

Curriculum Vita

F. Patrick McCluskey
Assistant Professor
Department of Mechanical Engineering
University of Maryland, College Park 20742

Year of Appointment to current rank: August 1997

Education

- Ph.D. 1991** *Materials Science and Engineering, Lehigh University, Bethlehem, PA 18015.*
- M.S. 1986** *Materials Science and Engineering, Lehigh University, Bethlehem, PA 18015.*
- B.S. 1984** *Metallurgical Engineering, Lafayette College, Easton, PA 18042, Summa Cum Laude*

Employment History

- 1997 – Present** *Asst. Professor, Mechanical Engineering, University of Maryland, College Park, MD*
Direct component level research at the CALCE Electronic Products and Systems Center
Direct high temperature and high power electronics research at the CALCE EPSC
Direct the Electronic Components Alliance and the development of component level design-for-reliability software
Coordinate and teach graduate and undergraduate classes on mechanics of materials, electronic packaging and materials, and high temperature electronics.
- 1994 - 1997** *Asst. Research Scientist, CALCE EPRC, University of Maryland, College Park, MD*
Defined and Managed Research Projects on Plastic Encapsulated Microcircuits
Defined and Managed Research Projects on High Temperature Electronics
Coordinated and Taught Graduate Course in Extreme Temperature Electronics
Taught Introductory and Advanced Short Courses on Plastic Encapsulated Microcircuits
- 1991- 1994** *Materials Technologist. W. L. Gore and Associates, Inc., Elkton, MD*
Led Team in Developing Metallization Technology for Polymer Membranes.
Managed Research Efforts on Deposition of Coatings onto Oriented Polymer Films
Supervised Reliability and Lifetime Testing on Electrical Interconnect Systems.
Developed Electronic Packaging and Interconnection Products
- 1988** *Summer Research Associate. AT&T Bell Laboratories, Murray Hill, NJ*
Determined effects of plasma treatment on multilayer III-V semiconductor structures.
- 1984-1991** *Research Fellow, Lehigh University, Sherman Fairchild Center, Bethlehem, PA*
Researched gas phase reactions and thin film deposition in semiconductor devices.

Publications

Books and Chapters in Books:

Books Co-authored –

F. P. McCluskey, R. R. Grzybowski, and T. F. Podlesak, **High Temperature Electronics**, CRC Press, Boca Raton, FL, 1996.

Michael Pecht, Rakesh Agarwal, **Patrick McCluskey**, Terrance Dishongh, Sirus Javadpour, and Rahul Mahajan, **Electronic Packaging Materials And Their Properties**, CRC Press, Boca Raton, FL, 1998.

Books Co-edited -

F. P. McCluskey, J. Boudreaux, H. Last, and R. Dauskardt, **Proceedings of MRS Spring Meeting 2001: Microelectronics and Microsystems Packaging, Symposium N**. Materials Research Society, Boston, MA 2001. (to be published on-line).

Chapters in books –

F. P. McCluskey, Chapters 5 and 6 in **High Temperature Electronics**, F. P. McCluskey, R. R. Grzybowski, and T. F. Podlesak, eds., CRC Press, Boca Raton, FL, 1996.

F. P. McCluskey, Chapter 2 in **Electronic Packaging Materials And Their Properties** by Michael Pecht, Rakesh Agarwal, **Patrick McCluskey**, Terrance Dishongh, Sirus Javadpour, and Rahul Mahajan, CRC Press, Boca Raton, FL, 1998.

Michael Pecht, **Patrick McCluskey**, Jillian Evans, Chapter 8: Failures in Electronic Assemblies and Devices, **Product Integrity and Reliability in Design**, Springer-Verlag, Singapore, 2000.

Michael Pecht, **Patrick McCluskey**, Chapter 13: Failure Analysis in Electronic Assemblies and Devices, **Product Integrity and Reliability in Design**, Springer-Verlag, Singapore, 2000.

Articles in Refereed Journals:

F. P. McCluskey, Loren Pfeiffer, K. W. West, J. Lopata, M. Lamont-Schnoes, T. D. Harris, S. J. Pearton, and W. C. Dautremont-Smith, "Depth Dependence of Silicon Donor Passivation and Reactivation in Hydrogenated GaAs," **Applied Physics Letters**, **Vol. 54**, No. 18, p.1769 (1989).

F. P. McCluskey and R. J. Jaccodine, "Effect of NF_3 on the Direct Thermal Nitridation of Silicon," **Journal of the Electrochemical Society**, **Vol. 136**, No. 8, p.2328 (1989).

D. Kouvatso, **F. P. McCluskey**, R. J. Jaccodine, and F. A. Stevie, "Silicon-Fluorine Bonding and Fluorine Profiling in SiO_2 Films Grown by NF_3 Enhanced Oxidation," **Applied Physics Letters**, **Vol. 61**, No. 7, p.780 (1991).

A. C. Miller, **F. P. McCluskey**, and J. Ashley Taylor, "An X-ray Photoelectron Spectroscopy Study of Aluminum Surfaces Treated with Fluorocarbon Plasmas," **Journal of Vacuum Science and Technology, Part A**, **Vol. 9**, No. 3, p.1461 (1991).

R. Munamarty, **P. McCluskey**, M. Pecht, and L. Yip, "Popcorning in Fully Populated and Perimeter Plastic Ball Grid Array Packaging," **Soldering and Surface Mount Technology**, **Vol. 22**, Feb. 1996, p.42 (1996).

F. P. McCluskey, L. Condra, J. Fink, and T. Torri, "Packaging Reliability for High Temperature Electronics: A Materials Focus," **Microelectronics International**, Vol. 41, Sept. 1996, pp. 23-26 (1996). *(Review Article)*

F. P. McCluskey, R. Munamarty, and M. Pecht, "Popcorning in PBGA Packages During IR Reflow Soldering," **Microelectronics International**, Vol. 42, Jan. 1997, pp. 20-23 (1997). Adapted from **Proceedings of the IEPS Conference**, held in Austin, TX, Sept 29-Oct 1, 1996. p. 271.

F. P. McCluskey, D. Das, J. Jordan, L. Condra, T. Torri, J. Fink and R. Grzybowski, "Packaging of Electronics for High Temperature Environments," **International Journal of Microcircuits and Electronic Packaging**, Vol 20, No. 3, p. 409. Third Quarter 1998. Adapted from **Proceedings of the Int'l Electronics Packaging Society Conference**, held in Austin, TX, Sep 29- Oct 1, 1996. pp. 143 - 155.

E. B. Hakim, J. Fink, S. M. Tam, **P. McCluskey**, and M. Pecht, "Plastic Encapsulated Microcircuits (PEMs): Long-term Dormancy Studies," **Circuit World**, Vol. 23, No. 4, pp.26-29, (1997).

