J. Adler, Y. Gershon, T. Mutat, A. Sorkin, E. Warszawski, R. Kalish, and Y. E. Yaish, "Visualizing Nanodiamond and Nanotubes with AViz", Computer Simulation Studies in Condensed-Matter Physics XIX, **123**, 56–60 (2009).
5. O. Prus, Y. Yaish, M. Reznikov, U. Sivan, and V. Pudalov, "The thermodynamic spin magnetization of strongly correlated two-dimensional electrons in a silicon inversion layer", Physics of Semiconductors 2002, Proceedings institute of physics conference series, **171**, 185 (2003).
6. U. Sivan, Y. Yaish, O. Prus, S. Shapira, I. Ussishkin, E. Buchstab, G. Ben Yoseph, and A. Stern, "On the relation between interband scattering and *metallic* behavior of two dimensional holes in GaAs/AlGaAs", Electronic Correlations: From Meso- to Nano-Physics, 181 (2001).
7. M. Reznikov, O. Prus, Y. Yaish, U. Sivan, and V. Pudalov, "In-plane magnetization of electrons in a silicon inversion layer Electronic Correlations": From Meso- to Nano-Physics, 201 (2001).

Submitted

1. Y. Calahorra, O. Shtempluck, V. Kotchtakov, and Y. E. Yaish, "Probing and altering the initial stress in doubly clamped silicon nanowire beams", ACS Nano (2013).
2. A. Katsman, M. Beregovsky, and Y. E. Yaish,"Formation and evolution of nickel silicides in silicon nanowires", IEEE Transactions on Electron Devices (2013).

Conferences

Invited Talks

1. , "Origin of Hysteresis in Carbon Nanotubes", Micro-Nano workshop, Technion, Israel, 2014
2. , "Carbon Based Nano-materials", Nano-bit conference for nanotechnology, Israel, 2013.
3. , "Origin of Hysteresis in Carbon Nanotubes", RBNI-NanoGune Symposium, Barcelona, Spain, 2012.
4. , "Low Power Electronics based on Silicon Nanowires", ALPHA Symposium, Tel-Aviv, Israel, 2012.
5. , "Electrical and Optical Properties of Carbon Nanotubes and Graphene", Elbit Annual Research Meeting, Israel, 2012.
6. "Electrical and Mechanical Properties of Silicon Nanowires", The International Nano Technology Conference, Jerusalem, Israel, 2009
7. "Chemical Sensors based on Carbon Nanotubes", AFRL Bio-Nano Workshop, San Francisco, USA, 2008.
8. "Nano Electro Mechanical System based on carbon Nanotubes", 6th International Conference on Physics of Light-Matter Coupling in Nanostructures, Magdeburg, Germany, 2006.

9. "Nano Electro Mechanical System based on carbon Nanotubes", The Jubilee Nanotechnology Symposium, Ramat-Gan, Israel, 2006.
10. "Nano Electro Mechanical System based on carbon Nanotubes", France-Israel Symposium on Diamond, Carbon Nano-structures and Related Materials, Ein Bokek, Israel, 2006.
11. "Nano Electro Mechanical System based on carbon Nanotubes", 71st meeting of the Israel Chemistry Society, Tel-Aviv, 2006.
12. "Nano Electro Mechanical System based on carbon Nanotubes", 25th GIF meeting: Nanotubes and Nanowires, Dresden, 2005.
13. "Nano Electro Mechanical System based on carbon Nanotubes", German Physical Society, Berlin, 2005.
14. "Electrical and Mechanical properties of Carbon Nanotubes", The Electrochemical Society, 203rd Meeting, Paris, 2003.
15. "Electrical and Mechanical properties of Carbon Nanotubes", Material Research Society March Meeting, San Francisco, 2003.
16. "Metal Insulator Transition in 2DHG", Workshop on Mesoscopic Physics, Oslo, 1999.

