Curriculum Vitae for

James G. Cottle, Ph.D.

Spring 2016

Curriculum Vitae

James G. Cottle, Ph.D.

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Personal Brief:

I am a US-Citizen with a wide background and experience in all main sectors of engineering employment - university, industry and government. In 1994 I relocated to San Francisco and after a year at UCal-Berkeley was forced to leave teaching to facilitate my move. Missing teaching and my interaction with students, in spring of 2016 I returned to teaching electrical engineering at California State University, Sacramento (CSUS). When in industry, I pride myself as a facilitative manager with best practices leading/facilitating small, highly trained technical professionals. When teaching, I strive for non-traditional pedagogy, active student participation and close student interaction.

Education:

1983 B.S.	University of South Florida	Electrical Engineering
1983 M.S.	University of South Florida	Electrical Engineering
1987 Ph.D.	University of South Florida	Electrical Engineering

Professional Academic Experience:

California State Univ. - Sacramento	Professor (EEE)	2016 - present
Univ. of California - Berkeley	Visiting Assoc. Prof. (EECS)	1995-1996
University of South Florida - Tampa	Assoc. Professor (EE)(Tenure Awarded in 1992)	1992-1996
University of South Florida - Tampa	Assistant Professor (EE)	1986-1992
University of South Florida - Tampa	Research Assistant/Instructor (EE)	1983-1986

Professional Industrial Experience:

Dolby Laboratories San Francisco, CA	Manager - LS&TD Licensing Standards and Test Development	2003-2007
Agilent Technologies Santa Clara, CA	Manager - High Speed Analog IC Design	2002-2003
Agilent Technologies Santa Clara, CA	Manager - Agilent Optical Switch Reliability	2001-2002
Agilent Technologies / (HP) Palo Alto, CA	Manager - Reliability Physics Integrated Circuit Business Division (ICBD)	1996-2001
Harris Corporation Melbourne, FL	Analog Device Engineer - Semiconductor Sector	1984
NASA John F. Kennedy Space Center	Design Engineering Trainee Ground Support Equipment Apollo/Saturn V Program	1970-1973

Research Interests:

Formal:

Solid State Materials & Devices, Noise and Fluctuation Phenomena, Low Noise Electronic Design, Process Development for High Reliability VLSI, Thick and Thin Films, Reliability Physics, Solid State Modeling, Computer-Enchanced Instrumentation

Informal:

Variable Star Photometry - American Association of Variable Star Observers (AAVSO), Cataclismic Variable Stars and Outbursts, Novae and SuperNovae - Center for Backyard Astrophysics, Columbia University, NY, RF Propagation and LF, MF and HF radio, Licensed since 1964 by Federal Communications Commission, FCC Volunteer Examiner (VE-ARRL & W5YI acceditation)

Professional Membership and Honors:

- Member of Management Committee, IEEE Intl. Rel. Physics Symp. (IRPS), 1992 through 1996
- Vice Chair - Technical Program Committee on Metallization, 1991, 1992, 1993 IEEE IRPS
- Recipient of USF President's Council Faculty Award in Research 1987
- Outstanding Master's Thesis Award (USF Sigma-Xi - 1983)
- Member: Institute of Electrical and Electronics Engineers (IEEE), International Society of Hybrid Microelectronics (ISHM), Tau Beta Pi, Sigma Xi, Audio Engineering Society (AES), Past Member: The Metallurgical Society (TMS), American Physical Society (APS), Society of Motion Picture and Television Engineers (SMPTE) and American Society for Engineering Education (ASEE)

Academic Administrative Experience:

- Chairman - USF Electrical Engineering Undergraduate Advising. Responsibility for establishing undergraduate advising policy, delegation of advising responsibility to committee members, holding review meetings and scheduling on-going, pro-active approach to undergraduate advising at the Electrical Engineering Department of the University of South Florida (1990-1995).
- USF EE Department Library Committee Liason. Responsibility for all permanent acquisitions in the University of South Florida Library purchased by Electrical Engineering funds (1990 to 1995).
- College of Engineering Faculty Governance Committee Member. Advise the Dean of the College on matters of Tenure, Discipline, Merit Raises, Teaching Incentive Awards and miscellaneous matters associated with the Faculty of the College of Engineering.
- Finance Chair - 1994-95 IEEE International Reliability Physics Symposium. Managed budgets for Symposium. Responsibility for budget projections, managment of symposium expenses and audits for Symposium (approximate budget $300K).

