

ZEYNEP DILLI – CURRICULUM VITAE

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MAIN RESEARCH AREAS Semiconductor device and integrated circuit physics, innovative power sources, power harvesting and management systems, high power microwave effects.

OTHER AREAS OF INTEREST Sensor devices and circuits, embedded system design, novel integration techniques, optoelectronics, electrical engineering education.

EDUCATION **Ph.D., Electrical Engineering**, University of Maryland College Park, MD, USA, December 2007
Dissertation: “Physical Aspects of VLSI Design with a Focus on Three-Dimensional Integrated Circuit Applications”
M.Sc., Electrical Engineering, University of Maryland College Park, MD, USA, August 2001
B.Sc., Electrical and Electronics Engineering, Bilkent University, Ankara, Turkey, May 1998

WORK EXPERIENCE

January 2010-Present **Senior Engineer** at *FlexEl, LLC, College Park, MD*
January 2008-Present **Research Associate** at the *Dept. of Electrical and Computer Engineering (ECE), University of Maryland, College Park*
January 2008-May 2009 **Lecturer** at the *ECE Dept., U. of Maryland, College Park*
August 2000-Dec. 2007 **Graduate study** at the *University of Maryland, College Park, under Dr. Neil Goldsman*
August 1998-Aug. 2000 **Graduate study** at the *University of Maryland, College Park, under Dr. Mario Dagenais*
April 1998-August 1998 **Internship** with the *Computational Electromagnetics Group, Bilkent University, under Dr. Levent Gürel*
June-August 1997 **Internship** with the *Optics Research Laboratory, Bilkent University, under Dr. Orhan Aytür.*
June-July 1996 **Internship** with the *Microelectronics, Guidance and Electro-Optics Division, R&D Section, ASELSAN (Military Electronics Industry) Inc., Ankara, Turkey.*

SELECTED JOURNAL PUBLICATIONS

1. M. Peckerar, Z., Dilli, M. Dornajafi, N. Goldsman, Y. Ngu, R.B. Proctor, B.J. Krupsaw and D.A. Lowy, "A Novel High Energy Density Flexible Galvanic Cell," to be published in *Energy and Environmental Science*, advance online publication at DOI:10.1039/C1EE01075A .
2. M. Peckerar, M, Dornajafi, Z. Dilli, N. Goldsman, Y. Ngu, B. Boerger, N. van Wyck, J. Gravelin, B. Grenon, R.B. Proctor, and D.A. Lowy, "Fabrication of Flexible Ultracapacitor/Galvanic Cell Hybrids Using Advanced Nanoparticle Coating Technology," *The Journal of Vacuum Science and Technology B*, v. 29, no. 1, Jan/Feb 2011.
3. Z. Dilli, A. Akturk, N. Goldsman, G. Metze, "Controlled On-Chip Heat Transfer for Directed Heating and Temperature Reduction," *Solid State Electronics*, v. 53, no. 6, pp. 590-598, June 2009.
4. Z. Dilli, N. Goldsman, M. Peckerar, A. Akturk and G. Metze, "Design and Testing of a Self-Powered 3D Integrated SOI CMOS System," *Microelectronic Engineering*, v. 85, no. 2, pp. 388-394, Feb. 2008.
5. R. Melik, N.K. Perkgoz, E. Unal, Z. Dilli and H. V. Demir, "Design and Realization of a Fully On-Chip High-Q Resonator at 15 GHz on Silicon", *IEEE Transactions on Electron Devices*, v. 55, no. 12, pp.4359-3466, Dec. 2008.
6. Akturk, A., Allnut, J., Dilli, Z., Goldsman, N., Peckerar, M., "Device Modeling at Cryogenic Temperatures: Effects of Incomplete Ionization," *IEEE Trans. on Electron Devices*, v. 54, no. 11, pp. 2984-2990, Nov. 2007.
7. Saini, S.S., Johnson, F.G., Dilli, Z., Hu, Y., Grover, R., Stone, D.R., Shen, P., Pamulapati, J., Zhou, W., Dagenais, M. "Compact Low-loss Vertical Resonant Mode Coupling Between Two Well-Confined Waveguides," *Electronics Letters*, v. 35, no. 14, pp.1145-1147, Jul. 1999.

