

# CURRICULUM VITAE

## FARROKH AYAZI

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## I. EARNED DEGREES

- Ph.D. in Electrical Eng. from the University of Michigan, Ann Arbor, MI, January 2000.
- M.S. in Electrical Eng. from the University of Michigan, Ann Arbor, MI, May 1997.
- B.S. in Electrical Eng. (Honors) from the University of Tehran, Tehran, Iran, May 1994.

## II. EMPLOYMENT

- April 2009 – present: Professor, School of Electrical and Computer Engineering, Georgia Institute of Technology, Atlanta, GA.
- July 2005 – April 2009: Associate Professor, School of Electrical and Computer Engineering, Georgia Institute of Technology, Atlanta, GA.
- December 1999 – July 2005: Assistant Professor, School of Electrical and Computer Engineering, Georgia Institute of Technology, Atlanta, GA.
- March 1995 – December 1999: Graduate Research Assistant, Center for Integrated Microsystems, Electrical Engineering and Computer Science Department, University of Michigan, Ann Arbor, MI.

## III. TEACHING

### A. INDIVIDUAL STUDENT GUIDANCE

#### *Ph.D. Students*

#### Graduated:

[1] Sidharth Dalmia (co-advised with Prof. M. Swaminathan)

Graduation Date: Fall 2002

Thesis: Design and Implementation of High-Q Passive Devices for Wireless Applications Using System-on-Package (SOP) Based Organic Technologies

Current Employer: Jacket Micro Devices, Atlanta, GA, Chief Technologist and Founder

[2] Babak Vakili Amini

Graduation Date: Spring 2006

Thesis: A Mixed-Signal Low-Noise Sigma-Delta Interface IC for Integrated Sub-Micro-Gravity Capacitive SOI Accelerometers

Current Employer: Atheros, Santa Clara, CA

[3] Pejman Monajemi

Graduation Date: Spring 2006

Thesis: Low-Cost Wafer-Level Packaging of Micromachined HARPSS Devices

Current Employer: Pacific Biosciences Inc., Menlo Park, CA

[4] Krishnakumar Sundaresan

Graduation Date: Fall 2006  
Thesis: Temperature-Compensated CMOS and MEMS-CMOS Oscillators for Clock Generators and Frequency References  
Current Employer: GE Global Research, Niskayuna, NY

- [5] Siavash Pourkamali  
Graduation Date: Fall 2006  
Thesis: High Frequency Single Crystal Silicon Capacitive Resonators and Coupled Resonator Systems  
Current Employer: University of Denver, ECE Department, Denver, CO, Assistant Professor
- [6] Ajit Sharma  
Graduation Date: Fall 2007  
Thesis: CMOS Systems and Circuits for Sub-Degree per Hour MEMS Gyroscopes  
Current Employer: Texas Instrument, Dallas, TX
- [7] Reza Abdolvand  
Graduation Date: Fall 2007  
Thesis: Thin-Film Piezoelectric-on-Substrate Resonators and Narrowband Filters  
Current Employer: Oklahoma State University, School of ECE, Stillwater, OK, Assistant Professor
- [8] Mohammad Faisal Zaman  
Graduation Date: Spring 2008  
Thesis: High-Performance Mode-Matched Micromachined Silicon Vibratory Gyroscopes  
Current Employer: Qualtré, Atlanta, GA
- [9] Gavin K. Ho  
Graduation Date: Summer 2008  
Thesis: Design and Characterization of Silicon Micromechanical Resonators  
Current Employer: Independent Consultant, San Francisco, CA
- [10] Mina Rais-Zadeh  
Graduation Date: Summer 2008  
Thesis: Wafer-Level Encapsulated High-Performance MEMS Tunable Passives and Bandpass Filters  
Current Employer: University of Michigan, EECS Department, Ann Arbor, MI, Assistant Professor
- [11] Hourii Johari  
Graduation Date: Fall 2008  
Thesis: Micromachined Capacitive Silicon Bulk Acoustic Wave Gyroscopes  
Current Employer: Analog Devices, Inc., Cambridge, MA

