**Jack C. Lee**
Professor and Cullen Trust for Higher Education Endowed Professorship in Engineering # 4, Electrical and Computer Engineering Department
The University of Texas at Austin

**Current Employer**
Department of Electrical and Computer Engineering
The University of Texas at Austin

**Research / teaching experience and expertise:**

- Integrated circuits manufacturing
- Photovoltaic/solar cell technologies
- Alternative channel devices
- Dielectric and passivation processes
- Display technologies
- Semiconductor memory devices

**Education**

9/84 – 8/88 Ph.D., Electrical Engineering, University of California at Berkeley
9/80 – 12/81 M.S., Electrical Engineering, University of California at Los Angeles
9/76 – 6/80 B.S., Electrical Engineering (with highest honors), University of California at Los Angeles

**Professional Career**

9/00 – present Cullen Trust for Higher Education Endowed Professorship in Engineering #4
Department of Electrical and Computer Engineering
The University of Texas at Austin
9/96 – present Professor, Department of Electrical and Computer Engineering
The University of Texas at Austin
9/92 – 8/96 Associate Professor, Department of Electrical and Computer Engineering
The University of Texas at Austin
9/88 – 8/92 Assistant Professor, Department of Electrical and Computer Engineering
The University of Texas at Austin
1/88 – 6/88 Lecturer, Electrical Engineering and Computer Science Department
University of California at Berkeley
6/79 – 8/84 Member of Technical Staff, High-Speed Bipolar Device Program
TRW Microelectronics Center, Redondo Beach, CA

**Honors and Awards**

IEEE Electron Devices Society Distinguished Lecturer, 2004 - 2016.
Fellow, The Institute of Electrical and Electronic Engineers (IEEE), 2002 "For contributions to the understanding and development of ultra-thin dielectrics and their application to silicon devices"
Gordon Lepley IV Endowed Memorial Teaching Award, ECE Department, The University of Texas at Austin, 2004
Cullen Trust For Higher Education Endowed Professorship in Engineering, 2000-present
Dean's Fellow, College of Engineering, The University of Texas at Austin, 1999, 2003
Lockheed Fort-Worth Division Award for Excellence in Engineering Teaching, College of Engineering, The University of Texas at Austin, 1996

Award of Excellence, Halliburton Foundation, 1993
Departmental Teaching Award, College of Engineering, The University of Texas at Austin, 1993
SRC Inventor Recognition Award, Semiconductor Research Corporation, 1991
Hughes Aircraft Company Endowed Faculty Fellowship in Engineering, The University of Texas at Austin, 1991- 2000
Outstanding Engineering Teaching by an Assistant Professor, College of Engineering, The University of Texas at Austin, 1991
Best Paper Award, SEMATECH Centers of Excellence Coordination Meeting, 1990.
Dow Outstanding Young Faculty Award, American Society for Engineering Education, 1990
Engineering Research Initiation Award, Engineering Foundation of the United Engineering Trustees, 1989
Best Paper Award, IEEE International Reliability Physics Symposium, 1988

**Litigation Experience as Testifying Experts**
The following is a list of cases in which I have provided expert testimony, including through a declaration, report or testimony at deposition or trial since 2015

- The Trustees of Purdue University v. Wolfspeed, Inc.
  February 2022 -
  (Representing defendant, Wolfspeed)

- GlobalFoundries - IPR
  March 2021 –
  (Representing defendant and filed an IPR declaration)

- HD Silicon Solutions LLC v. Microchip Technology Inc.
  January 2021 –
  (Representing defendant, Microchip Technology Inc.)

- Impinj, Inc. v. NXP USA, Inc.
  September 2019 –
  (Representing defendant, NXP USA, Inc.)

- Monterey Research, LLC v. Qualcomm Inc.
  February 2020 – May 2022
  (Representing defendant, Qualcomm)

- Bell Semiconductor, LLC v. Texas Instruments Incorporated
  July 2020 – March 2021
  (Representing defendant, Texas Instruments)

- Greenthread LLC v. Samsung
  February 2020 – July 2020
  (Representing plaintiff, Greenthread LLC)

- MLC Intellectual Property LLC vs. Micron Technology, Inc.,
  June 2016 –
  (Representing plaintiff, MLC Intellectual Property LLC)

- Hanwha v. LONGi Solar Technology
  April 2019 – June 2020
  (Representing defendant LONGi Solar Technology)

- Vista Peak Ventures, LLC v. Innolux Corp.
  January 2019 – March 2019
  (Representing IPR Petitioner, Innolux Corp.)