Contributed Talks

1. "Origin of Hysteresis in Carbon Nanotubes Field Effect Transistors", MRS Fall Meeting, Boston, USA, 2013.
2. A. Katsman, M. Beregovsky, Y. E. Yaish, "Formation and Evolution of Nickel Silicides in Silicon Nanowires", ICANM, International Conference and Exhibition on Advanced and Nano Materials, Quebec, Canada, 2013.
3. "Chemical Potential of inhomogeneous Single Layer Graphene", Grapnene 2013, Bilbao, Spain, 2013.
4. "Evolution of Nickel Silicide Contacts in Silicon Nanowires during Thermal Cycling", International Conference and Expo on Materials Science and Engineering, Chicago, USA, 2012.
5. "Diffusion Instability and Tapering of Nickel Silicide Intrusions in Silicon Nanowires", MRS Fall Meeting, Boston, USA, 2011.
6. "From Contact to Diffusion Controlled Growth of Nickel Silicides in Silicon Nanowires", DIMAT 8th International Conference On Diffusion In Materials, Dijon France, 2011.
7. "Kinetics of Nickel Silicides Growth in Silicon Nanowires: From Linear to Parabolic Growth", MRS Fall Meeting, Boston, USA, 2010.
8. "Diffusion Formation of Nickel Silicides Contacts in Silicon Nanowires", Electronic Materials Conference, Notre Dame, Indiana, USA, 2010.
9. "Surface Diffusion Controlled Formation of Nickel Silicides in Silicon Nanowires", Electronic Materials Conference, University Park, Pennsylvania, USA, 2009.

Graduate Students

Completed Theses

Ph.D.

Eitan Hajaj, "Electrical Properties of Single Layer Graphene", Ph.D. Thesis, March 2013 (YY primary supervisor).

Yael Pascal-Levi, "Hysteresis in Carbon Nanotubes Field Effect Transistors", Ph.D. Thesis, October 2012 (YY primary and Prof. Yoav Eichen additional supervisors).

Polina Pine, "Atomistic Simulation of NanoElectro Mechanical Systems Based on Carbon Nanotubes", Ph.D. Thesis, October 2012 (Dr. Joan Adler primary and YY additional supervisors).

M.Sc.

Evgeny Shifman, "Scanning Prob Microscopy of Charged Surfaces", M.Sc. Thesis, February 2014 (YY primary supervisor).

Orit Even-Zur, "Forests and Turfs based on Carbon Naotubes", M.Sc. Thesis, March 2012 (Prof. Eugen Rabkin primary and YY additional supervisors).

Tsvika Rabkin, "Influence of Dielectric/Nanotube Interface on Carbon Nanotube Field-Effect Transistors Charge Sensing", M.Sc Thesis, March 2011 (YY primary supervisor).

Shay Maayani, "Electro-Mechanical Oscillator which Controls Nanometric Junction", M.Sc Thesis, April 2010 (YY primary supervisor).

Elad Oved, "Scanning Probe Microscopy of Graphene on Charged Substrate", M.Sc Thesis, March 2010 (YY primary supervisor).

Yonathan Calahora, "Electrical and Mechanical Properties of Silicon Nanowires", M.Sc Thesis, March 2010 (YY primary supervisor).

Nir Yom Tov, "Accurate Electrical Measurements of Doped Diamond Layers", M.Sc. Thesis, September 2009 (Prof. Rafi Kalish primary and YY additional supervisors).

Emanuel Mordechai, "Fabrication of Mechanical and Electrical Graphene-Based Devices", M.Sc. Thesis, September 2009 (YY primary supervisor).

Aharon Gassman, "Investigation of the Electrical Properties of Carbon Nanofibers with Embedded Carbon Nanotubes", M.Sc. Thesis, August 2009 (Prof. Eyal Zussman primary and YY additional supervisors).

Dan Nusssinson, "Field Effect Transistors Based on Carbon Nanotubes", M.Sc. Thesis, February 2009 (Prof. Michael Reznikov primary and YY additional supervisors).

Oren Shirak, "Silicon Nanowire Field Effect Transistors", M.Sc. Thesis, September 2008 (Prof. Gad Bahir primary and YY additional supervisors).

Theses in progress:

Post-Docs

M. Pal-Chowdhury, "Nano-Electro-Mechnical System based on CNTs".

Ph.D.

Michael Shlaphman, "Nano-Electro-Mechanical System based on Suspended Carbon Nanotubes", Ph.D. Thesis, September 2015 (YY primary supervisor).

M.Sc.

Ziv Even-Zur, "Non Volatile Memory based on Silicon Nanowires ", M.Sc. Thesis, May 2014 (YY primary supervisor).

Tal Tabenchik, "Nano-Electro-Mechanical System based on Suspended Carbon Nanotubes", M.Sc. Thesis, February 2014 (YY primary supervisor).

Tzipora Montag, "Electrical Properties of CVD of Graphene", M.Sc. Thesis, September 2014 (Dr. Joan Adler primary and YY additional supervisors).

Zeev Rogachevsky, "Electrical Properties heterostuctures based on Graphene", M.Sc. Thesis, March 2015 (YY primary supervisor).

Gilad Zeevi, "Electrical Properties exfoliated Graphene", M.Sc. Thesis, September 2015 (YY primary supervisor).