Current:

- [1] Hossein Miri Lavassani  
Advisement began: August 2004  
Ph.D. Preliminary exam passed in Fall 2004  
Ph.D. Proposal passed in Spring 2008  
Title of the project: Design and Phase-Noise Modeling of Temperature-Compensated High Frequency MEMS-CMOS Reference Oscillators  
Expected graduation date: 2009
- [2] Dongning Zhao  
Advisement began: May 2005  
Ph.D. Preliminary exam passed in Fall 2004  
Ph.D. Proposal scheduled for Summer 2008  
Title of the project: Chopper-Stabilized Lateral-BJT-Input Interface IC in CMOS for Capacitive MEMS  
Expected graduation date: 2009
- [3] Milap Jayesh Dalal  
Advisement began: January 2006  
Ph.D. Preliminary exam passed in Fall 2006

Title of the project: Low-Power Interface IC for High Frequency Resonant MEMS Sensors  
Expected graduation date: 2010

[4] Xin Gao

Advisement began: May 2006  
Ph.D. Preliminary exam passed in Fall 2005  
Title of the project: Hermetic Thin-Film Packaging of MEMS Resonators  
Expected graduation date: 2010

[5] Mauricio Pardo

Advisement began: August 2006  
Ph.D. Preliminary exam passed in Spring 2007  
Title of the project: PLL-Based Clock Jitter Cleaning Using High-Q MEMS Resonators  
Expected graduation date: 2010

[6] Ashwin Kumar Samarao

Advisement began: August 2006  
Ph.D. Preliminary exam passed in Fall 2006  
Title of the project: Low Insertion Loss Integrated Micromechanical Filters  
Expected graduation date: 2010

[7] Jenna Li-Jah Fu

Advisement began: August 2006  
Ph.D. Preliminary exam passed in Fall 2007  
Title of the project: Thin-Film Piezoelectric-on-Substrate Biochemical Sensor Arrays  
Expected graduation date: 2011

[8] Logan Sorenson

Advisement began: January 2008  
Ph.D. Preliminary exam passed in Spring 2008  
Title of the project: Electromechanical Design and Simulation of Micromechanical Resonators  
Expected graduation date: 2012

[9] Roozbeh Tabrizian

Advisement began: January 2008  
Ph.D. Preliminary exam passed in Spring 2008  
Title of the project: Temperature and Process Stable Piezo-Capacitive AlN-on-Silicon Resonators & Filters  
Expected graduation date: 2012

[10] Wang-kyung Sung

Advisement began: May 2008  
Ph.D. Preliminary exam passed in Spring 2008  
Title of the project: Six Degrees-of-Freedom Silicon Inertial Sensors  
Expected graduation date: 2012

***M.S. Students:***

*Graduated:*

[1] Akinori Hashimura

Graduation Date: August 2002  
Thesis: Single Crystal Silicon HARPSS Capacitive Beam Resonators  
Current Employer: Sharp Labs, Camas, WA

[2] Siavash Pourkamali

Graduation Date: Spring 2004  
Thesis: Electrically-Coupled MEMS Bandpass Filters (continued with Ph.D. in Dr. Ayazi's group)  
Current Employer: University of Denver, Denver, CO, Assistant Professor

- [3] Shweta Sameer Humad  
Graduation Date: July 2004  
Thesis: High-Frequency Piezo-On-Silicon Microelectromechanical Resonators  
Current Employer: Goodrich, Sensor and Integrated Systems, Minneapolis, MN
- [4] Mina Rais-Zadeh  
Graduation Date: May 2005  
Thesis: High-Q Integrated Inductors on Trenched Silicon Islands (continued with Ph.D. in Dr. Ayazi's group)  
Current Employer: to join University of Michigan, Ann Arbor, MI, Assistant Professor
- [5] Abhishek Sivapurapu  
Graduation Date: December 2005  
Thesis: RF Sputtering of PZT Thin Films for Applications in Micromechanical Resonators  
Current Employer: Applied Materials, Santa Clara, CA
- [6] John Perng  
Graduation Date: August 2006  
Thesis: Characterization of High Aspect Ratio Nanoscale Etching in Silicon Using Electron Beam Lithography and Deep Reactive Ion Etching (DRIE) Technique  
Current Employer: Continuing PhD in Bioengineering at Georgia Tech
- [7] Jalpa Shah  
Graduation Date: December 2007  
Thesis: CMOS Interface IC for MHz Silicon BAW Gyroscope  
Current Employer: Medtronic, Minneapolis, MN