- Home Semiconductor Corp. v. Samsung
  August 2018 – June 2020
  (Representing plaintiff, Home Semiconductor Corp.)

- Mariner IC Inc. v. Asustek Computer Inc.
  May 2018 -
  (Representing plaintiff, Mariner IC Inc.)

- Godo Kaisha IP Bridge 1 v. OmniVision Technologies, Inc.
  January 2018 – December 2018
  (Representing defendant, OmniVision Technologies, Inc.)

- Macronix v. Toshiba
  May 2017 – February 2018
  (Representing defendant, Toshiba)

- University of Illinois v. Micron Technology
  September 2009 – November 2017
  (Representing plaintiff, Univ. of Illinois)

- Silicon Genesis v. Soitec
  October 2016 – March 2017
  (Representing plaintiff, Silicon Genesis)

- Samsung Electronics v. NVIDIA Corporation,
  January 2015 – April 2016
  (Representing defendant, NVIDIA)

- Macronix, Inc. v. Spansion, Inc.
  September 2014 – January 2015
  (Representing defendant, Spansion, Inc.)

**Non-Litigation Consulting**

- Applied Materials, Inc.
  Teaching short courses on semiconductor physics, devices, design/layout, and fabrication technologies (2-3 courses per year).

**Jack C. Lee** is a Professor of the Electrical and Computer Engineering Department and holds the Cullen Trust for Higher Education Endowed Professorship in Engineering # 4 at The University of Texas at Austin. He received the B.S. and M.S. degrees in electrical engineering from University of California, Los Angeles, in 1980 and 1981, respectively; and the Ph.D. degree in electrical engineering from University of California, Berkeley, in 1988. From 1979 to 1984, he was a Member of Technical Staff at the TRW Microelectronics Center, CA, in the High-Speed Bipolar Device Program. He worked on bipolar device and circuit design, fabrication and testing. In 1988, he joined the faculty of The University of Texas at Austin. His current research interests include semiconductor devices including 3D structures such as FinFETs, fabrication processes, characterization and modeling, dielectric process, characterization and reliability, high-K gate dielectrics and electrode, semiconductor memory applications, and alternative channel materials. Dr. Lee has over 35 years of experience in semiconductor technology and dielectric processing. He has published over 600 journal publications and conference proceedings and 9 patents; and co-authored 8 book and book chapters. He has also been recognized with many teaching and research awards. Dr. Lee is a Fellow of IEEE and had been a Distinguished Lecturer for the IEEE Electron Devices Society.

**Publications**
**Jack C. Lee**
**Refereed Journal Publications**

1. J. Lee, K. Mayaram and C. Hu, "A Theoretical Study of Gate/Drain Offset in LDD MOSFET's," IEEE Electron Device Letters, vol. EDL-7, no. 3, p. 152 - 154, March 1986.

2. J. Lee, I-C Chen and C. Hu, "Comparison Between CVD and Thermal Oxide Dielectric Integrity," IEEE Electron Device Letters, vol. EDL-7, no. 9, p. 506 - 509, September 1986.

3. K. Mayaram, J. Lee and C. Hu, "A Model for the Electric Field in Lightly Doped Drain Structures," IEEE Transactions on Electron Devices, vol. ED-34, no.7, p. 1509 - 1518, July 1987.

4. J. Lee and C. Hu, "Polarity Asymmetry of Oxides Grown on Polycrystalline Silicon," IEEE Transactions on Electron Devices, vol. ED-35, no. 7, p. 1063 - 1070, July 1988.

5. J. Lee, C. Hegarty and C. Hu, "Electrical Characteristics of MOSFET's Using Low-Pressure Chemical Vapor Deposited Oxide," IEEE Electron Device Letters, vol. EDL-9, no. 7, p. 324 - 327, July 1988.

6. J. Lee, I-C Chen and C. Hu, "Modeling and Characterization of Gate Oxide Reliability," Special Issue of IEEE Transactions on Electron Devices on Reliability, Vol. ED-35, no. 12, p. 2268 - 2278, December 1988.