M. B. Wright, D. Humphrey, and **F. P. McCluskey**, "Upgrading Electronic Components for Use Outside Their Temperature Specification Limits," **IEEE Transactions on Components, Packaging, and Manufacturing Technology Part A**, Vol. 20, No. 2, pp. 252-256, June 1997. *(Invited Article)*

F. P. McCluskey, E. B. Hakim, J. Fink, A. Fowler, M. Pecht, "Reliability Assessment of Electronic Components Exposed to Long-Term Non-Operating Conditions" **IEEE Transactions on Components, Packaging and Manufacturing Technology, Part A**, Vol. 21, No. 2, pp. 352-360, June 1998.

T. Panchwagh, **F. P. McCluskey**, G. Kromholtz, and G. Wenzel, "Reliability of Surface Mount Capacitors Subjected to Wave Soldering," **International Journal of Microelectronics Packaging, Volume 1**, Number 2, pp. 71-81, August 1998.

R. R. Grzybowski, and **F. P. McCluskey**, "High Temperature Performance of Polymer Film Capacitors," **International Journal of Microelectronic Packaging, Volume 1**, Number 2, pp. 153-158, August 1998. *(Review Article)*

P. McCluskey, F. Lilie, O. Beysser, A. Gallo, "Low Temperature Delamination of Plastic Encapsulated Microelectronics," **Microelectronics Reliability**, Vol. 38, No. 12, December 1998, pp. 1829-1834.

N. Palli, S. Azarm, **P. McCluskey**, and R. Sundararajan, "An Interactive Multistage ϵ -Inequality Constraint Method for Multiple Objectives Decision Making," **Trans. ASME: Journal of Mechanical Design**, Vol. 120, No. 4, December 1998, pp. 678-686.

F. P. McCluskey, "Life Cycle and Environmental Mismatches in Electronics for Critical Applications," **Microelectronics International**, Vol. 16, No. 1, Jan. 1999, pp. 6-7. *(Invited Article)*

R. Sundararajan, S. Azarm, **P. McCluskey**, N. Palli, "A Stress Model for Multiobjective Optimization of a Power Electronic Module," **Mechanics of Structures and Machines**, Vol. 27, No. 2, pp. 163-183. (1999).

F.P. McCluskey, Y.D. Kweon, H.J. Lee, J.W. Kim, and H.S. Jeon, "Method for Assessing Remaining Life in Electronic Assemblies," **Microelectronics Reliability**, Vol. 40, No. 2, pp. 293-306 (2000).

F. P. McCluskey, K. Mensah, C. O'Connor, A. Gallo, "Reliable Use of Commercial Technology in High Temperature Environments," **Microelectronics Reliability**, Vol. 40, pp. 1673-1680 (2000).

Other Articles:

P. Yalamanchili, R. Gannamani, R. Munamarty, **P. McCluskey**, and A. Christou, "Optimum Processing Prevents PQFP Popcorning," **Surface Mount Technology**, May 1995, pp. 39-42, and **Surface Mount Technology: Supplemental Guide to Soldering**, January 1996, p. 9-12.

F. P. McCluskey and M. Pecht, "Pushing the Limit: The Rise of High Temperature Electronics," **Advanced Packaging**, Jan/Feb 1997, pp. 36-39. (*Review Article and Invited Article*)

F. P. McCluskey, D. Das, J. Jordan, L. Condra, T. Torri, J. Fink, and R. Grzybowski, "Packaging of Power Electronics for High Temperature Applications," **Advancing Microelectronics**, Jan/Feb 1998. (*Review Article and Invited Article*)

F. P. McCluskey and L.-Y. Chen, "Microsystem Packaging for High Temperature Applications," **MST News**, September 2001.

Talks, Abstracts and Other Professional Papers Presented:

Invited Talks –

F. P. McCluskey, presented "Long Term Reliability of Electronic Assemblies," at Daewoo Electronics, Inc., Inchon, KOREA, Aug. 1995.

F. P. McCluskey, R. Munamarty, and M. Pecht, "Popcorning in PEMs and PBGAs During Reflow Soldering," **International Acoustic Microimaging Symposium - IAMIS'96**, held in San Diego, CA, January 30-31, 1996.

Member of Panel Session on the Future of Electronics Packaging, **IEEE Computer Society Systems and Packaging Group Spring Conference**, Tamiment, PA, May 1996.

F. P. McCluskey, presented "A Review of Long Term Dormant Storage Studies," at Army Missile Command (MICOM), Huntsville, AL, Jan 1997.

F. P. McCluskey, "High Temperature Electronics," **1997 Space Parts Working Group Meeting**, held in Torrance, CA, March 17-19, 1997.

F. P. McCluskey, A. Dasgupta, K. Beatty, "Reliability Assessment of High Density Printed Wiring Boards," **IPC Workshop on Metallization of High Density Printed Wiring Boards, IPC Printed Circuit Expo**, San Jose, CA, March 1997.

F. P. McCluskey, "Expert Systems for Facilitating the Commercial Insertion of PEMs," **Boeing Electronic Components Management Program: User's Forum II**, Renton, WA. March 1997.

Panel Session, Component Availability for Aerospace Applications, **Boeing Electronic Components Management Program: User's Forum II**, Renton, WA. March 1997.

F. P. McCluskey and R. R. Grzybowski, "Reliability Concerns in High Temperature Electronic Systems," **Proceedings of the IEEE Engineering Foundation Conference on High Temperature Electronic Materials, Devices, and Sensors**, held in San Diego, CA, February 22-27, 1998.

P. McCluskey, F. Lilie, O. Beysser, A. Gallo, "Low Temperature Delamination of Plastic Encapsulated Microelectronics," **1998 International Acoustic Microimaging Symposium - IAMIS'98**, held in Anaheim, CA, February 26-27, 1998.