## IV. SCHOLARLY ACCOMPLISHMENTS

*Note: The names of authors who are Dr. Ayazi's students or postdocs are boldfaced throughout section IV.*

### A. PUBLISHED BOOKS OR PARTS OF BOOKS

- [1] R. Ramesham, R. Ghaffarian, and F. Ayazi, "Fundamentals of Microelectromechanical Systems (MEMS)," in *Fundamentals of Microsystems Packaging*, Ch. 14, pp. 542-579, Edited by R. Tummala, McGraw-Hill, 2001.
- [2] F. Ayazi, "High-Frequency Integrated Micro-Electro-Mechanical Resonators and Filters," book chapter in *Advanced Micro and Nano Systems*, Vol. 1, pp. 165-192, 2004, Edited by H. Baltes et al, Wiley-VCH.
- [3] F. Ayazi, **M.F. Zaman**, **A. Sharma**, "Vibrating Gyroscopes," in *Comprehensive Microsystems: Fundamentals, Technology and Applications*, Vol. 2, pp 181-208, Edited by Y.B. Gianchandani, O. Tabata, and H. Zappe, Oxford, Elsevier Ltd.
- [4] **P. Monajemi**, F. Ayazi, and D. Sparks, "MEMS Packaging," in *Introduction to System-on-Package (SOP)*, pp. 494-533, 2008, Edited by R. Tummala and M. Swaminathan, McGraw-Hill.
- [5] **A. Sharma**, **M.F. Zaman**, and F. Ayazi, "CMOS Systems and Interfaces for Microgyroscopes," book chapter in *Circuits at the Nanoscale: Communications, Imaging, and Sensing*, pp. 601-622, 2008, Edited by K. Iniewski, CRC Press.

### B. REFEREED PUBLICATIONS

#### I. REFEREED JOURNAL PUBLICATIONS

- [1] N. Yazdi, F. Ayazi, and K. Najafi, "Micromachined Inertial Sensors," *Invited paper, Proceedings of the IEEE*, Aug. 1998, pp. 1640-1659.
- [2] F. Ayazi and K. Najafi, "High Aspect-Ratio Combined Poly and Single-Crystal Silicon (HARPSS) MEMS Technology," *IEEE Journal of Microelectromechanical Systems*, vol. 9, Sept. 2000, pp. 288-294.