7. H. Hwang, W. Ting, D. L. Kwong, J. Lee, L. Buhrow and R. Bowling, "Electrical Characteristics of Reoxidized-nitrided CVD Oxide," Applied Physics Letters, 55(8), p. 755 - 756, 21 August, 1989.

8. R. Moazzami, J. Lee and C. Hu, "Temperature Acceleration of Time-Dependent Dielectric Breakdown," Special issue of IEEE Transactions on Electron Devices on Vacuum Microelectronic Devices, vol. ED-36, no. 11, p. 2462 - 2465, November 1989.

9. H. Hwang, W. Ting, D.L. Kwong, J. Lee, L. Buhrow and R.A. Bowling, "Effects of Dynamic Stressing on Nitrided and Reoxidized-Nitrided Chemical Vapor Deposited Gate Oxides," IEEE Electron Device Letters, vol. EDL-10, no. 12, p. 568 - 570, December 1989.

10. J. Lin, S. Banerjee, J. Lee, and C. Teng, "Soft Breakdown in Titanium-Silicided Shallow Source/Drain Junction," IEEE Electron Device Letters, vol. EDL-11, no. 5, p. 191 - 193, May 1990.

11. K. Park, S. Batra, J. Lin, S. Yoganathan, J. Lee, S. Banerjee, S. Sun, J. Yeargain, and G. Lux, "Anomalous Capacitance-Voltage Behavior Due to Dopant Segregation and

Carrier Trapping in Arsenic-Implanted Polysilicon and Polycide Gates," Applied Physics Letters, vol. 56, no. 23, p.2325 - 2327, June 4, 1990.

12. J. Lin, S. Banerjee, J. Lee, and C. Teng, "Anomalous Current-Voltage Behavior in Titanium-Silicided Source/Drain Junctions," Journal of Applied Physics, vol. 68, no. 3, p. 1082 - 1087, August 1, 1990.

13. H. Hwang, W. Ting, B. Maiti, D.L. Kwong and J. Lee, "Electrical Characteristics of Ultrathin Gate Dielectrics Prepared by Rapid Thermal Oxidation of Si in $N_2O$," Applied Physics Letters, vol. 57, no. 10, p. 1010 - 1011, Sept. 3, 1990.

14. S. Batra, K. Park, J. Lin, S. Yoganathan, J. Lee, S. Banerjee, S. Sun, J. Yeargain and G. Lux "Effects of Dopant Redistribution, Segregation and Carrier Trapping in As-Implanted MOS Gates," IEEE Transactions on Electron Devices, vol. 37, no. 11, p. 2322 - 2330, October, 1990.

15. S. Bhattacharya, S. Banerjee, J. Lee, A. Tasch and A. Chatterjee, "The Impact of Trench Isolation on Latch-up Immunity in Bulk, Non-epitaxial CMOS," IEEE Electron Device Letters, vol. EDL-12, no. 2, p. 77 - 79, February, 1991.

16. W. Ting, H. Hwang, J. Lee and D. L. Kwong, "Composition and Growth Kinetics of Ultrathin $SiO_2$ Films Formed by Oxidizing Si Substrate in $N_2O$," Applied Physics Letters, vol. 57, p. 2808 - 2810, 1990.

17. W. Ting, P.C. Li, G. Q. Lo, J. Lee and D.L. Kwong, "Metal-Oxide Semiconductor Characteristics of Rapid Thermal Processed Chemical Vapor Deposited $SiO_2$ Gate Dielectrics," Solid State Electronics, vol. 34, no. 4, p 385 - 388, 1991.

18. W. Ting, H. Hwang, J. Lee and D.L. Kwong, "Growth Kinetics of Ultrathin $SiO_2$ Films Prepared by Rapid Thermal Oxidation of Si Substrates in $N_2O$," Journal of Applied Physics, vol. 70, no. 2, p. 1072 - 1074, July 15, 1991.

19. J. Lin, K. Park, S. Batra, S. Banerjee, J. Lee and G. Lux, "Enhancement of Boron Diffusion Through Gate Oxides in MOS Devices During Rapid Thermal Silicidation," Applied Physics Letters, vol. 58, no. 19, p. 2123 - 2125, May 1991.

20. H. Hwang, W. Ting, D. L. Kwong and J. Lee, "A Physical Model for Boron Penetration Through Oxynitride Gate Dielectric Prepared by Rapid Thermal Processing in $N_2O$," Applied Physics Letters, vol. 59, no. 13, p. 1581 - 1582, September 23, 1991.