- F. P. McCluskey**, “High Temperature Components and Assembly in the Oil Well Drilling Industry,” **Surface Mount Technology Association Seminar**, Houston, TX, April 14, 1998.
- F. P. McCluskey**, “Low Temperature Delamination in Plastic Encapsulated Microcircuits,” **Scanning Acoustic Microscopy Training Seminar**, SONIX, Inc., Springfield, VA, April 21, 1998.
- F. P. McCluskey**, “Mitigating the Risks of Using Components Outside the Manufacturer’s Specified Operating Range,” Briefing for NAVAIR and NAWCAD, Patuxent River Naval Air Station, Aug 12, 1998.
- F. P. McCluskey**, “High Temperature Electronics” **Invited Seminar at Lear Astronics**, Santa Monica, CA, Nov. 2-3, 1998.
- F. P. McCluskey**, “A Physics-of-Failure Approach to Accelerated Testing,” **Invited Seminar at General Dynamics Information Systems**, Bloomington, MN, December 1998.
- F. P. McCluskey**, “Rapid Reliability Assessment with CADMP-II,” **Invited Presentation at International Rectifier**, El Segundo, CA, February 1999.
- F. P. McCluskey**, “Physics-of –Failure Analysis in Aerospace Applications,” **IEEE Aerospace Conference**, Aspen, CO, March 1999. (*Invited Plenary Session Speaker*)
- F. P. McCluskey**, “Techniques for Virtual Qualification of Automotive Electronic Modules,” **Invited Presentation at Visteon Electronics, Inc.**, Dearborn, MI, March 1999.
- F. P. McCluskey**, “The Electronic Components Alliance Role in Electronics R&D in the 21st Century,” **Invited Seminar at Centre Nationale d’Etudes Spatiale**, Toulouse, France, May 1999.
- F. P. McCluskey**, “High Temperature Electronics Research at the CALCE EPSC,” **Invited Seminar Series, Siemens Corporate Research and Development Center**, Munich, Germany, June 1999.
- F. P. McCluskey**, “Reliability Analysis of Power Modules,” **Invited Seminar at Research Center of TEMIC Division of DaimlerChrysler**, Stuttgart, Germany, July 1999.
- F. P. McCluskey**, “Issues in MEMs Packaging and Assembly,” **NIST Advanced Technology Program Annual Meeting**, San Jose, CA, November 15-17, 1999
- F. P. McCluskey**, “Virtual Qualification of Components,” **Invited Seminar at Sandia National Laboratories**, Albuquerque, NM, November 10, 1999.
- F. P. McCluskey**, “Extreme Temperature Electronics,” **Invited Seminar at Tatung University**, Taipei, Taiwan, Feb. 2000.
- F. P. McCluskey**, “Latest Research in High Temperature Electronics,” **Technical University of Dresden**, Dresden, Germany, April 12, 2000.
- F. P. McCluskey**, “Stress and Fatigue Life Modeling in Thin Attach Layers,” **MicroMat 2000**, held in Berlin, Germany, April 17-19, 2000.
- F. P. McCluskey**, “High Temperature Electronics Research,” **Technical University of Berlin**, Berlin, Germany, April 20, 2000.
- F. P. McCluskey**, “Physics-of-failure reliability assessment of power electronic systems,” **Tutorial Session of the 2000 NSF Engineering Research Center for Power Electronic Systems Seminar**, Virginia Tech, Blacksburg, VA. Sept. 17, 2000.

F. P. McCluskey, “Die Attach Fatigue in Power Semiconductor Packages,” **Plenary Session of the 2000 NSF Engineering Research Center for Power Electronic Systems Seminar**, Virginia Tech, Blacksburg, VA. Sept. 18, 2000.

F. P. McCluskey, “Computer Aided Concurrent Design Optimization of Power Electronic Systems,” **ONR Advanced Electrical Power Systems Conference and Workshop**, Ocean City, MD, October 4-5, 2000.

F. P. McCluskey, “Physics-of-failure reliability assessment of high temperature and power electronics,” **NSF ERC Data Systems Storage Center Symposium Series, Carnegie-Mellon University**, Pittsburgh, PA. November 10, 2000.

F. P. McCluskey, “PoF Reliability Assessment of High Temperature and Power Electronics, **IMAPS Capital Chapter Meeting**, held in Laurel, MD, January 10, 2001.

F. P. McCluskey and C. Hillman, “CADMP-II: Physics of Failure Reliability Assessment Software for Microelectronic Components,” **Reliability and Maintainability Symposium 2001**, held in Philadelphia, PA, January 24, 2001.

Contributed talks –

F. P. McCluskey, U. S. Kim, and R. J. Jaccodine, “*Characteristics of Fluorinated Thin Film Dielectrics.*” **First Workshop on Process Related, Electrically Active Defects in Semiconductor-Insulator Systems**, Microelectronics Center of North Carolina, Research Triangle Park, NC. Sept. 1987.

F. P. McCluskey, R. J. Jaccodine, J. C. Bean, and A. C. Miller, “*Oxynitridation of MBE Grown Si_xGe_{1-x} Layers.*” **Electronic Materials Conference**, Boston, MA Aug. 1989.

A. K. Fowler, **F. P. McCluskey**, P. Lenahan, and K. Rogers, “Long Term Storage Reliability of Plastic Encapsulated Microelectronics,” **1995 Advanced Technology Acquisition, Qualification, and Reliability Workshop**, Newport Beach, CA. Aug. 1995.

R. Gannamani, R. Munamarty, and **F. P. McCluskey**, “Qualifying Plastic Encapsulated Microcircuits Against Popcorning,” **1995 Advanced Technology Acquisition, Qualification, and Reliability Workshop**, Newport Beach, CA Aug. 1995.

F. P. McCluskey, “Materials Challenges for High Temperature Automotive Electronics,” **CDF-AEC Conference**, Indianapolis, IN. Oct. 1995.

F. P. McCluskey, R. Munamarty, and M. Pecht, “Popcorning in Full and Perimeter Array PBGA Packages During IR Reflow,” **Area Array Packaging Conference**, Berlin, GERMANY Nov. 1995.

F. P. McCluskey, A. Fowler, J. Kadesch, K. Rogers, “Issues in the Long Term Dormant Storage of PEMs,” **1996 Advanced Technology Acquisition, Qualification, and Reliability Workshop**, Schaumburg, IL. Aug. 1996.

F. P. McCluskey, and M. G. Pecht, “An expert system for the design and virtual qualification of PEMs,” **1996 Advanced Technology Acquisition, Qualification, and Reliability Workshop**, Schaumburg, IL. Aug. 1996.

F. P. McCluskey, “Reliability Assessment of Microelectronic Devices for Use in Automotive Environments,” **CDF-AEC Automotive Electronics Reliability Workshop**, Nashville, TN. Oct. 1996.

Presented, “A Concurrent Design Optimization Tool for PEBB,” Progress Report for ONR, **Quarterly Review Meeting for Power Electronics Building Blocks Program**, Mountaintop, PA, Dec. 1996.

M. Natishan, C. C. Tu, K.E. Beatty, and **P. McCluskey**, “Manufacturability of Lead-Free Solder Candidates for High Temperature Power Electronics,” **2nd International Conference on the All-Electric Combat Vehicle** held in Dearborn, MI, June 9-12, 1997.