- [3] F. Ayazi and K. Najafi, "High Aspect-Ratio Polysilicon Micromachining Technology," *Sensors and Actuators A*, Vol. 87, Dec. 2000, pp. 46-51.
- [4] F. Ayazi and K. Najafi, "A HARPSS Polysilicon Vibrating Ring Gyroscope," *IEEE Journal of Microelectromechanical Systems*, vol. 10, June 2001, pp. 169-179.
- [5] F. Ayazi, "The HARPSS Process for Fabrication of Precision MEMS Inertial Sensors," *Mechatronics 12 (2002)*, Nov. 2002, pp. 1185-1199, Elsevier Science Ltd.
- [6] **S. Pourkamali, A. Hashimura, R. Abdolvand, G. Ho**, A. Erbil, and F. Ayazi, "High-Q Single Crystal Silicon HARPSS Capacitive Beam Resonators with Sub-micron Transduction Gaps," *IEEE Journal of Microelectromechanical Systems*, Vol. 12, No. 4, August 2003, pp. 487-496.
- [7] **Z. Hao**, A. Erbil, and F. Ayazi, "An Analytical Model for Support Loss in Micromachined Beam Resonators with In-plane Flexural Vibrations," *Sensors and Actuators A*, Vol. 109, Dec. 2003, pp.156-164.
- [8] **G. Piazza, R. Abdolvand, G. Ho**, and F. Ayazi, "Piezoelectrically-Transduced, Capacitively-Tuned, High-Q Single-Crystal Silicon Micromechanical Resonators on SOI Wafers," *Sensors and Actuators A*, Vol. 111, N1, March 2004, pp. 71-78.
- [9] **Z. Hao, S. Pourkamali**, and F. Ayazi, "VHF Single Crystal Silicon Elliptic Bulk-Mode Capacitive Disk Resonators; Part I: Design and Modeling," *IEEE Journal of Microelectromechanical Systems*, Vol. 13, No. 6, Dec. 2004, pp. 1043-1053.
- [10] **S. Pourkamali, Z. Hao**, and F. Ayazi, "VHF Single Crystal Silicon Elliptic Bulk-Mode Capacitive Disk Resonators; Part II: Implementation and Characterization," *IEEE Journal of Microelectromechanical Systems*, Vol. 13, No. 6, Dec. 2004, pp. 1054-1062.
- [11] **B.V. Amini** and F. Ayazi, "A 2.5V 14-bit Sigma-Delta CMOS-SOI Capacitive Accelerometer," *IEEE Journal of Solid State Circuits*, Dec. 2004, pp. 2467-2476.
- [12] **S. Pourkamali** and F. Ayazi, "Electrically Coupled MEMS Bandpass Filters; Part I: With Coupling Element," *Sensors and Actuators A*, Aug. 2005, pp. 307-316.
- [13] **S. Pourkamali** and F. Ayazi, "Electrically Coupled MEMS Bandpass Filters; Part II: Without Coupling Element," *Sensors and Actuators A*, Aug. 2005, pp. 317-325.
- [14] **B.V. Amini** and F. Ayazi, "Micro-Gravity Capacitive Silicon-On-Insulator Accelerometers," *Journal of Micromechanics and Microengineering*, Vol. 15, No. 11, Oct. 2005, pp. 2113-2120.
- [15] **M. Rais-Zadeh** and F. Ayazi, "Characterization of High-Q Spiral Inductors on Thick Insulator-On-Silicon," *Journal of Micromechanics and Microengineering*, Vol. 15, Sept. 2005, pp. 2105-2112.
- [16] **P. Monajemi** and F. Ayazi, "Design Optimization and Implementation of a Micro-Gravity Capacitive HARPSS Accelerometer," *IEEE Sensors Journal*, vol. 6, issue 1, Feb 2006, pp. 39-46.
- [17] **K. Sundareshan**, P.E. Allen, and F. Ayazi, "Process and temperature compensation in a 7MHz CMOS clock oscillator," *IEEE Journal of Solid-State Circuits*, vol. 41, no. 2, Feb. 2006, pp. 433-441.
- [18] **P. Monajemi**, P. Joseph, P. A. Kohl, and F. Ayazi, "Wafer-Level Packaging of MEMS via Thermally Released Metal-Organic Membranes," *Journal of Micromechanics & Microengineering*, vol. 16, March 2006, pp. 742-750.
- [19] **R. Abdolvand, H. Johari, G.K. Ho**, A. Erbil, and F. Ayazi, "Quality factor in trench-refilled polysilicon beam resonators," *IEEE Journal of Microelectromechanical Systems*, vol.15, no.3, June 2006, pp. 471- 478.
- [20] **R. Abdolvand** and F. Ayazi, "A gap reduction and manufacturing technique for thick oxide mask layers with multiple-size sub- $\mu\text{m}$  openings," *IEEE Journal of Microelectromechanical Systems*, vol.15, no.5, Oct. 2006, pp. 1139- 1144.
- [21] **B.V. Amini, R. Abdolvand**, and F. Ayazi, "A 4.5mW closed-loop delta-sigma micro-gravity CMOS-SOI accelerometer," *IEEE Journal of Solid State Circuits*, Vol. 41, No. 12, Dec. 2006, pp. 2983-2991.
- [22] **Z. Hao** and F. Ayazi, "Support Loss in the Radial Bulk-mode Vibrations of Center-supported Micromechanical Disk Resonators," *Sensors and Actuators A: Physical*, Volume 134, Issue 2, 15 March 2007, pp. 582-593.
- [23] P. Joseph, **P. Monajemi**, F. Ayazi, and P. A. Kohl, "Wafer-Level Packaging of Micromechanical Resonators," *IEEE Trans. on Advanced Packaging*, Vol. 30, No.1, Feb 2007, pp. 19-26.
- [24] **K. Sundareshan, G.K. Ho, S. Pourkamali**, and F. Ayazi, "Electronically temperature compensated Silicon bulk acoustic resonator reference oscillators," *IEEE Journal of Solid-State Circuits*, Vol. 42, No. 6, June 2007, pp. 1425-

