

# Janet Kay Lumpp

## Personal:

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## Education:

**THE UNIVERSITY OF IOWA** Ph.D., 8/93  
Advisors: Susan D. Allen and David G. Rethwisch  
Thesis: *Excimer Laser Processing of Aluminum Nitride*

**PURDUE UNIVERSITY** M.S.Met.E., 12/89  
Advisor: Robert W. Vest  
Thesis: *PZT Films by MOD Technology for Ferroelectric Nonvolatile Memories*

**PURDUE UNIVERSITY** B.S.Met.E., 12/88, With Highest Distinction

## Professional Experience:

**University of Kentucky, Lexington, KY** - Electrical and Computer Engineering Department  
7/98 - present, Associate Professor  
8/93 - 6/98, Assistant Professor

**Oak Ridge National Laboratory, Oak Ridge, TN** - Solid State Division  
6/94 - 8/94, Faculty Research Participant

**Rockwell International, Cedar Rapids, IA** - Advanced Technology and Engineering  
5/90 - 8/90, 5/91 - 8/91, 5/92 - 8/92, Graduate Student Co-Op

**Argonne National Laboratory, Argonne, IL** - Energy Technology Division, Ceramics Group  
8/86 - 12/86, 5/87 - 8/87, 1/88 - 8/88, Undergraduate Co-Op

**Union Carbide Corporation, Indianapolis, IN** - Coating Services Division  
5/85 - 8/85, Undergraduate Co-Op

## Awards and Honors:

- National Science Foundation CAREER Award 1997-2001
- National Science Foundation Research Initiation Award 1994-1997
- National Science Foundation Graduate Fellow 1989-1992
- Dept. of Defense National Defense Science and Engineering Graduate Fellowship 1989
- Iowa Engineering Dean's Ph.D. Fellowship

## Patent:

U.S. Patent 5,584,956, Janet K. Lumpp and Susan D. Allen, *Method for Producing Conductive or Insulating Feedthroughs in a Substrate and the Substrate Produced Therefrom*, University of Iowa Research Foundation, Iowa City, IA. Issued: December 17, 1996.

## Book Chapter:

J.K. Lumpp, "Ceramic Assemblies" The Electronic Packaging Handbook, Glenn Blackwell, Editor. CRC Press/IEEE Press, Boca Raton, FL, 2000.

