

Juan Alejandro Herbsommer

Ciclon semiconductors juanherb@ciclonsemi.com

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EDUCATION

Postdoctoral position (2001-2003) Bell Labs , Lucent Technologies.

R&D on MEMS and Thin Film Resonators (piezoelectric devices)

PhD in Physics (1995-2000) Thesis on Solid State Physics (High Temperature superconductors)

Instituto Balseiro, Universidad Nacional de Cuyo, Bariloche, Argentina.

Grade: Outstanding GPA 4 / 4

PROFESIONAL EXPERIENCE

CICLON SEMICONDUCTORS,

Technical manager

Bethlehem, PA

2006-present

- Developed and implemented the backend, packaging, and manufacturing process flows of our high power MOSFET transistors. Successfully sampled customers in 2006.
- Developed the technology and implemented Chip Scale Package process flow for some of our products. Successfully sampled customers in 2006.
- Selected, set up and managed supply chain in South East Asia.
- Managed a program funded by Ben Franklin Technology Partners to develop power devices technology in collaboration with Lehigh University.
- Developing a partnership deal with key supplier in South East Asia.

AGERE SYSTEMS (spin off of Lucent Bell Labs),

Senior Member of the Technical Staff

Allentown , PA

2002-2005

- Project manager of a group of engineers to develop of a highly integrated RF high Power module (3 patents generated). Transferred the technology to a external manufacturer in Asia
- Developed a technological disruptive Silicon process to thin 8 inches wafers down to 2 mils thickness (8 mils was the industry maximum capability). This achievement reduced the junction temperature of the devices by 40% and the electrical and reliability improvements created a very important competitive advantage for Agere Systems.
- Successfully transferred the thinning process to manufacturing in less than 3 months with a 99% yield. Still today the process constitutes a competitive advantage for Agere and Ciclon.
- Developed and transferred to manufacturing a low cost package solution for high power RF transistors. This development meant a 10x cost reduction at manufacturing level.
- Designed and simulated several semiconductor devices using Finite Element Analysis Simulation.
- Promoted to Senior Member of the Technical Staff in less than a year.

LUCENT BELL LABS,

Postdoctoral Member Technical Staff

Murray Hill, NJ

2001-2002

- Developed an innovative voltage controlled RF inductor using MEMS technology. Designed and simulated the device using Ansys Finite Element Analysis.
- Designed and simulated a novel read/write head for hard disk drives using surface MEMS technology.
- Characterized the electrical, mechanical and reliability performance of piezoelectric devices (TFR)

LUCENT, BELL LABS,
Consultant in Condensed Matter Physics

Murray Hill, NJ
1999-2000

- Discovered and solved a serious reliability problem with piezoelectric filters, increasing the Mean Time to failure by 10x (well above specs). The problem (electromigration in SiN membranes) was solved using an innovative metal stack as electrodes.
- Developed a novel reliability test to measure this electromigration problem using an Atomic Force Microscope (patent granted).
- Designed and fabricated a RF microscope to scan the radiated fields of piezoelectric oscillating membranes. The RF scanning microscope image the local electrical fields providing information about the device's performance (see publication listed below).

INSTITUTO BALSEIRO, Low Temperature Lab.,
Graduate Student

Bariloche, RN, Argentina
1996-2000

- Discovered the optimum crossing angle between columnar defects in High Tc superconductors to increase by a factor of two the critical current (most important parameter for applications)
- Visualized for first time in science different realizations of a vortex glass structure in the same superconductor sample. The experiment was performed by imaging the vortex structure using a Magnetic Decoration Technique.
- Designed and fabricated ultra-small miniature coils for ac susceptibility experiments and Magnetic Decoration Technique, tool that allows to image individual vortices (0.1 um) in superconductors.
- Wide experience in cryogenics and vacuum techniques, cryostat design and use of cryogenic liquids.

EXPERIMENTAL SKILLS

- Wide experience in cryogenics and vacuum techniques, cryostat design and use of cryogenic liquids
- Design, simulation (ANSYS), fabrication (Chronos) and characterization of surface MEMS.
- Susceptibility AC. Design and fabrication of ultra small miniature coils and susceptibility measurement at low temperatures.
- Magnetometer used to measure magnetization of High Temperature Superconductors.
- Magnetic decoration of vortex structures of superconductors. Design, fabrication and data analysis
- Design, fabrication and operation of a Phase-Sensitive Near-Field Microwave microscope to measure RF electromagnetic fields of devices
- Infrared Imaging to measure temperature fields of devices in operation
- Scanning Electron Microscopy used for material and device analysis. Sample prep and SEM operation
- Atomic Force Microscope used material surface analysis and piezoelectric device oscillations.
- Acoustic micro imaging Microscopy (C-SAM) used to measure internal structure of devices.
- Solderability/wirebondability techniques to evaluate thin films used for microelectronic applications.

COMPUTER SKILLS

I have wide experience in processing and analysis of data. I program in different languages and have 4 years experience with 3D Finite Elements simulation tools.

- Finite Element simulation: Ansys (3D multyphysics simulation tool), ADS
- Program languages: C, Fortran, HTML, Basic and Labview
- Software: Mathematica, Mathcad, Origin. IDL etc.

AWARDS AND SCHOLARSHIPS

Undergraduate studies: full scholarship from the Comision Nacional de Energia Atomica awarded only to 30 students per year to be full time student at Instituto Balseiro (the best ranked Physics and Nuclear Engineering University in South America) Bariloche, Argentina. 1992 -1995.