- [25] **A. Sharma, M.F. Zaman,** and F. Ayazi, "A 104dB Dynamic Range Transimpedance-Based CMOS ASIC for Tuning Fork Microgyroscopes," *IEEE Journal of Solid-State Circuits*, Vol. 42, No. 8, Aug. 2007, pp. 1790-1802.
- [26] **S. Pourkamali, G. K. Ho,** and F. Ayazi, "Low-impedance VHF and UHF capacitive silicon bulk acoustic wave resonators - Part I: Concept and Fabrication" *IEEE Transactions on Electron Devices*, May 2007, Vol. 54, No. 8, Aug. 2007, pp. 2017-2023.
- [27] **S. Pourkamali, G. K. Ho,** and F. Ayazi, "Low-impedance VHF and UHF capacitive silicon bulk acoustic wave resonators - Part II: Measurement and Characterization," *IEEE Transactions on Electron Devices*, Vol. 54, No. 8, Aug. 2007, pp. 2024-2030.
- [28] **R. Abdolvand, B.V. Amini,** and F. Ayazi, "Sub-micro-gravity in-plane accelerometers with reduced capacitive gaps and extra seismic mass," *IEEE Journal of Microelectromechanical Systems*, Vol. 16, Oct. 2007, pp. 1036-1043.
- [29] **M. Rais-Zadeh,** P. A. Kohl, and F. Ayazi, "MEMS Switched Tunable Inductors," *IEEE/ASME Journal of Microelectromechanical Systems*, Vol. 17, No. 1, Feb. 2008, pp. 78-84.
- [30] **G. K. Ho, R. Abdolvand, A. Sivapurapu, S. Humad,** and F. Ayazi, "Piezoelectric-on-Silicon Lateral Bulk Acoustic Wave Micromechanical Resonators," *IEEE Journal of Microelectromechanical Systems*, Vol. 17, No. 2, April 2008, pp. 512-520.
- [31] **M. Rais-Zadeh,** J. Laskar, and F. Ayazi, "High performance inductors on CMOS-grade trenched silicon substrate," *IEEE Transaction on Components and Packaging Technology*, Vol. 39, March 2008, pp. 126-134.
- [32] **R. Abdolvand** and F. Ayazi, "An Advanced Reactive Ion Etching Process for Very-High Aspect-Ratio Sub-Micron Wide Trenches in Silicon," *Sensors and Actuators A: Physical*, Volume 144, Issue 1, May 2008, pp. 109-116.
- [33] **J. Fang, J. Fu,** and F. Ayazi, "Metal-organic thin-film encapsulation for MEMS," *Journal of Micromechanics & Microengineering*, Volume 18, No. 10, October 2008, .
- [34] **M.F. Zaman, A. Sharma, Z. Hao,** and F. Ayazi, "A Mode-Matched Silicon-Yaw Tuning-Fork Gyroscope with Subdegree-Per-Hour Allan Deviation Bias Instability," *IEEE Journal of Microelectromechanical Systems*, Vol. 17, Issue 6, December 2008, pp. 1526-1536.
- [35] **R. Abdolvand, H. Mirilavasani, G.K. Ho,** and F. Ayazi, "Thin-Film Piezoelectric-on-Silicon Resonators for High-Frequency Reference Oscillator Applications," *IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control*, Volume 55, Issue 12, December 2008, pp. 2596-2606.
- [36] **M.F. Zaman, A. Sharma,** and F. Ayazi, "The Resonating Star Gyroscope: Implementation of a Novel Multiple-Shell Gyroscope with sub-5 deg/hr Allan Deviation Bias Instability," *IEEE Sensors Journal*, letter of final acceptance received October 1, 2008.
- [37] **A. Sharma, M.F. Zaman,** and F. Ayazi, "A 0.1°/hr Bias Drift Micromechanical Silicon Gyroscope with Automatic CMOS Mode-Matching," under review, *IEEE Journal of Solid-State Circuits*, letter of acceptance subject to revision received August 27, 2008.
- [38] **H. Johari** and F. Ayazi, "High-Density Embedded Deep Trench Capacitors in Silicon with Enhanced Breakdown Voltage," under review, *IEEE Transaction on Components and Packaging Technology*, letter of acceptance subject to revision received September 30, 2008.
- [39] **R. Abdolvand** and F. Ayazi, "High Frequency Monolithic Thin-Film Piezoelectric-on-Substrate Filters," under review, *Proceedings of the European Microwave Association*, letter of acceptance subject to revision received October 14, 2008.
- [40] **M. Rais-Zadeh, H. M. Lavasani,** and F. Ayazi "An Integrated 750MHz Couple Resonator Tunable Bandpass Filter in Silver with a Constant Bandwidth," under review, *IEEE Journal of Microelectromechanical Systems*, submitted in April 2008.
- [41] **G.K. Ho, J. K. C. Perng,** and F. Ayazi, "Micromechanical IBARs: Modeling and Design for Manufacturability," under review, *IEEE Journal of Microelectromechanical Systems*, submitted in April 2008.
- [42] **G.K. Ho, K. Sundaresan, S. Pourkamali,** and F. Ayazi, "Micromechanical IBARs: Tunable High-Q Resonators for Temperature-Compensated Reference Oscillators," under review, *IEEE Journal of Microelectromechanical Systems*, submitted in June 2008.
- [43] **H. Johari** and F. Ayazi, "Capacitive Bulk Acoustic Wave Silicon Disk Gyroscope – Part I: Design and