## Journal Publications: (\*Graduate Student, †Advisor)

1. P. Thota\*, J. Leifer, S.W. Smith, J.K. Lumpp, "Pattern Evaluation for In-Plane Displacement Measurement of Thin Films", to appear in *Experimental Mechanics*.
2. C. Cai\* and J.K. Lumpp, "Microstructural Studies of Cu Brazing on AlN", *Journal of Materials Research*, 16 (3), 670-677, March 2001.
3. J.C. Ball\*, J.K. Lumpp, S. Daunert, and L.G. Bachas, "Effect of Fabrication Factors on Performance of Screen-Printed/Laser Micromachined Electrochemical Nanovials", *Electroanalysis*, 12 (9), 685-690, May 2000.
4. C.A. Grimes, J.K. Lumpp, "Control of The Permeability Loss-Peak Frequency of Ni<sub>81</sub>Fe<sub>19</sub> Thin Films Through Laser Ablation of Triangular and Square Cluster Geometries", *Journal of Applied Physics*, 87 (9), 5254-5256, 1 May 2000.
5. J.C. Ball\*, D.L. Scott, J.K. Lumpp, S. Daunert, J. Wang, L.G. Bachas, "Electrochemistry in Nanovials Fabricated by Combining Screen Printing and Laser Micromachining", *Analytical Chemistry*, 72(3); 497-501, February 1, 2000.
6. J. Lumpp and S. Raman\*, "Electrical Connection of Thick Film Conductor Pads and Excimer Laser Machined and Metallized Vias in AlN", *IEEE Transactions on Components, Packaging, and Manufacturing Technology Part C: Manufacturing*, 21 (2), 118-125, April 1998.
7. J. Lumpp and S. Gopalakrishnan\*, "Adhesion of Thick Film Conductors on Excimer Laser Irradiated AlN", *International Journal of Microcircuits and Electronic Packaging*, 20 (4), 556-562, 1997.
8. C. Crofcheck\*, A. Grosvenor, K. Anderson, J.K. Lumpp, D. Scott, S. Daunert, "Detecting Biomolecules in Picoliter Vials Using the Bioluminescence of Aequorin", *Analytical Chemistry*, December 15, 1997.
9. J.K. Lumpp and S.D. Allen†, "Excimer Laser Machining and Metallization of Vias in Aluminum Nitride", *IEEE Transactions on Components, Packaging, and Manufacturing Technology Part B: Advanced Packaging*, 20 (3), 241-246, August 1997.
10. C.A. Grimes, P.L. Trouilloud, J.K. Lumpp, and G.C. Bush, "The Permeability Spectra of Hole Arrays Defined Upon Single Layer Permalloy Thin Films", *Journal of Applied Physics*, 81 (8), 4720-4722, 15 April 1997.
11. Janet K. Lumpp, "Excimer Laser Machining of AlN", *Proc. Int'l. Conf. On Processing and Adv. Appl. Of Lasers*, Palm Coast, FL, May 1994, *Materials Science & Engineering B*, B45, 208-212, 1997.
12. J.K. Lumpp and S.D. Allen†, "Excimer Laser Ablation of Aluminum Nitride", *Journal of Materials Research*, 12 (1), 218-225, January 1997.
13. Craig A. Grimes and J.K. Lumpp, "Laser Processing of Ni<sub>81</sub>Fe<sub>19</sub> Thin Films: Control of Anisotropy", *IEEE Trans. on Magnetics*, 32 (5), 4523-25, September 1996.
14. Craig A. Grimes, and Janet K. Lumpp, "The Soft Magnetic Properties of Stripes Fabricated Using Laser Ablation of Multilayer Thin Films", *Journal of Applied Physics*, 79 (8), 5497-9, 15 April 1996.
15. J. K. Lumpp, N. Chen, K. C. Goretta, and H. M. Herro, "Mechanical Properties of CuO," *High Temperature Materials and Processes*, Vol. 9, No. [1], 1990.
16. M. T. Lanagan, R. B. Poeppel, J. P. Singh, D. I. Dos Santos, J. K. Lumpp, and etal., "Superconducting Wires," *Journal of the Less Common Metals*, Vol. 149, April 1989.
17. J.P. Singh, U. Balachandran, D. Shi, J. K. Degener (Lumpp), and R. B. Poeppel, "Observations of Preferred Orientations in High-Tc Oxide Superconductor Tapes," *Materials Letters*, Vol. 7, No. [3], September 1988.