Graduate studies: full scholarship from CONICET to pursue a Ph.D. degree in experimental physics at the Low Temperature Group of the Centro Atómico Bariloche (CNEA), Bariloche, Argentina, 1996-2000

TEACHING EXPERIENCE

- Professor of Physics 215, Northampton Community College, 2007- present
- Teaching Assistant at Instituto Balseiro, Bariloche, Argentina, 1997-2000.
- Instructor in the 'Experimental Workshop on High Temperature Superconductors and related materials' (Oct. 1998), International Centre for Theoretical Physics (ICTP), Trieste, Italy.
- Teaching Assistant 'Summer School on Physics', Inst. Balseiro, Argentina, 1997.
- Teaching Assistant 'School of Solid State Physics', Inst. Balseiro, Bariloche Argentina, 1995 -1996.
- Teaching Assistant at Univ. Nacional del Comahue, Bariloche, Argentina, 1995-1996, 1997-1999
- Teaching Assistant at Univ. Nacional del Sur , Bahía Blanca, Argentina, 1993.

PATENTS

1. *Method and apparatus for determining and/or improving high power reliability in Thin Film Resonators, and a Thin Film Resonator device resultant therefrom.* J.A. Herbsommer et al.
2. *A process for fabricating a Power Hybrid Module* J.A. Herbsommer et al.
3. *A process to fabricate Flex frame packages* J.A. Herbsommer et al.
4. *Intelligent RF Amplifier Module*, J.A. Herbsommer et al
5. *High-Power plastic packages for modules* J.A. Herbsommer et al (submitted 2005)
6. *Bond –wireless semiconductor package* (submitted 2007).
7. *High Thermal Performance MOSFET with Topside Cooling and method of assembly* (in preparation)

PUBLICATIONS

1. "Vortex glass melting in single crystal $LaSrCuO$ " Herbsommer et al, Physica C, 258, p.169, 1996
2. "Vortex phase diagram of $BSCCO$ 2212: c -axis superconducting correlation in the different phases" M.F.Goffman, J.A.Herbsommer, F.de la Cruz, T.W.Li and Kes, Phys. Rev. B **57**, 3663 (1998)
3. "Angular variation of pinning near the irreversibility temperature in single crystal of YBCO with splayed columnar defects" J.A.Herbsommer, J. Luzuriaga, L. Civale, G. Nieva, G. Pasquini, H. Lanza and P. Levy, Physica C, 304, 112-118, (1998).
4. "Vortex pinning induced by Bitter decoration" Y.Fasano, J.A.Herbsommer, F. de la Cruz, F. Pardo, P.L.Gammel, E. Bucher and D.J.Bishop, Phys. Rev. B 60, R15074 (1999).
5. "Interplay between pinning energy and vortex interaction in YBCO with oriented twin boundaries in tilted magnetic fields" J.A.Herbsommer et al, Phys. Rev. B 62, 3534 (2000).
6. "Superficial periodic pinning induced by Bitter decoration applied to the study of vortex structure nucleation and growth" Physika Status Solidi B215,2232,(1999).
7. "Repetition of the disordered pattern in successive solidifications of vortex matter observed by Bitter decoration" J. A. Herbsommer, G. Nieva and J. Luzuriaga. Phys. Rev. B 62, 678 (2000).
8. "Interaction of vortices oriented twin boundaries in single crystal of YBCO" J.A.Herbsommer, J. Luzuriaga y G. Nieva, Phys. Rev. B 61, 11745 (2000).
9. "Order-Disorder transition and the Zero dimensional Vortex Pinning Regime in $BSCCO$ 2212" V.Correa, J.A.Herbsommer, E.E.Kaul, F.de la Cruz and G. Nieva Phys. Rev. B 63, 92502 (2001)
10. "Reproducibility of the disordered vortex structure in twinned YBCO single crystals" J.A..Herbsommer, J.Luzuriaga and G. Nieva, Physica C 341-348, 1087 (2000).
11. "Onset of the 0-Dimensional Vortex Pinning Behavior in the Optimally Doped and Overdoped $Bi_2 Sr_2 CaCu_2 O_{8+d}$ System" V. F. Correa, J. A. Herbsommer, E. E. Kaul, F. de la Cruz and G. Nieva Physica C 341-348, 1285 (2000).
12. 'Imaging of Acoustic Fields in Bulk Acoustic Wave Thin-Film' H.Safar, J.A. Herbsommer et al . APS March Meeting 2000, Minneapolis, USA.
13. 'Phase-Sensitive Near-Field Microwave Microscopy and Acoustic Fields of Piezoelectric-Based devices' J.A. Herbsommer et al. , Int. Microwave Symposium May 2001, Phoenix, Arizona.
14. 'Vortex dynamics in $BSCCO$ single crystals with planar defects' J. A. Herbsommer, V. F. Correa, G. Nieva, H. Pastoriza, J. Luzuriaga. Solid State Commun. 120/2-3, 59 (2001)

15. *Ultra-thin RF LDMOS power transistors* . J.A.Herbsommer, H.Safar, W. Brown, Gammel, O.Lopez and G.Terefenko, European Microwave Week 2002, Milan Italy Sept. 2002.
16. *Improved Electrical and Thermal Performance of Ultra-thin RF LDMOS Power Transistors*, J.A. Herbsommer et al., International Microwave Symposium October 2003, Philadelphia.
17. *Power transistors fabricated using isotopically purified silicon (²⁸Si)* Kizilyalli, I.C.; Safar, H.; Herbsommer, S.J. Gammel, P.L. Electron Device Letters, IEEE **26**, 6, June 2005 (404-406)
18. *Wirebondability and Solderability of NiAu electroless metallizations subjected to high temperature process flows* (submitted to IMAPS).
19. *Effect of the plastic molding compound in the performance of RF microelectronic devices* J.A. Herbsommer et al.(in preparation)