Modeling,” *IEEE Journal of Microelectromechanical Systems*.

[44] **H. Johari, J. Shah**, and F. Ayazi, “Capacitive Bulk Acoustic Wave Silicon Disk Gyroscope – Part II: Implementation and Characterization,” *IEEE Journal of Microelectromechanical Systems*.

## 2. REFEREED CONFERENCE PUBLICATIONS

[1] A. Selvakumar, F. Ayazi, and K. Najafi, “A High Sensitivity Z-Axis Torsional Silicon Accelerometer,” *Tech. Dig. IEEE Int. Electron Devices Meeting (IEDM 1996)*, San Francisco, CA, Dec. 1996, pp. 765-768.

[2] F. Ayazi and K. Najafi, “Design and Fabrication of a High-Performance Polysilicon Vibrating Ring Gyroscope,” *Proc. IEEE International Micro Electro Mechanical Systems Conference (MEMS’98)*, Heidelberg, Germany, Feb. 1998, pp. 621-626.

[3] F. Ayazi and K. Najafi, “High Aspect-Ratio Polysilicon Micromachining Technology,” *Proc. 10th Int. Conf. Solid-State Sensors and Actuators (Transducers’99)*, Sendai, Japan, June 1999, pp. 320-323.

[4] F. Ayazi, H.H. Chen, and K. Najafi, “A High Performance Vibratory Silicon Microgyroscope,” *Proc. Sixth Annual Strategic and Technical Symposium “Vehicle Displays and Microsensors ’99”*, Ypsilanti, MI, Sept. 1999, pp. 153-157.