F. P. McCluskey, L. Condra, J. Fink, and T. Torri, “Packaging of Power Electronics for High Temperature Applications,” **2nd International Conference on the All-Electric Combat Vehicle** held in Dearborn, MI, June 9-12, 1997.

F. P. McCluskey and R. R. Grzybowski, “Decision Support System for High Temperature Electronics,” **HiTEN Conference**, Manchester, UK, September 15-17, 1997.

F. P. McCluskey, “SPI in Commercialization,” **American Helicopter Society Meeting**, Bridgeport, CT, October 8, 1997.

F. P. McCluskey and M. Pecht, “CALCE Component Technology Insertion Roadmap,” **Workshop on the Use of Commercial ICs in Critical Applications**, held at Sandia National Laboratories, Albuquerque, NM, November 11-12, 1997.

Member of Panel Session: **Workshop on the Use of Commercial ICs in Critical Applications**, held at Sandia National Laboratories, Albuquerque, NM, November 11-12, 1997.

F. P. McCluskey, M. Pecht, and D. Das, “Long Term Storage of Plastic Encapsulated Microcircuits,” **Technology Management Symposium and Exposition**, Hilton Head, SC, November 15-17, 1997.

F. P. McCluskey, “Physics-of-failure Modeling for Rapid Reliability Assessment,” **NCMS/NEMI/ITRI Joint Workshop for the Microelectronics Manufacturing Initiative**, Tempe, AZ, January 29, 1998.

F. P. McCluskey, “Supply Chain Selection and Management,” **Moving Toward Virtual Qualification of Components Workshop**, held at CALCE Electronic Products and Systems Center, February 17, 1998.

R. Sundararajan, **P. McCluskey**, and S. Azarm, “Semi Analytic Model for Thermal Fatigue Failure of Die Attach in Power Electronic Building Blocks,” **1998 SEM Spring Conference on Experimental and Applied Mechanics**, Houston, TX, June 1998.

F. P. McCluskey, “Virtual Qualification and Reliability Assessment with CADMP-II,” **Raytheon-TI Systems**, June 25, 1998.

F. P. McCluskey, “Rapid Reliability Assessment with CADMP-II,” Presentation at the **High Density Packaging User’s Group Forum on Reliability**, San Jose, CA, October 1998.

F. P. McCluskey, “Decision Support System for High Temperature Electronics Development,” Presented at the **Ninth Quarterly Review Meeting of the High Temperature Distributed Control Systems TRP**, Irvine, CA, November 1998.

J. Fink, and **P. McCluskey**, “Issues in Commercial Insertion,” **1998 ASME International Mechanical Engineering Congress and Exposition**, Anaheim, CA, November 1998.

S. Azarm, **P. McCluskey**, and P. Sandborn, “Developments in the Decision Support System for PEBB,” Presented at the **Quarterly Review Meeting of the Power Electronics Building Blocks (PEBB) Project**, Charleston, SC, January 1999.

F. P. McCluskey, “Decision Support System for High Temperature Electronics,” **1999 NASA/JPL Conf. on Electronics for Extreme Environments**, Pasadena, CA, Feb 1999.

F. P. McCluskey, “Die Attach and Wirebond Systems for High Temperature Electronics,” **1999 NASA/JPL Conf. on Electronics for Extreme Environments**, Pasadena, CA, Feb 1999.

F. P. McCluskey, “A Web-Based Graduate Course on High Temperature and High Power Electronics,” **Third International Conference on Next Generation of Microelectronic Systems Packaging Education and Research**, Atlanta, GA, March 8-10, 2000.

F. P. McCluskey, “Stress and Fatigue Life Modeling in Thin Attach Layers,” **MicroMat 2000**, held in Berlin, Germany, April 17-19, 2000.

F. P. McCluskey, “Reliability of Commercial PEMs in High Temperature Environments,” **IMAPS Advanced Technology Workshop on Electronic Parts and Packaging for Space and Aeronautic Applications**, held in Washington, DC, May 22-25, 2000.

F. P. McCluskey, “Reliability of Commercial PEMs in High Temperature Environments,” **Fifth International High Temperature Electronics Conference**, held in Albuquerque, NM, June 12-15, 2000.

P. McCluskey, C. O’Connor, S. Young, and J. von Bank, “Long Term Reliability of Delaminated PEMs,” **Commercialization of Military and Space Electronics 2001**, held in Los Angeles, CA, February 12-14, 2001.

Unrefereed Conference Proceedings -

F. P. McCluskey and R. J. Jaccodine, “*Fluorine Enhanced Thermal Nitridation of Silicon*” in the **Proceedings of the Symposium on Silicon Nitride and Silicon Dioxide Thin Insulating Films**, Vol. 87-10, V. J. Kapoor and K. T. Hankins, eds., Electrochemical Society, Pennington, NJ. 1987. p. 178.

R. R. Grzybowski and **F. P. McCluskey**, “Performance of High Temperature Polymer Film Capacitors,” **Proc. of Third Int’l High Temperature Electronics Conf.**, held in Albuquerque, NM, June 10-14, 1996. pp. VI-15 to VI-20.

F. P. McCluskey, L. Condra, J. Fink, and T. Torri, “Packaging Reliability for High Temperature Electronics: A Materials Focus,” **Proc. of Third Int’l High Temperature Electronics Conf.**, held in Albuquerque, NM, June 10-14, 1996. pp. III-3 to III-10.

F. P. McCluskey, R. Munamarty, and M. Pecht, “Popcorning in PBGA Packages During IR Reflow Soldering,” **Proceedings of the Int’l Electronics Packaging Society Conference**, held in Austin, TX, Sep 29- Oct 1, 1996. p. 271-281 (*Best Paper in Session*).

F. P. McCluskey, D. Das, J. Jordan, L. Condra, T. Torri and J. Fink, “Packaging of Electronics for High Temperature Environments,” **Proceedings of the Int’l Electronics Packaging Society Conference**, held in Austin, TX, Sep 29- Oct 1, 1996. pp. 143 - 155.

F. P. McCluskey, A. Govind, and D. Beaudet, “Reliability Assessment of BGA Interconnects with CADMP-II,” **Proc. of ASME Annual Conference**, Atlanta, GA, Nov. 1996.

P. Mead, **F. P. McCluskey**, and Q-Y Chan, “Physics of Failure Study of Optoelectronic Laser Transmitter Module,” **Proc. of ASME Annual Conference**, Atlanta, GA, Nov. 1996.

P. McCluskey, M. Pecht, and S. Azarm, “Reducing the Time-to-Market Using Virtual Qualification,” **Proceedings of the 43rd Annual Technical Meeting of the Institute for Environmental Sciences, 43rd Annual Technical Meeting**, held in Los Angeles, CA, May 4-8, 1997, pp. 148-152.