21. H. Hwang, W. Ting, D. L. Kwong and J. Lee, "Improved Reliability Characteristics of Submicron nMOSFET's with Oxynitride Gate Dielectrics Prepared by Rapid Thermal Oxidation in $N_2O$," IEEE Electron Device Letters, vol. 12, no.9, p.495-497, September 1991.

22. J. Carrano, C. Sudhama, V. Chikarmane, J. Lee, A. Tasch, W. Shepherd and N. Abt, "Electrical and Reliability Properties of PZT Thin Films for ULSI DRAM Applications," IEEE Transactions on Ultrasonics, Ferroelectrics and Frequency Control, vol. 38, no. 6, p. 690 - 703, November 1991.

23. V. Chikarmane, C. Sudhama, J. Kim, J. Lee, A. Tasch and S. Novak, "Comparative Study of The Perovskite Phase Microstructure Evolution and Electrial Properties of PZT Thin Film Capacitors Annealed in Oxygen and Nitrogen Ambients," Applied Physics Letters, vol. 59, no. 22, p. 2850 - 2852, Nov. 25, 1991.

24. M. Hao and J. Lee, "Electrical Characteristics of Oxynitrides Grown on Textured Single-Crystal Silicon," Applied Physics Letters, vol. 60, no. 4, p. 445 - 447, January 27, 1992 .

25. S. Bhattacharya, S. Banerjee, J. Lee, A. Tasch and A. Chatterjee, "Parametric Study of Latchup-Immunity of Deep Trench-Isolated, Bulk, Non-epitaxial CMOS," IEEE Trans. Elec. Dev., vol. 39, no. 4, p. 921 - 931, April 1992.

26. V. Chikarmane, J. Kim, C. Sudhama, J. Lee and A. Tasch, "Annealing of Lead Zirconate Titanate (65/35) Thin Films for Storage Dielectric Applications: Phase Transformations and Electrical Characteristics," Journal of Electronic Materials, vol. 21, no. 5, p. 503 - 512, May 1992.

27. V. Chikarmane, C. Sudhama, J. Kim, J. Lee and A. Tasch, "Effects of Post-Deposition Annealing Ambient on the Electrical Characteristics and Phase Transformation Kinetics of Sputtered Lead Zirconate titanate (65/35) Thin Film Capacitors," Journal of Vacuum Science and Technology, vol. 10, no. 4, p. 1562 - 1568, July 1992.

28. V.K. Mathews, R. L. Maddox, P.C. Fazan, J. Rosato, H. Hwang and J. Lee, "Degradation of Junction Leakage in Devices Subjected to Gate Oxidation in Nitrous Oxide," IEEE Electron Device Letters, vol. 13, no. 12, p. 648 - 650, Dec. 1992.

29. B. Maiti, M. Hao, I. Lee and J. Lee,"Improved Ultrathin Oxynitride Formed by Thermal Nitridation and Low Pressure Chemical Vapor Deposition Process," Applied Physics Letters, vol. 61, p. 1790 - 1792, 1992.

30. B. Maiti and J. Lee, "Low-Pressure Chemical Vapor Deposited Silicon-Rich Oxides for Non-volatile Memory Applications," IEEE Electron Device Letters, vol. 13, no. 12, p. 624 - 626, Dec. 1992.

31. H. Hwang, M. Y. Hao, J. Lee, V. Mathews, P. Fazan and C. Dennison, "Furnace $N_2O$ Oxidation Process for Submicron MOSFET Device Applications," Solid-State Electronics, vol. 36, p. 749 - 751, 1993.

32. H. Hwang, J. Lee, P. Fazan and C. Dennison, "Hot-Carrier Reliability Characteristics of Narrow Width MOSFETs," Solid-State Electronics, Vol. 36, No. 4, p. 665 - 666, 1993.

33. B. Maiti and J. Lee, "A New Low-Thermal Budget Process for Ultrathin Oxynitride Dielectrics," Journal of Electronic Materials, 1992.

34. J. Lin, W. Chen, S. Banerjee and J. Lee, "Cobalt Disilicide as a Dopant Diffusion Source for Polysilicon Gates in MOS Devices," Journal of Electronic Materials, vol. 22, p. 667 - 673, 1993.