[5] D. Aslam, V. Papageorgiou, F. Ayazi, and K. Najafi, “IC-Compatible Technology of Poly-Diamond MEMS,” *Proc. Sixth Annual Strategic and Technical Symposium “Vehicle Displays and Microsensors ’99”*, Ypsilanti, MI, Sept. 1999, pp. 113-116.

[6] F. Ayazi and K. Najafi, “High Aspect-Ratio Dry-Release Poly-Silicon MEMS Technology for Inertial-Grade Microgyroscopes,” *Proc. IEEE 2000 Position Location and Navigation Symposium (PLANS 2000)*, San Diego, CA, March 2000, pp. 304-308.

[7] F. Ayazi, H.H. Chen, F. Kocer, G. He, and K. Najafi, “A High Aspect-Ratio Polysilicon Vibrating Ring Gyroscope,” *Tech. Dig. Solid-State Sensors & Actuators Workshop*, Hilton Head, SC, June 2000, p. 289-292.

[8] F. Ayazi, “High Aspect-Ratio Poly-Silicon MEMS Technology for Precision Inertial Sensors,” *Invited Paper, Proc. 7<sup>th</sup> Mechatronics Forum International Conference*, Atlanta, GA, Sept. 2000.

[9] **S.Y. No** and F. Ayazi, “The HARPSS Process for Fabrication of Nano-Precision Silicon Electromechanical Resonators,” *Proc. IEEE 2001 Conf. on Nanotechnology (IEEE NANO’01)*, Maui, HI, Oct. 2001, pp. 489-494.

[10] R. Tummala, S. Bhattacharya, **S. Dalmia**, P. M. Raj, T. Ogawa, S.H. Lee, R. Mani, D. Balaraman, A. Bavisi, F. Ayazi, M. Swaminathan, A. Erbil, “Recent Advances in Integral Passive Research at Georgia Tech,” in *Proc. IMAPS 2002 International Conference on Electronic Packaging (ICEP)*, Tokyo, Japan, April 2002.

[11] **S. Dalmia**, S.H. Lee, S. Bhattacharya, F. Ayazi, and M. Swaminathan, “High-Q RF Passives on Organic Substrates Using a Low-Cost Low-Temperature Laminate Process,” in *Proc. 2002 Symposium on Design, Test, Integration and Packaging of MEMS/MOEMS (DTIP 2002)*, Cannes, France, May 2002, pp. 660-669.

[12] **S. Dalmia**, J.M. Hobbs, V. Sundaram, M. Swaminathan, S.H. Lee, F. Ayazi, G. White, and S. Bhattacharya, “Design and Optimization of High-Q RF Passives on SOP-Based Organic Substrates,” in *Proc. 2002 Electronic Components and Technology Conference*, San Diego, CA, May 2002, pp. 495-503.

[13] **D. Balaraman**, S. Bhattacharya, F. Ayazi, and J. Papapolymerou, “Low Cost Low Actuation Voltage Copper RF MEMS Switches,” in *Dig. 2002 IEEE MTT-S International Microwave Symposium (IMS 2002)*, Seattle, WA, June 2002, pp. 1225-1228.

[14] **S. Dalmia**, F. Ayazi, M. Swaminathan, S.H. Min, S.H. Lee, W. Kim, D.S. Kim, S. Bhattacharya, V. Sundaram, G. White, and R. Tummala, “Design of Inductors in Organic Substrates For 1-3 GHz Wireless Applications,” in *Dig. 2002 IEEE MTT-S International Microwave Symposium (IMS 2002)*, Seattle, WA, June 2002, pp. 1405-1408.

[15] S.H. Lee, S. Min, D.S. Kim, **S. Dalmia**, W. Kim, V. Sundaram, S. Bhattacharya, G. White, F. Ayazi, J.S. Kenney, M. Swaminathan, and R. Tummala, “High Performance Spiral Inductors Embedded in Organic Substrates for SOP Applications,” in *Dig. 2002 IEEE MTT-S International Microwave Symposium (IMS 2002)*, Seattle, WA, June 2002, pp. 2229-2232.