M. Rosman, **P. McCluskey**, H. Greenhouse, and R. Jain, "Reliability Assessment of Digital MCM-C for GPS Applications," **Advancements in Electronic Packaging: Proceedings of INTERPAK97**, held in Maui, HI, June 1997, pp. 1299-1304.

F. P. McCluskey, E. Hakim, and J. Fink, "Assessment of Commercial Components," **Proceedings of The Exploitation of Commercial Technology in Guided Weapons Conference**, Royal Aeronautical Society, London, UK, Sept. 18, 1997, pp. 4.1-4.13.

J.E. Morris, **P. McCluskey**, M. Osterman, R. Mak, and H. Lo, "Electrical Performance Modeling for the CALCE CADMP-II Electronics Package Reliability Software," **Proceedings of the Pan Pacific Microelectronics Symposium** held in Kona, HI, February 10-13, 1998. p. 87-92.

J. E. Morris, **P. McCluskey**, M. Osterman, R. Mak, and H. Lo, "Electrical Performance Modeling for the CALCE CADMP-II Electronics Package Reliability Software," **Proceedings of the 2nd International Conference on Emerging Microelectronics and Interconnection Technologies** held in Bangalore, India, February 16-20, 1998. p. 246-251.

F. P. McCluskey and R. R. Grzybowski, "Reliability Concerns in High Temperature Electronic Systems," **Proceedings of the IEEE Engineering Foundation Conference on High Temperature Electronic Materials, Devices, and Sensors**, held in San Diego, CA, February 22-27, 1998, pp. 199-206.

F. P. McCluskey and D. Das, "Component Technology Insertion into Critical Avionics Applications," **Proc. of the 54th Annual Forum of AHS International: The Vertical Flight Society**, Washington, DC, May 21, 1998. Proceedings on CD-ROM (no page numbers).

J. Morris and **P. McCluskey**, "A Multidisciplinary Sophomore Course in Electronics Packaging," **Proc. of 48th Electronic Components and Technology Conference**, Seattle, WA, May 25-28, 1998. pp. 535-540.

F. P. McCluskey, M. Osterman, R. Jain, N. Tiwari, R. Grzybowski, S. Lin, and J. Benoit, "Decision Support System for High Temperature Electronics," **Proc. of the 4th IEEE Int'l High Temperature Electronics Conf.**, Albuquerque, NM, June 14-18, 1998. pp. 176-180.

J. Benoit, S. Chin, R. Grzybowski, S. Lin, R. Jain, and **P. McCluskey**, "Wire Bond Metallurgy for High Temperature Electronics" **Proc. of the 4th IEEE Int'l High Temperature Electronics Conference**, Albuquerque, NM, June 14-18, 1998. pp. 109-113.

R. Sundararajan, **P. McCluskey**, and S. Azarm, "Semi Analytic Model for Thermal Fatigue Failure of Die Attach in Power Electronic Building Blocks" **Proc. of the 4th IEEE Int'l High Temperature Electronics Conference**, Albuquerque, NM, June 14-18, 1998. pp. 94-102.

F. P. McCluskey, J. Morris, V. Pai-Verneker, P. Kondracki, and D. Finello, "Models of electrical conduction in nanoparticle filled polymers," **Proc. of the 3rd Int'l IEEE Conference on Adhesives in Electronics**, Binghamton, NY, Sept 25-27, 1998. pp. 84-89.

F. P. McCluskey, M. Nagvanshi, V. Pai-Verneker, P. Kondracki, and D. Finello, "Nanocomposite Materials Offer Higher Conductivity and Flexibility," **Proc. of the 3rd Int'l IEEE Conference on Adhesives in Electronics**, Binghamton, NY, Sept 25-27, 1998. pp. 282-286.

R. Knoell, R. Adams, and **F.P. McCluskey**, "The Use of Physics-of-Failure Analysis to Predict the Reliability of Semiconductor Devices," **Proc. of the Society of Automotive Engineers Conference**, Detroit, MI, March 1, 1999.

M. Pecht, P. Sandborn, and **P. McCluskey**, "Virtual Component Qualification," **Proc. of the 1999 Int'l Conf. on Modeling and Simulation of Microsystems (MSM99)**, San Juan, PR, April 19-21, 1999.

F. P. McCluskey and M. Pecht, “Rapid Reliability Assessment Using CADMP-II,” **Proc. of the 1999 Int’l Conf. on Modeling and Simulation of Microsystems (MSM99)**, San Juan, PR, April 19-21, 1999.

J. Morris and **P. McCluskey**, “A Multi-university Web-based Undergraduate Course in Electronics Packaging,” **Proc. of 49th Electronic Components & Technology Conf.**, San Diego, CA, June 1-4, 1999. pp. 899-903.

P. McCluskey, K. Mensah, C. O’Connor, F. Lilie, A. Gallo, and J. Fink, “Reliability of Commercial Plastic Encapsulated Microelectronics in Environments, with Temperatures from 125°C to 300°C,” **Proceedings of HITEN’99, the European High Temperature Electronics Conference**, Berlin, Germany, July 4-7, 1999.

F. P. McCluskey, R. Iyengar, S. Azarm, Y. Joshi, P. Sandborn, B. Reynolds, P. Srinivasan, D. Gopinath, T. Trichy, and V. Temple, “Rapid Reliability Optimization of Competing Power Module Designs Using Semi-Analytical Fatigue Models,” **Proc. of the Fourteenth Annual High Frequency Power Conversion Conference**, Chicago, IL, November 9-11, 1999, pp. 184-194.

P.F. Mead, M. Burch, **P. McCluskey**, F.G. Johnson, Failure Analysis of Plastic Packaged GaAs and AlGaAs/GaAs LEDs, **Proc. of the 25th International Symposium for Testing and Failure Analysis**, held at Santa Clara, CA, November 14-18, 1999. pp. 173-181.

F. P. McCluskey, K. Mensah, C. O’Connor, A. Gallo, “Reliable Use of Commercial Technology in High Temperature Environments,” **Proc. of the IEEE Aerospace Conference**, held in Big Sky, MT, 2000.

F. P. McCluskey, “Die Attach Fatigue in Power Semiconductor Packages,” **Proc. of the 2000 CPES Seminar**, held at Virginia Tech, Blacksburg, VA. Sept. 17-19, 2000.

P. Srinivasan, **F. P. McCluskey**, A. Sawle, and A. Woodworth, “Die Attach Fatigue in Power Semiconductor Packaging,” **Proc. of the PCIM 2000 Conference**, Boston, MA, October 5, 2000.