SELECTED CONFERENCE PUBLICATIONS

1. Dilli, Z., Akturk, A., Goldsman, N., Holloway, M., Rodgers, J., "Nonlinear Behavior of Electrostatic Discharge Protection Structures under High-Power Microwave Excitation: Modeling and Simulation," *to be presented in the International Symposium on Circuits and Systems (ISCAS) 2011*, May 2011, Rio de Janeiro, Brazil.
2. Peckerar, M., Dornajafi, M., Dilli, Z., Goldsman, N., Dagenais, M. "Power Distribution Systems for Distributed Sensor Networks and Pervasive Computing," 35th GOMACTech Conf., Reno, NV, Mar. 2010.
3. Holloway, M.A., Dilli, Z., Jun, M.J., Rodgers, J., "An Introduction to Experimental and Modeling Methods of Evaluation of High Power Microwave Effects on Digital Microelectronic Systems," The 2009 International Semiconductor Device Research Symposium (ISDRS '09), College Park, MD, USA, Dec. 2009.
4. Holloway, M.A., Firestone, T., Dilli, Z., Rodgers, J., "Identification, Characterization and Modeling of High Power Microwave Effects in CMOS Electronics," 12th Annual Directed Energy Symposium, San Antonio, TX, Nov. 2009.
5. Dilli, Z., Akturk, A., Goldsman, N. "Controlled Localized Heating on Integrated Circuits for Cold-Ambient Temperature Applications," in the 2007 Int. Semicond. Device Res. Symp. (ISDRS'07), College Park, MD, Dec. 2007.

6. Akturk, A., Goldsman, N., Dilli, Z., Peckerar, M. "Effects of Cryogenic Temperatures on Small-Signal MOSFET Capacitances," in the 2007 Int. Semiconductor Dev. Res. Symp. (ISDRS'07), College Park, MD, Dec. 2007.
7. Ngu, Y., Peckerar, M., Dilli, Z., Goldsman, N. "High Capacitance Battery for Powering Distributed Networks Node Devices," in the 2007 Int. Semiconductor Dev. Res. Symp. (ISDRS'07), College Park, MD, Dec. 2007.
8. Dilli, Z. and Goldsman, N. "Relating Electrical and Computer Engineering to the High School Classroom," in the 2007 Int. Semiconductor Dev. Res. Symp. (ISDRS'07), College Park, MD, Dec. 2007.
9. Dilli, Z., Goldsman, N., Akturk, A., Metz, G., "A 3-D Time-Dependent Green's Function Approach to Modeling Electromagnetic Noise in On-Chip Interconnect Networks," in Int. Conf. on Simulation of Semiconductor Proc. and Dev. (SISPAD) 2006, pp.240-243, Monterey Bay, CA, Sep. 2006.
10. Akturk, A., Goldsman, N., Dilli, Z., Peckerar, M. "Device Performance and Package Induced Self Heating Effect at Cryogenic Temperatures," in Int. Conf. on Simulation of Semiconductor Proc. and Dev. (SISPAD) 2006, pp. 240-243, Monterey Bay, CA, Sep. 2006.
11. Z. Dilli, N. Goldsman, M. Peckerar and G. Metz, "Realization of Self-Powered Electronics by 3-D Integration," in the 2005 Int. Semiconductor Dev. Res. Symp. (ISDRS'05), pp. 324-325, Bethesda, MD, Dec. 2005.
12. Dilli, Z., Goldsman, N., Akturk, A., "An Impulse-Response Based Methodology for Modeling Complex Interconnect Networks," in the 2005 Int. Semicond. Dev. Res. Symp. (ISDRS'05), pp.64-65, Bethesda, MD, Dec. 2005.
13. Dilli, Z. and Goldsman, N. "Development and Implementation of a Multi-Specialty Advanced Capstone Design Course," in Information Technology Based Higher Education and Training (ITHET) '04, pp. 425-428, Istanbul, Turkey, Jun. 2004.
14. Bai, Y.; Dilli, Z.; Goldsman, N.; Metz, G.; "Frequency-dependent Modeling of On-chip Inductors on Lossy Substrates," in 2003 Int. Semic. Dev. Res. Symp. (ISDRS'03), pp.292-293, Washington DC, Dec. 2003.
15. Dilli, Z., Goldsman, N., Schmidt, J.A., Harper, L., Marcus, S.L., "A New Pedagogy in Electrical and Computer Engineering: An Experiential and Conceptual Approach," *Frontiers in Education (FIE)* 2002, v.1, pp. T2C-3-7, Nov. 2002.
16. Saini, S.S., Hu, Y., Dilli, Z., Grover, R., Dagenais, M., Johnson, F.G., Stone, D.R., Shen, H., Zhou, W., Pamulapati, J., "Integrated 1x2 loss-less Y-junction Splitter on a Passive Active Resonant Coupler Platform," *Lasers and Electro-Optics (CLEO)* 2000, pp. 423-424, May 2000.
17. Saini, S.S., Dilli, Z., Hu, Y., Grover, R., Dagenais, M., Johnson, F.G., Stone, D.R., Shen, H., Pamulapati, J., Zhou, W., "Compact Low-Loss Vertical Resonant Mode Coupling Between Two Well-Confined Waveguides for Monolithic Integration," *Lasers and Electro-Optics Society 12th Annual Meeting (LEOS)* 1999, v. 2, pp.840-841, Nov. 1999.