Consulting Experience:

- Consultant for Micro Instrument Systems, Escondido, CA, 2001.
- Consultant for Digital Equipment Corporation (DEC), Hudson, MA, 1994.
- Consultant for Advanced Micro Devices (AMD), Sunnyvale, CA, 1992.
- Consultant for AT & T Bell Laboratories, Murray Hill, NJ, 1989.

Teaching Experience:

Undergraduate Courses	Graduate Courses
University of South Florida:[a]	
EGN 3373 Introduction to Electrical Systems I	EEL 5937 VLSI Reliability
EGN 3374 Introduction to Electrical Systems II	EEL 5937 Low Noise Electronic Design
EEL 3302 Electronics I	
EEL 4305 Electronics II	(the above were developed by Prof. Cottle for USF)
EEL 4351 Semiconductor Devices[b]	
EEL 4744 Principles of Microprocessors[b c]	
University of California-Berkeley:[d]	
EECS 131 Semiconductor Electronics	
EECS 130 Integrated Circuit Devices	
California State University-Sacramento:[e]	
EEE 180 Signals and Systems	

[a] In the Florida system, courses beginning with a 3 & 4 indicate junior & senior undergraduate, respectively.
[b] Supplementary study guides were published for student use in these courses.
[c] Non-traditional pedagogical methods were developed for use in this course including in-class, guided design
[d] Invited by ChenMing C. Hu to teach at UC-Berkeley while on sabbatical
[e] Professor since spring 2016

Graduate Student Supervision:

A. **Ph.D. Students and Dissertations** (served as major professor or committee member on the following Ph.D. student committees)

1. H.Hickman, "Low Frequency Electrical Noise in Bulk $YBa_2Cu_3O_7$", (December, 1989).
2. T. L. Crandell,"Characterization and Modeling of $\frac{1}{f}$ Noise in Polysilicon Emitter Bipolar Transistors", (August 1990).
3. L. M. Head, "The Prediction of Electromigration in VLSI Circuits Using Noise Measurements as a Tool", (January 1991).
4. N. S. Klonaris, "Effects of Stress on the Noise Signature of VLSI Interconnections", (May 1995), Principal Advisor.

B. **M.S. Students and Theses** (served as major professor of the following graduate students)

1. G. M. Gutt, "An Automated Noise Measurement System for Packaged VLSI Metal Thin Films", (August 1989).
2. M. L. Dreyer, "A Statistical Approach to $\frac{1}{f^2}$ Noise Measurements in Thin Metal Films", (August 1989).
3. N. S. Klonaris, "Excess Noise Measurements in VLSI Interconnections Using a Dual Frequency AC Bridge Method",(December 1990).
4. Omar Ksaibati, "Characterization of Resistance Drift in Passivated AlSiCu VLSI Interconnections",(December 1994).
5. J. Swiatkowski, non-thesis program advisor (April 1992).
6. A. Hege, non-thesis program advisor (April 1992).

Research Publications:

A. Research Papers in Refereed Journals and Conference Proceedings

1. "Electrical Noise and Reliability", an invited paper in preparation for submission, *IEEE Circuits and Devices Magazine*.
2. "Effects of electro and stress migration forces on the $\frac{1}{f}$ noise of patterned thin metal films", *Thin Solid Films*, (1994)(with N. S. Klonaris).
3. "Modeling $\frac{1}{f}$ noise using a simple physical model based on vacancy motion", in *Materials Reliability in Microelectronics III*, K. P. Rodbell, W. F. Filter et. al (eds.), The Materials Research Society, Pittsburg, PA (1993)(with N. S. Klonaris).
4. "$\frac{1}{f^\alpha}$ Noise and Fabrication Variations of TiW/Al VLSI Interconnections", *IEEE Electron Device Letters*, Vol. 11, No. 11, November 1990 (with N.S. Klonaris and M. Bordelon).
5. "Microstructural Effects on the $\frac{1}{f^\alpha}$ Noise of Thin Aluminum Based Films", *Journal of Electronic Materials*, Vol. 19, No. 11, 1990 (with N. S. Klonaris).
6. "Reliability Testing of VLSI Interconnections Using Noise Measurements", Proceedings of TECHCON'90, San Jose, CA, Oct. 16-18, 1990 (with T. M. Chen).
7. "A New Method for Reliability Testing of VLSI Interconnects", Proceedings of the Second Florida Microelectronics Conference, Melbourne Florida, May 10-11, 1990 (with T. M. Chen).
8. "Reliability and Resistance Minimization Studies of the Laser Diffused Diode Links in Wafer-Scale-Integration", Proc. of the 19th European Solid State Device Research Conference, Sept. 1989 (with P. Fang, G. H. Massiha and T. M. Chen).
9. "Determination of Metal Film Lifetimes Using Excess Noise Measurements", in *Noise in Physical Systems*, Edited by A. Ambrozy, Akademiai Kiado, Budapest (1990), also presented at the 10th Intl. Conf. on Noise in Physical Systems, Budapest, August 21-25 (1989) (with M. I. Sun and T. M. Chen).
10. "Electromigration and $\frac{1}{f^\alpha}$ Noise in Al-Based Thin Films", in *Noise in Physical Systems*, Edited by A. Ambrozy, Akademiai Kiado, Budapest (1990), also presented at the 10th Intl. Conf. on Noise in Physical Systems, Budapest, August 21-25 (1989) (with T. M. Chen and P. Fang).
11. "Observations of Deterministic Chaos in Superconducting $YBa_2Cu_3O_7$", Proc. Southeastcon, Columbia, SC, April 9-12 (1989) (with H. Hickman, G. Gutt and T. M. Chen).
12. "An Automated Noise Measurement System for Packaged VLSI Metal Films", Proc. Southeastcon, Columbia, SC, April 9-12 (1989) (with G. M. Gutt).
13. "A Statistical Approach to Noise Response Measurements in Thin Al-Cu 1.9% Films", Proc. Southeastcon, Columbia, SC, April 9-12 (1989) (with M. L. Dreyer).
14. "Activation Energies Associated with Current Noise of Thin Metal Films", published in *Microstructural Science for Thin Film Metallizations in Electronic Applications*, J. Sanchez et. al., Eds., The Metallurgical Society, Warrendale, PA (1988) (with T. M. Chen).
15. "Activation Energies Associated with Current Noise of Thin Metal Films", Journal of Electronic Materials, Vol. 17, Number 6, Sept. (1988).
16. "A Comparison Between Noise Measurements and Conventional Electromigration Reliability Testing", Proc. of the 26th Annual Reliability Physics Symposium, Monterey, CA, April (1988) (with T. M. Chen and K. P. Rodbell).
17. "Excess Noise in Thin Aluminum-based Metal Films", *Noise in Physical Systems*, Edited by C. M. Van Vliet, pp. 521-524, World Scientific (1987) also presented at the 9th Intl. Conf. on Noise in Physical Systems, Montreal (1987) (with T.M. Chen and L.M Head).
18. "Excess Noise and Its Relationship to the Activation Energies Associated with Electromigration in Thin Al and Al-Si Films", IEEE Multilevel Interconnection Conference, Santa Clara, CA (1987) (with T.M. Chen).

19. "Characterization of Excess Noise in VLSI Interconnections" Proc. IEEE Southeastcon, Tampa, Florida (1987) (with T.M. Chen).
20. "Excess Noise and its Relationship to Electromigration in Thin Film Interconnections", Ph.D. Dissertation, University of South Florida (1987).
21. "Characterization, Sources and Minimization of Thick Film Resistor Burst Noise", Proceedings of the 1986 International Symposium on Microelectronics, pp. 835-839, Atlanta, Georgia, Oct. 6-8, 1986.
22. "Physical Model of Burst Noise in Thick Film Resistors", *Solid State Electronics*, Vol. 29, No. 9, pp. 865-872, Sept. (1986) (with T.M. Chen).
23. "Instrumentation and Analysis Techniques for Burst Noise Waveforms", IMTC/85 Proc. of the IEEE Instrumentation/Measurement Technology Conference, Tampa, FL (1985) (with T.L. Crandell and T.M. Chen).
24. "The Effect of Electric Field Intensity on Thick Film Resistor Burst Noise", *Proc. ISHM Hybrid Microelectronics Symposium (1984)*(with T.P. Djeu and T.M. Chen).
25. "Computerized Analysis of Burst Noise in Thick Film Resistors", *IEEE Transactions on Components, Hybrids and Manufacturing Technology*, Vol. CHMT-6, No. 2, pp. 163-167, June 1983 (with T.M. Chen).
26. "Power Spectral Measurements of Electrical Noise Using a Minicomputer", Proc. of IEEE Southeastcon (1983). (with S.F. Su and T.M. Chen).
27. "Characterization of Burst Noise in Thick Film Resistors", M.S. Thesis, University of South Florida (1983).
28. "Statistical Properties of Burst Noise in Thick Film Resistors", Proc. of University/Government Industry Microelectronics Symp. (1983). (with T.M. Chen).
29. "Design of an Electronic Music Composition Studio", Selected by R. Moog for the Proc. of the 67th AES Convention, New York, NY, October 31 - November 3, 1980 AES Preprint No. 1686(J-3).