35. W. Chen, J. Lin, S. Banerjee and J. Lee, "Thermal Stability and Dopant Drive-Out Characteristics of $CoSi_2$ Polycide Gates," Journal of Applied Physics, vol. 73, p. 4712 - 4714, May 1993.

36. J. Lee, V. Chikarmane, C. Sudhama, and J. Kim, "Sputtered PZT Thin Films for Memory Applications," Journal of Integrated Ferroelectrics, vol. 3, 1993.

37. C. Sudhama, J. Kim, J. Lee, W. Shepherd and E. Meyer, "The Effects of Lanthanum Doping on the Electrical Properties of Sol-Gel Derived Ferroelectric Lead Zirconate Titanate (PZT) for ULSI DRAM Applications," Journal of Vacuum Science and Technology, p. 1302 - 1309, July / Aug 1993.

38. M. Y. Hao, H. Hwang and J. Lee, "Silicon-Implanted SiO2 for Non-volatile Memory Applications," Solid-State Electronics, vol. 36, p. 1321 - 1324, 1993.

39. M. Y. Hao, H. Hwang and J. Lee, "Memory Effects of Silicon-Implanted Oxides for EEPROM Applications," Applied Physics Letters, vol. 62, No. 13, p. 1530 - 1532, March 1993.

40. S. Batra, K. Picone, K. Park, S. Bhattacharya, S. Banerjee, J. Lee, M. Manning and C. Dennison, "Study of Lateral Non-Uniformity as a Function of Junction Depth in Ultra-Shallow Junctions and Its Effects on Leakage Behavior in As-Deposited Polycrystalline Si and Amorphous Si Diodes," Solid-State Electronics vol. 36, no. 7, p. 955 - 960, 1993.

41. J. Lee, C. Sudhama, J. Kim and R. Khamankar, (Invited Paper) "High Dielectric Constant Ferroelectric Thin Films for DRAM Applications", Extended Abstracts of International Conf. on Solid State Devices and Materials, p. 850 - 852, 1993.

42. W. M. Chen, S. K. Banerjee, and J. C. Lee," Degradation mechanism and improvement of thermal stability of $CoSi_2$/polycrystalline Si layers," Applied Physics Letters, vol. 64, no. 12, p. 1505 - 1507, 1994.

43. W. M. Chen, J. Lin, S. K. Banerjee, and J. C. Lee," Simultaneous Shallow-Junction Formation and Gate Doping p-channel Metal-Semiconductor-Oxide Field-Effect

Transistor Process Using Cobalt Silicide as a Diffusion/Doping Source," Applied Physics Letters, vol. 64, no. 3, p. 345 - 347, 1994.

44. M. Y. Hao, B. Maiti, and J. Lee," Novel Process for Reliable Ultrathin Tunnel Dielectrics," Appl. Phys. Lett., vol.. 64, p. 2102 - 2104, April 1994.

45. B. Jiang, C. Sudhama, R. Khamankar, J. Kim and J. Lee, "Effects of Nonlinear Storage Capacitor on DRAM READ/WRITE," IEEE Electron Device Letters, vol. 15, no. 4, p.126 - 128, April 1994.

46. J. Kim, C. Sudhama, R. Khamankar, B. Jiang, J. Lee, P. Maniar, R. Moazzami, R. Jones and C. J. Mogab, "La Doped PZT Thin Films for Gigabit DRAM Technology," 1994 Symposium on VLSI Tech. Digest, p. 151 - 152, 1994.

47. M. Y. Hao, K. Lai, W. M. Chen, and J. Lee, " Surface Cleaning Effect on Dielectric Integrity for Ultrathin Oxynitrides Grown in $N_2O$," Applied Physics Letters, vol. 65, no. 9, p. 1133 - 1135, August 1994.

48. K. Lai, M. Y. Hao, C. Y. Hu, W. M. Chen, and J. Lee, " Effects of Surface Preparation on the Electrical and Reliability Properties of Ultrathin Thermal Oxide," IEEE Electron Device Letters, vol. ED-15, no. 11, p. 446 - 448, November, 1994.

49. M. Y. Hao, W. M. Chen, K. Lai, M. Gardner, J. Fulford, and J. Lee, "Correlation of Dielectric Breakdown with Hole Transport for Ultrathin Thermal Oxides and $N_2O$ Oxynitrides," Applied Physics Letters, vol. 66, no. 9, p. 1126 - 1128, February 27, 1995.