PATENTS AND OTHER PUBLICATIONS

1. Peckerar, M., Goldsman, N., Ngu, Y., Dilli, Z., Metz, G., "Thin Flexible Rechargeable Electrochemical Energy Cell and Method of Fabrication," *Utility Patent Application filed with the USPO, July 2009.*

2. Peckerar, M., Goldsman, N., Ngu, Y., Dilli, Z., Metze, G. "A Flexible, High Specific-Energy Density, Rechargeable Battery." *Provisional Patent filed with the USPO*, July 2008.
3. Salter, T., Goldsman, N., Metze, G., Choi, K., Dilli, Z., Ngu, Y., Peckerar, M., Bo, L. "An RF Power Harvesting Circuit," *provisional patent application filed with the UM Office of Technology Commercialization*, Dec. 2009.
4. Goldsman, N., and Dilli, Z., *An Experiential Introduction to Electrical and Computer Engineering*, University of Maryland, College Park, 2001.

AWARDS AND COMPETITIONS

1. Maryland Incubator Company of the Year 2010, "FlexEl, LLC."
2. University of Maryland Business Plan Competition, Information Technology, First Place, 2009, "FlexEl, LLC."
3. University of Maryland Office of Technology Commercialization Best Inventor of the Year Award, 2008, "World's Highest Energy Density Battery."
4. Benjamin J. Dasher Conference Best Paper Award, "A New Pedagogy in Electrical and Computer Engineering: An Experiential and Conceptual Approach," *Frontiers in Education (FIE)* 2002.
5. Army Research Lab Fellowship for graduate study at the ECE Department, University of Maryland College Park, Aug. 1998-May 2000.
6. National Postgraduate Education Entrance Examination, Turkey, December 1997: Ranked 35th in quantitative, 25th in verbal, 24th in equal-weighted score among 19383 applicants.
7. National University Entrance Examination, Turkey, June 1994: Ranked 34th with the math-based score and 64th with the science-based score among more than 1,000,000 applicants.
8. Full scholarship for duration of study in Bilkent University, a private foundation-supported institution in Ankara, Turkey.

EDUCATIONAL ACTIVITIES

1. Teaching ENEE 313, "Introduction to Device Physics," Spring 2008, Fall 2008, Spring 2009.

Selected Student Comments:

"I've had a great semester with you, you've been a great teacher, one of the best i've had in my college career..."

"I just wanted to say thank you for everything this semester. I appreciate the extra help you provided in your office hours, mid-term preparation sheets, and the review session - they helped a lot...and I found myself learning more and more as a result of your lectures and exams."

"Device physics and electromagnetic theory were things that I knew I'd never like and therefore I worried about being able to do well in these classes. However, the way you taught the material was very effective and I feel as if I have absorbed more out of this engineering class than I have with any others."