P. McCluskey, “Fatigue and Intermetallic Formation in Lead Free Solder and Die Attach,” **Proceedings of MRS Spring Meeting 2001: Microelectronics and Microsystems Packaging, Symposium N**. Materials Research Society, Boston, MA 2001.

P. McCluskey, “A Web-based Graduate Course on the Mechanical Design of High Temperature and High Power Electronics,” **Proceedings of the 51st Electronic Components and Technology Conference**, held in Orlando, FL, May 29-June 1, 2001. IEEE Press, Piscataway, NJ, 2001.

P. McCluskey, “Fatigue and Intermetallic Formation in Lead Free Solder Die Attach,” **Proceedings of IPACK’01, The Pacific Rim/ASME International Electronic Packaging Technical Conference**, held in Kauai, HI, July 8-13, 2001.

Citations

62 Total Citations listed in Science Citation Index. Breakdown available upon request.

Contracts and Grants**Current Contracts -**

PI or Co-PI	Title of Project	Funding Source	Inclusive Dates	Total Funding
PI	Design-for-Reliability Web Course	IEEE/NSF	9/01-8/02	\$30,000
PI	Large Area Solder Attach Modeling	NSF Outreach	6/01-5/02	\$25,000
PI	Microfatigue Testing of Attach Materials	DARPA	3/00-2/02	\$120,000
Co-PI	Life Cycle Cost Reduction through a Cradle-to-Grave Physics-of-Failure Approach to Sustainable Electronic Systems	WPAFB/ ManTech	6/99-9/03 (as Co-PI, I manage	\$4,198,767 \$250,000)
Co-PI	Decision Support for Design of High Performance PEBB	ONR	9/98-2/02 (as Co-PI, I manage	\$953,759 \$450,000)

Completed Contracts -

PI or Co-PI	Title of Project	Funding Source	Inclusive Dates	Total Funding
PI	Electronic Components Alliance (10 members)	Industry	10/98-9/01	\$600,000
PI	Uprating a RISC-based Processor	MIPS/ADS	8/00-7/01	\$67,500
PI	Reliability Assessment of a Size 6 ThinPak	SPCO	6/00-5/01	\$50,000
PI	Cold Start-up of Active Power Devices	NSF/CALCE	10/99-9/00	\$50,000
PI	Failure Mechanisms in Cathode Ray Tubes	NSF/CALCE	10/97-9/01	\$150,000
PI.	Accelerated Testing for Long Term Storage	NSF/CALCE	10/96-9/01	\$250,000
PI	Electromigration in Power Flip Chip Solder Balls	Delco	10/98-9/99	\$50,000
PI	Reliability of Delaminated PEMs	NSF/CALCE	10/98-9/99	\$50,000
PI	Virtual Qualification of Automotive Components	Visteon	4/98 - 4/01	\$125,000
PI	Uprating of Components for Deep Well Drilling	NSF/CALCE	4/98 – 4/99	\$50,000
PI	Failure Mechanisms in Automotive Speakers	NSF/CALCE	4/98 – 4/99	\$50,000
PI	High Temperature Distributed Control Systems	DARPA	6/96-12/98	\$1,100,000
PI	Enhanced Screening of LEDs	Microsoft	10/98-12/98	\$37,000
PI	Electronic Components Alliance (6 members)	Industry	10/97-9/98	\$150,000
PI.	Moisture Permeation Through Inorganic Coatings	NSF/CALCE	10/97-9/98	\$50,000
PI	Suitability of PEMs for Use in Fast Jet Avionics	NSF/CALCE	10/97-9/98	\$50,000
PI	Combustion in Electrically Degraded PEMs	NSF/CALCE	10/97-9/98	\$50,000
PI	Non-adhesion of Molding Compounds in PEMs	NSF/CALCE	10/97-9/98	\$50,000
PI	Polymer Nanocomposite Microdetector Array	DARPA/STTR	2/98 – 7/98	\$21,000
PI	Experimental Degradation Analysis of Intermittently Used PEMs and Assemblies	NSF/CALCE	10/96-10/97	\$50,000
PI	Uprating of Parts for Harsh Environments	NSF/CALCE	10/96-10/97	\$50,000
PI	Remaining Life in Intermittently Used Assemblies	NSF/CALCE	10/96-10/97	\$50,000
PI	Suitability of PEMs for Fast Jet Avionics	NSF/CALCE	10/96-10/97	\$50,000
PI	Effect of Delamination on PEM Reliability	NSF/CALCE	10/96-10/97	\$50,000
PI	CADMP Alliance (3 members)	Industry	4/96-9/97	\$75,000
PI	Nanoparticle Conducting Thin Films	DARPA/STTR	7/96 - 6/97	\$30,000
Co-PI	Power Electronics Building Blocks	ONR	9/96-3/97 (as Co-PI, I managed	\$100,000 \$35,000)

Honors and Awards

National Science Foundation Graduate Fellowship, September 1984- August 1987

AT&T Bell Laboratories Fellowship, September 1987- July 1991

Literati Society Award for Best Paper of 1997 in **Microelectronics International** for:

F. P. McCluskey, R. Munamarty, and M. Pecht, “Popcorning in PBGA Packages During IR Reflow Soldering,” **Microelectronics International**, Vol. 42, Jan. 1997, pp. 20-23.

Best Paper in Session, **1996 International Electronics Packaging Society Annual Technical Meeting**, held in Austin, TX, Sep 29- Oct 1, 1996.

Journal Editorships

Associate Editor, **IEEE Transactions on Components and Packaging**

North American Regional Editor, **Microelectronics International**

5 Articles reviewed this year for **Microelectronics and Reliability**

5 Articles reviewed this year for **IEEE Trans. on Components, Packaging, and Manufacturing Tech.**

General Chairman for the Following Workshops and Short Courses

First Annual Meeting of the Electronic Components Alliance, held at CALCE Electronic Products and Systems Center, University of Maryland, College Park, April 1996.

Workshop on Qualifying Components and Assemblies for Use Outside Their Temperature Specification Limits, held at CALCE Electronic Products and Systems Center, University of Maryland, College Park, January 23, 1997.

Second Annual Meeting of the Electronic Components Alliance, held at CALCE Electronic Products and Systems Center, University of Maryland, College Park, July 17, 1997

Workshop on Electronic Component Selection and Management, held at CALCE Electronic Products and Systems Center, University of Maryland, College Park, August 4-5, 1997.

Moving Toward Virtual Qualification of Components, held at CALCE Electronic Products and Systems Center, University of Maryland, College Park, February 17, 1998. (*held with the Third Annual Meeting of the Electronic Components Alliance*)

Seventh Quarterly Review Meeting, High Temperature Distributed Control System TRP, held in Columbia, MD, April 28-29, 1998.