50. R. Khamankar, J. Kim, C. Sudhama, B. Jiang, and J. Lee, "Effects of Electrical Stress Parameters on Polarization Loss in Ferroelectric PZT Thin Film Capacitors," Electron Device Letter, p. 130 - 132, April 1995.

51. J. Lee, B. Jiang, R. Khamankar, and J. Kim, "Nonlinearity of Ferroelectric Capacitors on DRAM R/W Operations," Integrated Ferroelectrics, p. 319 - 328, 1995.

52. W. M. Chen, M. Y. Hao, K. Lai, M. Gardner, J. Fulford, and J. Lee, " 'Turn-around' Effects of Stress-Induced Leakage Current of Ultrathin $N_2O$-Annealed Oxides," Applied Physics Letters, vol. 67, No. 5, p. 1 - 3, July 1995.

53. Kafai Lai, Wei-Ming Chen, Ming-Yin Hao, Mark Gardner, Jim Fulford, Jack C. Lee, "'Turn-around' effects of stress-induced leakage current of ultrathin $N_2O$-annealed oxides", Applied Physics Letters, vol. 67, no. 5, p. 673-5, Jul. 31, 1995.

54. Kafai Lai, Kiran Kumar, Anthony I. Chou, and Jack C. Lee, "Plasma damage and photo-annealing effects of thin gate oxides and oxynitrides during $O_2$ plasma exposure", IEEE Elec. Dev. Lett., vol. 17, no. 3, p. 82, Mar. 1996.

55. Anthony I. Chou, Kafai Lai, Kiran Kumar, Mark Gardner, Jim Fulford, and Jack C. Lee, "Optimization of gate dopant concentration and microstructure for improved electrical and reliability characteristics of ultrathin oxides and $N_2O$-oxynitrides", Applied Physics Letters, vol. 69, no. 7, p. 934, Aug. 12, 1996.

56 C. Lin, A. Chou, K. Kumar, P. Chowdhury, and J. C. Lee, "Effect of $BF_2$ implantation on ultra-thin gate oxide reliability" Appl. Phys. Lett., vol. 69, no. 11, p1591, Sep. 1996.

57. C. Lin, A. Chou, K. Kumar, P. Chowdhury, and J. C. Lee, "Reliability of gate oxide grown on nitrogen-implanted Si substrate" Appl. Phys. Lett. Vol. 69, No. 24, 9 Dec. 1996.

58. K. Kumar, A. Chou, C. Lin, P. Choudhury, and J. C. Lee, "Optimization of sub 3 nm gate dielectrics grown by rapid thermal oxidation in a nitric oxide ambient", Appl. Phys. Lett. 70 (3), 20 January 1997.

59. Prasenjit Chowdhury, Anthony I. Chou, Kiran Kumar, Chuan Lin and Jack C. Lee, "Improvement of Ultra-Thin Gate Oxide and Oxynitirde Integrity Using Fluorine Implantation Techniques," Applied Physics Letters 70 (1), January 6, 1997.

60. A. Chou, K. Lai, K. Kumar, P. Chowdhury and J. Lee, "Modeling of Stress-Induced Leakage Current in Ultra-Thin Oxide with the Trap Assisted Tunneling Mechanism," Applied Physics Lettes, vol. 70, no. 25, Pg. 3407, June 23, 1997.

61. Byoung Hun Lee, Yongjoo Jeon,Keith Zawadzki, Wen-Jie Qi and Jack C. Lee, "Effect of interfacial layer growth on the electrical characteristics of thin titanium oxide films on silicon", Appl. Phys. Lett. Vol. 74, p. 3143, 1999.

62. Tung-Sheng Chen, Venkatasubramani Balu, Shylaja Katakam, Jian-Hung Lee and Jack C. Lee, “Effects of Ir Electrodes on BST Thin Film Capacitors for High-Density Memory Application” IEEE Transactions on Electron Devices vol. 46, no. 12, p. 2304, Dec. 1999.

63. Jian-Hung Lee, Razak Mohammedali, Venkatasubramani Balu, Jeong Hee Han, Sundar Gopalan, Chun-Hui Wong and Jack C. Lee “The Niobium Doping Effects on Resistance Degradation of Strontium Titanate Thin Film Capacitors”, Applied Physics Letters, vol. 75, no. 10, p. 1455, September 6, 1999.