B. Published Book Chapter

"Microprocessors" - Chapter 8.5 in *The Electronics Handbook* , CRC Press, Boca Raton, FL, Jerry Whitaker (ed.), (1996 & 2005) ISBN-10: 0-8493-1889-0.

C. Conference Talks Without Published Proceedings

1. "Corruption of the $\frac{1}{f^{\alpha}}$ Noise Reliability Inferences due to Non-Stationary Events in the Time Domain", Fine Line Task Force Meeting, Minnowbrook Conference Center, Blue Mtn. Lake, NY, September 1991.
2. "Recent Progress in Noise and Reliability Research", Fine Line Task Force Meeting, Minnowbrook, NY, Sept. 1990.
3. "The Effect of Resistance Drift on $\frac{1}{f}$ Noise Measurements", Fine Line Task Force Meeting, New Orleans, LA, April, 1990.
4. "Metallization Quality and Reliability Using Noise Measurements", Sandia National Laboratories, April 1990.
5. "Noise and Reliability Research at USF", invited talk at the IEEE Student Chapter Meeting, March 1990.
6. "Electrical Noise and Reliability of Thin Metal Film VLSI Interconnections", Fifth Annual USF Engineering Research Seminar, Feb. 27, 1990 (with T. M. Chen, L. M. Head, G. H. Massiha, N. S. Klonaris, J. Swiatowski, N. Mallory and A. Yassine).
7. "Microstructural Effects on The $\frac{1}{f}$ Noise of Thin Aluminum Based Films", 119th TMS Annual Meeting, Anaheim, CA, February 18-22, 1990.
8. "Noise and Failure in IC Metallizations", Fine Line Task Force Meeting (RADC) Minnowbrook, NY, Sept. 1989.
9. "Electrical Noise in High T_c Superconductors", Presented in the Fourth Annual Engineering Research Seminar, College of Engineering, USF, Feb. 21, 1989 (with P. Fang, J. Hall, H. Hickman and T. M. Chen).

10. "Current Noise and Reliability of Thin Metal Films", Presented in the Fourth Annual Engineering Research Seminar, College of Engineering, USF, Feb. 21, 1989 (with T. M. Chen).
11. "A Possible Model for $\frac{1}{f^2}$ Noise in Thin Metal Films", Fine Line Task Force Meeting, Minnowbrook, NY, Oct. 1988.
12. "Electrical Noise of High Temperature Superconductors", DARPA Headquarters, Arlington, VA, August 1988.
13. "Noise Research at USF", Presented in the Third Annual Engineering Seminar, College of Engineering, USF, Feb. 25, 1988.
14. "New Method for Characterizing Electromigration in VLSI Circuits", Presented in the Second Annual Engineering Research Seminar, College of Engineering, USF, Feb. 24, 1987.

D. Technical Reports

1. "Metallization Quality and Reliability", 3rd Annual Progress Report, Sandia National Laboratories, August, 1995 (with N. S. Klonaris and J. Swiatowski).
2. "Metallization Quality and Reliability", 2nd Annual Progress Report, Sandia National Laboratories, August 16, 1991 (with N. S. Klonaris and J. Swiatowski).
3. "Metallization Quality and Reliability", 1st Annual Progress Report, Sandia National Laboratories, March 23, 1990 (with N. S. Klonaris and J. Swiatowski).
4. "A New Method for Wafer Level Testing of VLSI Interconnection Reliability", Quarterly Progress Reports for the Florida High Tech Industry Council submitted every three months in 1990 (T. M. Chen, PI).
5. "Prediction of Electromigration in VLSI Circuits Using Noise Measurements as a Tool", Progress Reports for the SRC Contract #90-SJ-124, Second Annual Report, Submitted March 1, 1990. In addition, progress reports were submitted every four months in 1990 (with T. M. Chen, PI).
6. "Reliability of Laser Restructurable Links", Progress Reports submitted quarterly and annually to the DARPA sponsored WSI project at USF. (October 1988 to December 1989).
7. "Silicon CMOS Characterization Above 425 Degrees Centigrade", Harris Internal Technical Report, August 1983.