## Conference Publications: (\*Graduate Student, † Advisor)

1. Janet K. Lumpp and Kelly D. Bradley, "Development and Dissemination of KEEP - Kentucky Electronics Education Project", *Proceedings of the Elec. Comp. & Tech. Conf.*, New Orleans, LA, May 2003.
2. P. Thota\*, J. Leifer, S. Smith and J. Lumpp, "Initial Pattern Evaluation for Inplane Measurement of Thin Films," *Proceedings of the International Modal Analysis Conference (IMAC XXI)*, Kissimmee, FL, February 2003.
3. Donald R. Owens\* and Janet K. Lumpp, "PLD and LCVD of Discrete and Microhotplate Tin Oxide Sensors", *Proc. 33<sup>rd</sup> International Symposium on Microelectronics, IMAPS 2000*, Boston, MA, 2000.
4. Kam S. Kwan\* and Janet K. Lumpp, "Characterization of Palladium Thick Film Hydrogen Sensor", *Proc. Int'l. Soc. For Hybrid Microelec., IMAPS'97*, Philadelphia, PA, 1997.
5. LeAnn Hodges\* and Janet K. Lumpp, "Evaluation of Lead-Free Solder and No-Clean Flux for Attachment of Packaged High Power Components to Direct Bond Copper", *Proc. Int'l. Soc. For Hybrid Microelec., ISHM'96*, Minneapolis, MN, pp. 308-13, 1996.
6. Sarmad Albanna\* and Janet K. Lumpp, "Electroless Copper Plating on Laser Patterned Aluminum Nitride", *Proc. Int'l. Soc. For Hybrid Microelec., ISHM'96*, Minneapolis, MN, pp. 371-6, 1996.
7. H. Li\* and J.K. Lumpp, "Excimer Laser Direct Write on AlN", *Proceedings, Electronic Packaging Materials Science VIII Symposium*, Materials Research Society, April 1995.
8. S. Gopalakrishnan\* and J.K. Lumpp, "Adhesion of Screen Printed Conductors on Laser Reduced AlN", *Proceedings, Electronic Packaging Materials Science VIII Symposium*, Materials Research Society, April 1995.
9. S. Raman\* and J.K. Lumpp, "Laser Machining and Metallization of Vias in Aluminum Nitride", *Proceedings, Electronic Packaging Materials Science VIII Symposium*, Materials Research Society, April 1995.
10. J. K. Lumpp, C. N. Coretsopoulos and S. D. Allen†, "Fluence Dependence of Excimer Laser Ablation of AlN," *Fall Meeting of the Materials Research Society, Electronic Packaging Symposium*, Boston, MA, November 1993.
11. J. K. Lumpp and S. D. Allen†, "Laser Micromachining of AlN," *Proceedings of the International Conference on Beam Processing of Advanced Materials TMS/ASM 1992 Fall Meeting*, November 1992.
12. J. K. Lumpp and S. D. Allen†, "Excimer Laser Etching of Aluminum Nitride," *Proceedings of the International Symposium for Hybrid Microelectronics 1991*, October 1991.
13. B. Poeppe, K. C. Goretta, M. T. Lanagan, J. T. Dusek, J. K. Degener (Lumpp), "Ceramic Fabrication Processes for High-T<sub>c</sub> Superconductors", *Proceedings of the American Power Conference*, Vol. 50, 450-453, 1988.

## Workshops and Short Courses:

Rao Tummala, Janet K. Lumpp, Leyla Conrad, "Microelectronic Systems Packaging: Careers, Technologies and Markets", half day course presented at the 33<sup>rd</sup> International Symposium on Microelectronics, IMAPS 2000, Boston, MA, September, 2000 and at the 35<sup>th</sup> International Symposium on Microelectronics, IMAPS 2002, Denver, CO, September, 2002.

Janet Lumpp, "KEEP Teacher Workshop", for math and science teachers grades 5-12, 3 day course on electricity, electronic properties of materials, and circuit fabrication techniques. Supported by NSF CAREER Award and MRSEC. 1999, 2001, 2002

## External Grants

1. Army Research Laboratory

J.K. Lumpp Curriculum Vitae

\$4,415,000 (\$1,000,000 to UK), 5/20/04 – 5/19/06

Principal Investigator: Dr. James Davidson, Vanderbilt University

UK Principal Investigator: Janet Lumpp

UK Co-PIs: Vijay Singh, Zhi Chen, Bruce Hinds, Leonidas Bachas, John Anthony, Mark Meier, Rodney Andrews

*“Advanced Carbon Nanotechnology Program”*

2. IMAPS Sidney J. Stein Educational Foundation

\$15,000, 1/1/03 - 12/31/03

Principal Investigator: Janet K. Lumpp

*“Carbon Nanotube Filled Conductive Adhesives”*

3. National Science Foundation

\$2,278,845, 8/1/98 - 7/31/03

Principal Investigators: Leonidas Bachas, D. Bhattacharyya

Co-PIs: Syliva Daunert, Kimberly Anderson, Arthur Cammers-Goodwin, Robert Lodder, Janet Lumpp

*“Development of Integrated Sensing and System Architectures” - Integrative Graduate Education and Research Training Program*

4. National Science Foundation

Principal Investigator: Eric Grulke

Education Outreach Coordinator: Janet K. Lumpp

*“Advanced Carbon Materials Center” - MRSEC*

5. DARPA

\$372,352, 4/1/97 - 4/30/99

Principal Investigator: Denise M. Wilson

Co-PIs: Janet K. Lumpp and Thad Roppel (Auburn University)