[16] **S.Y. No**, **A. Hashimura**, **S. Pourkamali**, and F. Ayazi, “Single-Crystal Silicon HARPSS Capacitive Resonators with Submicron Gap-Spacing,” *Tech. Dig. Solid-State Sensors, Actuators, and Microsystems Workshop*, Hilton Head, SC, June 2002, pp. 281-284.

[17] **S. Pourkamali**, **R. Abdolvand**, and F. Ayazi, “A 600kHz Electrically Coupled MEMS Bandpass Filter,” *Proc.*

*IEEE International Micro Electro Mechanical Systems Conference (MEMS'03)*, Kyoto, Japan, Jan. 2003, pp. 702-705.

[18] **G. Piazza, R. Abdolvand**, and F. Ayazi, "Voltage-Tunable, Piezoelectrically-Transduced, Single-Crystal Silicon Resonators on SOI Substrates," *Proc. IEEE Micro Electro Mechanical Systems Conference (MEMS'03)*, Kyoto, Japan, Jan. 2003, pp. 149-152.

[19] **K. Sundaresan, K. Brouse, K. U-Yen**, F. Ayazi, and P. Allen, "A 7-MHz Process, Temperature and Supply Compensated Clock Oscillator in 0.25 CMOS," *Proc. 2003 IEEE International Symposium on Circuits and Systems (ISCAS 2003)*, Bangkok, Thailand, May 2003, pp. 693-696.

[20] **S. Pourkamali** and F. Ayazi, "SOI-Based HF and VHF Single-Crystal Silicon Resonators with Sub-100 Nanometer Vertical Capacitive Gaps," *Digest of the 12th International Conference on Solid State Sensors, Actuators and Microsystems (Transducers'03)*, Boston, MA, June 8-12, 2003, pp. 837-840.

[21] **R. Abdolvand, G.K. Ho**, A. Erbil, and F. Ayazi, "Thermoelastic Damping in Trench-Refilled Polysilicon Resonators," *Digest of the 12th International Conference on Solid State Sensors, Actuators and Microsystems (Transducers'03)*, Boston, MA, June 8-12, 2003, pp. 324-327.

[22] **A. Bavis, S. Dalmia**, M. Swaminathan, and F. Ayazi, "A 802.11a WLAN Oscillator with High Q Embedded Passives on Laminate-Type Organic Package," *2003 IEEE Topical Conference on Wireless Communication Technology*, Honolulu, Hawaii, Oct. 2003, pp. 166-167.

[23] G. Wang, A. Bacon, **R. Abdolvand**, F. Ayazi, J. Papapolymerou, and E. Tentzeris, "Finite Ground Coplanar Lines on CMOS Grade Silicon with a Thick Embedded Silicon Oxide Layer Using Micromachining Techniques," *33rd European Microwave Conference*, Vol. I, October 2003, pp. 25-27.

[24] **S. Humad, R. Abdolvand, G.K. Ho, G. Piazza**, and F. Ayazi, "High Frequency Micromechanical Piezo-On-Silicon Block Resonators," *Tech. Dig. IEEE Int. Electron Devices Meeting (IEDM 2003)*, Washington, DC, Dec. 2003, pp. 957-960.

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## VII. HONORS AND AWARDS

- Roger P. Webb Outstanding Junior Faculty Member Award, School of ECE, 2008
- Best paper award at the IEEE Sensors Conference 2007, Atlanta, GA.
- GOMAC Tech Conference Meritorious Paper Award, 2005.
- NSF CAREER Award, 2004.
- Richard M. Bass/Eta Kappa Nu Outstanding Teacher Award (determined by the vote of the ECE senior class), School of ECE, Georgia Tech, Spring 2004.
- Georgia Tech College of Engineering Cutting Edge Research Award, 2001-02.
- Rackham Predoctoral Fellowship Award, University of Michigan, 1998-99.