High Temperature Electronics Short Course, held in association with the **4th Int’l IEEE High Temperature Electronics Conference**, held in Albuquerque, NM, June 14-18, 1998.

SiC Packaging Breakout Session, DARPA SiC Conf., held in Arlington, VA, August 1999.

Fourth Annual Meeting of the Electronic Components Alliance, held at the Mechanical Engineering Department, University of Maryland, College Park, October 15, 1999.

IMAPS Capital Chapter Meeting, held at University of Maryland, College Park, MD, January 2000.

Probabilistic Virtual Qualification of Components, held at CALCE Electronic Products and Systems Center, University of Maryland, College Park, July 10, 2000.

Fifth Annual Meeting of the Electronic Components Alliance, to be held at the Mechanical Engineering Department, University of Maryland, College Park, October 13, 2000.

Lead Organizer, **Symposium on Microsystem Packaging: Microelectronics and Microsystems Packaging**, 2001 Spring Meeting of the **Materials Research Society**, San Francisco, CA, April 2001.

High Temperature Electronics Short Course, held in association with the **International High Temperature Electronics Conference**, held in Oslo, Norway, June 5-8, 2001.

Design for Reliability Short Course, held in association with the **IMAPS Conference**, Baltimore, MD, October 2001.

Research Developments

- Developing a laboratory for nanoscale characterization of materials for MEMs, and micro/nano scale devices, including the microfatigue characterization of thin film attach materials. This laboratory is built around the acquisition of a MTS Tytron 250 materials test unit.
- Developed a novel research program investigating the technical and infrastructural issues related to “virtual qualification,” – the use of simulation to maximize the efficiency and minimize the cost of accelerated testing for qualifying components. This research was supported by ten corporations and government organizations, known collectively as the Electronic Components Alliance. This organization is to be merged into the CALCE EPSC in October 2001.
- Developed facilities for investigating the reliability of electronic systems at elevated temperatures including the purchase of inert gas, temperature cycling chambers that operate up to 550°C.
- Developed facilities for investigating the extreme temperature performance of electronic components including the development of a low temperature chamber that will reach -150°C and assisting in the reconditioning of a Tektronix S3270 functional tester that will provide functional test data on components from -70°C to 225°C.
- Developed a unique facility for combined temperature, humidity, and altitude testing to simulate the environment encountered by avionics used in fast jet applications. This included the development of a one-of-a-kind simulation testing chamber.
- Developed program for the study of power electronics packaging and automotive electronics as part of the Power Electronics Building Blocks effort. Included the purchase of a Tektronix 371 High Voltage Curve Tracer for electrical and thermal testing of discrete active power electronic devices.

Teaching and Advising**General Courses –**

Semester	Course No.	Course Name	Students	Grade	Grade1	Grade2
Fall 1997	ENME 310	Adv. Mechanics of Materials	42	2.93	2.81	2.96
Spring 2000	ENME 382	Materials and Mftg Processes	57	3.36	3.39	3.33
Spring 2001	ENME 382	Materials and Mftg Processes	77	3.16	3.22	3.11

Specialized Courses –

Semester	Course No.	Course Name	Students	Grade	Grade1	Grade2
Spring 1998	ENME 473	Mech. Design of Elect Systems	24	3.19	N/A	N/A
Fall 1998	ENME 473	Mech. Design of Elect Systems	48	4.25/5	N/A	N/A
Spring 1999	ENME 808D	High Temp Power Electronics	19	3.47	3.58	3.38
Fall 1999	ENME 473	Mech. Design of Elect Systems	25	3.43	3.65	3.25
Fall 1999	ENME 808	Mech. Design of Elect Systems	22	3.80	3.90	3.72
Fall 2000	ENME 808I	High Temp Power Electronics	17	3.43	3.55	3.31
Fall 2001	ENME 473	Mech Design of Elect Systems	15	Teaching at present		

Course or Curriculum Development -

ENME 382 – Changed the course focus to materials selection as opposed to manufacturing processes.

Developed a new lab on elastic modulus, coefficient of thermal expansion, and melting point interrelations to add a practical component to the early theoretical work on interatomic bonding. Also rewrote several other labs to permit the students the opportunity to conduct mechanical testing and determine material properties as a function of material processing and subsequent microstructural evolution. Included a class team project, which focused on investigating reported material properties and through searching for original references, determining the validity/credibility of values reported in the literature.

ENME 808D – High Power and High Temperature Electronics – The Spring 1999 offering of ENME 808D was the first time a course was offered providing the mechanical fundamentals of high power electronics design. This changed the focus of this course from one of covering solely the packaging of small signal electronics for high temperature environments (>125°C) to one including packaging challenges for power electronics at extreme temperatures as well. This was done to make the course more relevant for mechanical engineers facing today's mechatronic challenges in automotive, aerospace and other harsh environment applications where electronics are increasingly being used for power conditioning, distribution, and control. This change required developing sections on the function and selection of power components and the development of packaging techniques for thermal management of electronics dissipating significant amounts of heat.

Use of a debate format as a method of encouraging students to evaluate both sides of a technical controversy and to select application specific optimum solutions to a technical problem. This was useful in developing critical analysis, communications, and teamwork skills.

ENME 808 – Added material and projects to ENME 473 to make the course more challenging for graduate students and offered it as ENME 808. The modifications are being reviewed and will be included in the new graduate level version of ENME 473 to be offered as ENME 690.

ENME 473 - Use of commercially available design-for-reliability, thermal modeling, and vibration modeling software to familiarize students with the available tools for computer-aided mechanical design of electronic systems and to illustrate the design tradeoffs discussed in lecture.

Manuals, Notes, Software, and Other Contributions to Teaching –

- Creation of a set of videotaped presentations on applications and technological developments in high temperature electronics presented by industrial/academic leaders in the field.
- Use of industry/university collaborative projects assessing the reliability of electronic systems.
- Development of a website for the transfer of information on high temperature electronics.
- Development of a web-based design-for-reliability course focused on power electronics.