E. Invited Talks Presented:

1. Center for Microelectronics Research, USF- "The USF Method of Noise Testing for Thin Film Reliability", Presented to visitors from the Air Force's Space Technology Center, March 1990.
2. IEEE Student Chapter, USF - "Electrical Noise and Reliability Research at USF", February 1990.
3. Minority Graduate Student Program, USF Graduate School - "Noise and Reliability Research at USF", November 1989.
4. International Wafer Level Reliability Workshop, Lake Tahoe, CA - "Update - $\frac{1}{f}$ Noise Test Method", October 10, 1989.
5. Harris Semiconductor, Melbourne, FL - "Testing of Electromigration in VLSI Circuits Using Noise Measurements", July 26, 1989.
6. International Wafer Level Reliability Workshop, Lake Tahoe, CA - "$\frac{1}{f}$ Noise Advances in Detecting Electromigration", October 24, 1988.
7. AT&T Bell Laboratories, Murray Hill, NJ - "Current Noise and Reliability of Thin Metal Films", September 23, 1988.
8. IBM Corporation, East Fishkill, NY - "On the Model of $\frac{1}{f^2}$ Noise in Thin Metal Films", April 28, 1988.
9. Graduate Seminar, USF Elec. Eng. Dept, "Electromigration and Noise in Thin VLSI Interconnections", Spring Semester, 1987.

Technology Transfer:

- **Software Development/Site Licensing**
  "ANiMaL - An Automated Noise Measurement Language", disclosed on August 30, 1989 through University of South Florida's Division of Technology Transfer, Copyright October 6, 1989 and subsequently site licensed to AT&T Bell Laboratories, Murray Hill NJ and Motorola Advanced Technology Center, Phoenix, AZ (with Gregory M. Gutt).
- **Technology Transfer Course-Semiconductor Research Corporation (SRC)**
  "Electromigration and Its Relationship to Noise in Thin Films", developed, taught and published on November 10, 1989 through the SRC. The couse was conducted at USF to participants representing a broad cross section of US Semiconductor Companies (SRC publication # T89143).
- **1995 International Reliability Physics Symposium - Tutorial**
  "Practical Noise Measurements for Reliability Determination of Thin Metal Films", Presented at the 1995 IRPS, Las Vegas, NV.

Collaborative and Cooperative Research with Other Institutions:

- **Rennselaer Polytechnic Institute, Troy, NY**
  Cooperative research on stress in thin metal films with Professor Pete Ficalora (Materials Science), RPI.
- **Massachucetts Institute of Technology, Cambridge, MA**
  Cooperative research on thin film microstructures with Professor Carl V. Thompson (Materials Science), MIT.
- **Max Plank Institute, Stuttgart (1988-1990)**
  Cooperative research on thin film microstructures with John Sanchez, PhD (Materials Science) (now with Advanced Micro Devices, Sunnyvale, CA).

RESEARCH GRANTS:

Date	Source and Amount	Project Title
May 1987 to May 1988	President's Council Faculty Award $5,000	"A Statistical Database Supporting Electromigration Studies" (PI)
October 1987 to September 1988	Microelectronics Design and Test Center, USF, $61,798	"Electromigration Test for Microwave GaAS ICs/MMIC" (Co PI)
October 1987 to September 1988	Microelectronics Design and Test Center, USF, $58,144	"Quality Evaluation of High Temperature Superconductors" (Co PI)
October 1987 to September 1988	Semiconductor Research Corporation, $84,064	"Prediction of Electromigration in VLSI Circuits Using Noise Measurements as a Tool" (Co PI)
July 1988 to December 1989	DARPA/Microelectronics Reliability Task, $577,715	"Reliability of Restructurable VLSI Circuits" (PI)
October 1988 to December 1988	Semiconductor Research Corporation, $18,015	"Prediction of Electromigration in VLSI Circuits Using Noise Measurements as a Tool" (Co PI)
January 1989 to February 1990	Semiconductor Research Corporation, $98,000	"Prediction of Electromigration in VLSI Circuits Using Noise Measurements as a Tool" (Co PI)
April 1989 to May 1990	Sandia National Laboratories (DOE), $69,412	"Integrated Circuit Metallization Quality and Reliability" (PI)
October 1989	IBM Corporation Equipment Grant, $1,737	"Wire Bonder" (PI)
January 1990 to December 1990	Semiconductor Research Corporation Equipment Grant, $12,808	"Wafer Lever Electromigration Testing Using Noise Measurements" (Co PI)
January 1990 to December 1991	Florida High Technology and Industry Council, $94,000 (direct costs only)	"A New Method for Wafer-Level Testing of VLSI Interconnection Reliability" (Co PI)
March 1990 to March 1991	Semiconductor Research Corporation, $82,000	"A Study of Electromigration in VLSI Circuits Using Noise Measurements" (Co PI)
May 1990 to September 1990	Sandia National Laboratories (DOE), $20,000	"Integrated Circuit Metallization Quality and Reliability" (PI)
October 1990 to September 1991	Sandia National Laboratories (DOE), $91,236	"Integrated Circuit Metallization Quality and Reliability" (PI)
September 1991 to May 1995	Sandia National Laboratories (DOE), $40,000	"Integrated Circuit Metallization Quality and Reliability" (PI)