*“MEMS-Based Distributed Chemical Sensing Systems for Monitoring Battlefield and Weapon Storage Sites”*

6. National Science Foundation

\$210,000, 8/15/97 - 7/31/01

Principal Investigator: Janet K. Lumpp

*“CAREER: Electronic Packaging - Process Development and Microelectronics Education”*

7. NASA EPSCoR

\$31,890, 7/1/97 - 6/30/98

Principal Investigator: Janet K. Lumpp

*“Laser Micromachining Process Development for Biochemical Sensors and Optical Filters”*

8. National Science Foundation - Research Initiation Award

\$100,000, 8/1/94 - 7/31/97

Principal Investigator: Janet K. Lumpp

*“Improved Adhesion and Selective Area Deposition of Metal Films on Ceramics for Microelectronics”*

9. National Science Foundation - Major Research Instrumentation Award

\$150,000, 9/15/97 - 9/14/00, all funds to UofL

Principal Investigator: Robert W. Cohn (University of Louisville)

Co-PIs: Janet K. Lumpp (UK), Mahendra K. Sunkara, Peter W. Faguy, W. Karl Pitts (UofL)

*“Acquisition of Versatile Non-Contact Surface Profiling Microscopes for Characterizing Microtopographic Surfaces”*

10. Kentucky Space Grant Consortium

\$25,347, 7/1/95 - 6/30/96

Principal Investigator: Janet K. Lumpp

*“Excimer Laser Assisted Fabrication of Spatial Light Modulators”*

## **Biography:**

Janet Kay Lumpp received her B.S. and M.S. degrees in Metallurgical Engineering from the School of Materials Engineering, Purdue University in 1988 and 1989, respectively. Dr. Lumpp was a National Science Foundation Graduate Fellow from 1989-1992 and was also selected for the Department of Defense National Defense Science and Engineering Graduate Fellowship in 1989. She completed her Master's Degree in one year plus one semester as a dual level undergraduate/graduate student. Her M.S. thesis was on lead zirconate titanate thin films for nonvolatile memory applications. After moving to the University of Iowa and shifting to laser research, she completed her Ph.D. in three and a half years including the equivalent of one year of work at Rockwell International. She received her Ph.D. in Chemical and Materials Engineering from the University of Iowa in 1993.

Dr. Lumpp has published and presented technical papers at meetings of the American Ceramic Society, International Symposium on Hybrid Microelectronics, and The Metallurgical Society on topics ranging from powder metallurgy to ferroelectric thin films to laser machining. Her professional experiences include co-operative education positions at Argonne National Laboratory and Rockwell International. At Argonne, she worked on fabrication of ceramic superconductors and solid oxide fuel cells and taught gifted high school students a course on ceramic processing and mechanical testing. At Rockwell, her work in the multichip module group by focused on laser machining fine pitch vias in aluminum nitride packages.

In August 1993, Dr. Lumpp joined the Department of Electrical Engineering at the University of Kentucky. Her current research is concerned with modification of ceramic surfaces by laser irradiation as a preparation step for deposition of films by laser chemical vapor deposition, electroless plating, and screen printing. Applications for these projects include machining of multichip module packages and metallization for hybrid microelectronic circuits on ceramic substrates. She is also processing glass, metal, and polymer materials for gas sensing, chemical assay, and magnetic device applications. She has taught courses on the fabrication and operating principles of semiconductor devices, ceramic engineering, lasers, circuit analysis for non-EE students, and hybrid microelectronics. She has established the Laser Processing Laboratory and re-established the Hybrid Microelectronics Laboratory in the Electrical Engineering Department. Dr. Lumpp chartered a student chapter of IMAPS at UK and serves as Faculty Advisor. In 1998, Dr. Lumpp was promoted to Associate Professor with tenure.

Recently, Dr. Lumpp has devoted time to outreach and recruiting activities. Through an NSF CAREER Award she has started an educational program called KEEP - Kentucky Electronics Education Project using microelectronics as a theme in science and math education. Efforts are targeted at teachers and students at the middle school and high school levels. Activities to date include circuit fabrication projects, fieldtrips, and teacher workshops.