Selected Student Evaluations:

(Averages for 65 students responding to course evaluations over 8 sections in 3 semesters)

"The instructor was well-prepared in class": 3.85/4.00

"The instructor was effective in communicating the content of the course": 3.62/4.00

"The instructor was responsive to student concerns": 3.77/4.00

2. Design and implementation of the Electrical Engineering program in the Maryland Governor's Institute of Technology, Summer 2001
 - a. Assisted curriculum development

- b. Co-authored the textbook *An Experiential Introduction to Electrical and Computer Engineering*
 - c. Taught and directed the laboratory component of the course
3. Co-design, curriculum development, implementation of ENEE498C “Topics in Electrical Engineering: Capstone II: Advanced Design”, Fall 2003
4. Grader for ENEE698 (now ENEE690), “Quantum and Wave Phenomena with Electrical Applications,” Spring 2001, under Dr. Romel Gomez.
5. Teaching assistant for ENEE694 (now ENEE704), “Physics and Simulation of Semiconductor Devices,” Fall 2000, under Dr. Neil Goldsman.

PROFESSIONAL AND EXTRA-CURRICULAR ACTIVITIES

1. Member of the Steering Committee (proceedings co-editor), International Semiconductor Device Research Symposium (ISDRS) 2009.
2. Served as a reviewer for the following international technical publications:
 - a. *Microelectronics Engineering*, Elsevier.
 - b. *Transactions on Circuits and Devices*, IEEE.
 - c. *Solid State Electronics*, IEEE.
 - d. *Materials Science & Engineering B*, Elsevier.
3. Served as a reviewer for the following international conferences:
 - a. *International Semiconductor Device Research Symposium (ISDRS)*, IEEE, 2009.
 - b. *Frontiers in Education*, IEEE, 2003, 2005, 2009, 2011.
 - c. *IEEE Engineering Education (EDUCON)*, 2010, 2011.
4. Member of the IEEE for 1996-1998 and continuously since 1999.
5. Member of the Philosophical Society of Washington since 2011.
6. Nov. 1996-May 1998: Secretary, then President of Bilkent University IEEE Student Branch.
7. Aug. 1997-May 1998: Communications Unit Head, Bilkent University International Students’ Club.

RESEARCH PROJECTS

- A novel ruthenium oxide-based rechargeable electrochemical battery: the battery chemistry, structure, packaging, and manufacturing techniques
- The world’s first self-powering SOI three-dimensionally integrated circuit: development, design and testing
- Energy harvesting systems, including photovoltaic systems and rectifying antennas
- Power management systems for low-voltage batteries
- Physics of integrated circuits, including:
 - RF-induced errors in digital and analog integrated circuits, semiconductor devices and board-level circuits, including circuit development for reliability testing
 - Thermal effects in integrated circuits, modeling and targeted design for heat generation and dissipation
 - Modeling 3-D on-chip interconnect networks and the development of an efficient transient spatially-dependent Green’s Function approach
- An embedded microprocessor-based system for tracking fire/rescue personnel indoors and enhancing wireless sensor network system features
- Optical waveguides and electro-optical devices, including:

- Development of a passive-active resonant coupling platform for monolithic integration of optoelectronic devices, including lossless Y-splitters

TECHNICAL EXPERTISE

- Cleanroom semiconductor device processing
- Thin-film battery prototype manufacturing
- Automated and manual data acquisition and analysis
- Numerical modeling and computation
- Integrated circuit design and layout (Cadence, LASI, P-SPICE, Spectre)
- Programming languages: C, MATLAB
- Embedded system programming
- Optics CAD programs (Code V, BPM-CAD)

PERSONAL INFORMATION AND SKILLS

Languages: Turkish, English

Selected Social Activities and Personal Interests:

- Classical and early music,
 - Performance with the piano and the recorder
 - Member of the Saturday Morning Quartet (early Baroque/Renaissance chamber music)
 - Member of Three Left Feet and Playford Spice (mediaeval-Renaissance country dance music)
- Literature and translation,
 - Translated the novel “The Dream-Broken” (“Düş Kırğınları”) by Mehmet Eroğlu, upon the author’s request in 2007
- Ballroom dancing,
 - Member of the Centuries Historical Dance performance troupe.