64. Sundar Gopalan, Chun-Hui Wong, Venkatasubramani Balu, Jian-Hung Lee, Jeong Hee Han, Razak Mohammedali, and Jack C. Lee, “Effects of Nb Doping on the Microstructure and Electrical Properties of Strontium Titanates Thin Films for Semiconductor Memory Applications”, Applied Physics Letters, vol. 75, no. 14, p. 2123, October 4, 1999.

65. T. Ngai, W. Qi, R. Sharma, J. Fretwell, X. Chen, J. Lee and S. Banerjee, "Electrical Properties of $ZrO_2$ Gate Dielectric on SiGe," Applied Physics Letters, vol. 76, no. 4, p. 502, January 24, 2000.

66. Laegu Kang, Byoung Hun Lee, Wen-Jie Qi, Yongjoo Jeon, Renee Nieh, Sundar Gopalan, Katsunori Onishi, and Jack C. Lee," Electrical Characteristics of Highly Reliable Ultra-Thin Hafnium Oxide Gate Dielectric," IEEE Electron Dev. Lett., vol. 21, 4, p.181, 2000.

67. Byoung Hun Lee, Laegu Kang, Renee Nieh, Wen-Jie Qi, and Jack C. Lee, "Thermal stability and electrical characteristics of Hafnium oxide gate dielectric reoxidized with rapid thermal annealing", Appl. Phys. Lett., 76, p.1926, 2000.

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69. Wen-Jie Qi, Renee Nieh, Easwar Dharmarajan, Byoung Hun Lee, Yongjoo Jeon, Laegu Kang, Katsunori Onishi, and Jack C. Lee, "Ultrathin zirconium silicate film with good thermal stability for alternative gate dielectric applications", Appl. Phys. Lett., vol. 77, no.11, p. 1704-1706, Sept. 2000.

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73. H. Cho, C. Kang, K. Onishi, S. Gopalan, R. Nieh, R. Choi, S. Krishnan and Jack Lee, "Structural and Electrical Properties of $HfO_2$ with Top Nitrogen Incorporated Layer," IEEE Electron Device Letters, vol. 23, no. 5, p. 249, May 2002.

74. S. Gopalan, K. Onishi, R. Nieh, C. Kang, R. Choi, J. Cho, S. Krishnan, and J. Lee, "Electrical and Physical Characteristics of Ultrathin Hafnium Silicate Films with Polycrystalline Silicon and TaN Gates," Applied Physics Letters, vol. 80, no. 23, p. 4416, June 10, 2002.

75. R. Nieh, R. Choi, S. Gopalan, K. Onishi, C. Kang, H. Cho, S. Krishnan and J. Lee, "Evaluation of Silicon Surface Nitridation Effects on Ultra-thin ZrO2 Gate Dielectrics," Applied Physics Letters, vol. 81, no. 9, p. 1663, August 26, 2002.

76. Chang Seok Kang, Hag-Ju Cho, Katsunori Onishi, Renee Nieh, Rino Choi, Sundar Gopalan, Sid Krishnan, Jeong H. Han, and Jack C. Lee, "Bonding states and electrical properties of ultrathin HfOxNy gate dielectrics", Appl. Phys. Lett. 81, p2593, September 30, 2002.

77. Chang Seok Kang, Katsunori Onishi, Laegu Kang, and Jack C. Lee, "Effects of Hf contamination on the properties of silicon oxide metal--oxide--semiconductor devices", Appl. Phys. Lett. 81, p5018, December 23, 2002.

78. Y. Kim, K. Onishi, C. Kang, H. Cho, R. Nieh, S. Gopalan, R. Choi, J. Han, S. Krishnan, and J. Lee, "Area Dependence of TDDB Characteristics for $HfO_2$ Gate Dielectrics," IEEE Electron Devices Letters, vol. 23, no. 10, p. 594, October 2002.

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80. S. Mudanai, F. Li, S. Samavedam, R. Tobin, C. Kang, R. Nieh, L. Register, J. Lee, and S. Banerjee, "Interfacial Defect States in HfO2 and ZrO2 nMOS Capacitor," IEEE Electron Devices Letters, vol. 23, no. 12, p. 728, December 2002.

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