Advising (Other than Research) –

Faculty Advisor to the Student Chapter of IMAPS (the Electronics Packaging Society) – 30 students

Advising (Research Direction) -

Undergraduate

Student	Academic Year	Independent Study Project
Herman Lo	1997-98	Electrical Performance Modeling of Electronic Packaging
Ronald Mak	1997-98	Reliability Modeling of Electronic Packaging
Jeff Pulskamp	1997-98	Development of a Power Electronics Website
Tracie Didio	1998-99	WIE Fellowship: Reliability Assessment of Audio Speakers
Katie O'Brien	1998-99	WIE Fellowship: High Temperature Electronics Website
Zeke Topolosky	2000-01	Physics of failure approach to reliability of display devices
David Teitelbaum	2000-01	Virtual qualification of components for automotive applications

BS-MS Masters

Student	Academic Years	Placement
Zeke Topolosky	2000 – present	GRA

Masters

Student	Academic Years	Placement
Ritesh Jain	1997 - 1998	Delphi Delco Electronics
Krisada Kimseng	1997 - 1999	Returned to Thailand
Young-do Kweon	1997 - 1999	Flip Chip Industries
Manpreet Nagvanshi	1997 - 1998	General Motors
Rajagopalan Sundararajan	1997 - 1998	General Motors
Nivedan Tiwari	1997 - 1999	Qualcomm
Dhiraj Bansal	1998- 2000	Advanced Micro Devices
Kofi Mensah	1998 – 2000	Intel
Parthasarthy Srinivasan	1998 – 2000	Advanced Micro Devices
Rajdeep Sharma	1998 – 2000	Massachusetts Inst. Of Tech (PhD)
Raghuram Iyengar	1999 - 2000	Columbia University (PhD, Economics)
Shantanu Kalchuri	1999 – 2001	Qualcomm
Jaspreet Sidhu	1999 – 2001	Hughes Network Systems
Arvind Chandrasekhar	2000 – present	GRA
Shirish Gupta	2001 – present	GRA

PhD

Student	Academic Years	Placement	Status
Casey O'Connor	1998 - present	GRA	Proposal in August
Zheng Yungi	1999 - present	GRA	Proposal in August
Karumbu Meyappan	2000- present	GRA	Passed Qualifiers
Kaushik Ghosh	2001 – present	GRA	Qualifiers Scheduled

Masters (Committee Member)

Student	Graduation Date	Major Advisor
John Neel	October 1997	Barker
William Duvall	May 1998	Barker
Anant Mathur	May 1998	Pecht
Naveen Palli	October 1998	Azarm
Aravind Ramamoorthy	July 1999	Mead
Michael Blattau	July 1999	Barker
Uppalapati Ramgopal	September 1999	Pecht
Iuliana Bordelon	July 1999	Barker
Shapna Pal	January 2000	Mead
Neeraj Pendse	January 2000	Pecht
Keith Rogers	January 2000	Pecht
Cheng-Chieh Tu	August 1999	Natishan
Kang Zhang	January 2000	Pecht
Rajesh Natarajan	April 2000	Dasgupta
Andrew Green	April 2000	Barker
Zhenya Huang	June 2000	Pecht
Rajiv Subrahmanyam	July 2000	Sandborn
Gowrishankar Subaramanian	July 2000	Sandborn
Brian Reynolds	August 2000	Azarm
Deepak Gopinath	December 2000	Joshi
Arun Ramakrishnan	December 2000	Sandborn
Samuel Bardhan	March 2001	Pecht
Lang Yuan	May 2001	Joshi
Kontay Sexton	May 2001	Barker
Ravi Raghavan	July 2001	Sandborn
Siva Gurram	July 2001	Joshi
Heshan Gunawardane	August 2001	Natishan
Toby Syrus	August 2001	Pecht

PhD (Committee Member)

Student	Graduation Date	Major Advisor
Clifford Whitcomb	October 1998	Azarm
Rajeev Solomon	July 1999	Pecht
Diganta Das	September 1999	Pecht
Juscelino Okura*	April 2000	Dasgupta
John Powell *	April 2000	Natishan
Haleh Ardebili*	January 2001	Natishan
Pradeep Sharma*	August 2000	Dasgupta
Peter Haswell*	February 2001	Dasgupta
Nicoletta Sangalli*	May 2001	Barker
Keita Broadwater*	in progress	Mead
Kevin Moores*	in progress	Joshi
Qian Zhang*	in progress	Dasgupta

*Reviewed scholarly paper for MS degree or PhD Proposal

Service

Professional Activities and Memberships -

Society Memberships:

Member of ASM, ECS, IEEE, IMAPS, MRS, Tau Beta Pi, Phi Beta Kappa, Sigma Xi.

Technical Committees:

Member: JEDEC, IPC, and SEMATECH Task Groups on Moisture Sensitivity.

Session Chair and Technical Organizing Committee: International High Temperature Electronics Conference, (HiTEN'01) held in Oslo, Norway, June 5-8,2001.

Panel Member and Technical Organizing Committee: MicroMat 2000 Conference, held in Berlin, Germany, April 2000.

Session Chair and Technical Organizing Committee: 5th Int'l IEEE High Temperature Electronics Conference, held in Albuquerque, NM, June 12-15, 2000. Same for 3rd and 4th Int'l High Temperature Electronics Conference, held in Albuquerque, NM, June 1996 and June 1998.

Proposal Panel Reviews and Study Groups:

- Member of NSF Proposal Review Panel on Materials Processing and Manufacturing.
- Member WTEC Study Group on Electronics Packaging Technology in China (and Hong Kong)
- Member of EIA Workshop on Commercial-Military Integration in the Defense Electronics Industrial Base.
- Member of Proposal Review Panel for the NASA/JPL Electronic Parts Program

Paid Consultancies:

- Lear Astronics, Santa Monica, CA, Short Course/Consulting on High Temperature Electronics, June 1998
- Asea Brown Boveri, Lenzburg, Switzerland, Consulting on Power Electronics Packaging at their Corporate Power Electronic Products Review, October 1999.
- Applied Data Systems, Columbia, MD, Consulting on High Temperature Electronics, March-May 2000.
- Emerson Corporation, Power Electronics Design Reviews, January-March 2001.

University Service –

- Representative to the Library Committee for Mechanical Engineering
- Materials Review Instructor for Tau Beta Pi E.I.T. Review.
- Instructor in Women-in Engineering Summer Outreach Program

I certify that to the best of my understanding, the above CV is accurate.

F. Patrick McCluskey

Date

2001

Presentation 1/10/01 at Local IMAPS PoF RA of Power Electronics

Presented 1/22-23 CADMP Training at VA Tech

1/24/01 RAMS Proceedings

2/08-09 Consulting

2/14 Paper at COTS 2001

2/22-23 Consulting

3/1-2 Consulting

4/16-20 Meeting in San Francisco

5/30 Lake Buena Vista

6/5 Norway

7/10 Hawaii

High Temperature Short Course – HiTEN 01 Norway

At the university in the summer

At the IMAPS Fall general meeting

At the company that requested it

Call Jim McLeish about GM

Reimbursements

\$348 for the samples from Goodfellow.com

VA Tech Trip

Check reimbursements

Consulting Reimbursements

JPL/NASA NEPP Proposal Review

General Chairman of MRS Symposium N