Chad L. Rodekohr

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EDUCATION

Ph.D., Mechanical Engineering (December 2008), Auburn University
- Dissertation: ***Material Factors Influencing Metallic Whisker Growth***

M.S., Physics (May 2006), Auburn University

B.S., Aviation Management (December 1997), Auburn University

PROFESSIONAL INSTRUCTION

Associate Professor of Physics, Presbyterian College (PC) (Fall 2008-Present)
- Granted tenure, promotion (to associate professor), and sabbatical Spring of 2014
- 34 Normal courses taught totaling 600 students
  - 14 of them were new courses
- 19 Normal lab courses taught totaling 294 students
  - 8 of them were new courses
- 1 Senior Capstone (9 students)
- 2 On-line courses (27 students)
- 2 On-line lab courses (21 students)
- 12 Summer fellows projects
- 8 Honors projects
- 1 Travel course (9 students)
- 6 Directed readings/studies
- 17 Advised Internships
- 2 Internships (students worked for me)
- Averages:
  - 78.0 students taught/semester
  - 18.1 students/class, 15.5 students/lab
  - 30.5 teaching hours/year (not including internships)
  - 3 students mentored/ summer
  - 3 times chosen as 'favorite professor' by various student athletes
- **Courses and Labs taught:**
  - General Physics I, II, and associated labs
    - Redesigned all labs
  - General Physics I and associated lab - online

PROFESSIONAL INSTRUCTION (CONTINUED)

- **Courses and Labs taught (continued):**
  - Engineering Physics and associated lab
    - Designed this course for PC's Dual Degree students who will transfer into a partner engineering program Physics with Calculus I, II, III and associated labs
    - Redesigned all labs
  - Physical Interactions in Biological Settings (co-taught with Dr. Stuart Gordon)
  - Advanced Mechanics
  - Geophysics of the Colorado Plateau (worked with Dr. James Wanliss) (travel course)
  - The Physics of How Things Work and associated lab
    - Re-designed the class and labs for PC
  - The Physics of Paper Airplanes
  - The Mechanics of a Trebuchet
  - Electricity and Magnetism
  - Classical Optics
  - Advanced Physics Laboratory (Senior Capstone)
  - Earth Science and associated lab
    - Redesigned all labs
- **Honors Projects directed:**
  - True Green Project - Household heat flow, Spring 2013
  - Analysis of Rope Braiding, Fall 2012
  - True Green Project - Solar Panels, Fall 2012
  - Manipulation of Sn Whisker Growth, Fall 2012
  - Characterization of Toadfish Vocalizations (co-taught with Dr. Jim Wetzel, 2 students), Spring 2012
  - Making a House Green, Fall 2009
  - Design and construction of a shoe lifetime-indicator, Fall 2008
- **Summer Fellows Research Projects:**
  - "HVAC System Efficiency," 2013
  - "A Study in Refrigerator Efficiency," 2013
  - "A Geometrical Approach to Rope Braiding," 2013
  - "Environmental Values: A Study in World-views," 2013
  - "IMC Etching, Stress Analysis, and Sn Whisker Growth," 2012
  - "Mathematical Analysis of Braiding," 2012

PROFESSIONAL INSTRUCTION (CONTINUED)

- **Summer Fellows Research Projects (Continued):**
  - "Attic Temperature and Solar Irradiance," 2012
  - "Solar Panels: A Fundamental Calculation Tool," 2012
  - "Weather Data Measurement Methods and Limitations," 2011
  - "Foundations of Solar Irradiance," 2011
  - "Correlation Between Intermetallic (IMC) Layer Growth and Tin (Sn) Whisker Population Qualities," 2009
  - "Thin Film Stress Evolution as a Driving Force for Tin (Sn) Whisker Growth," 2009

Interim Instructor, Auburn University (Summer 2004)

- Foundations of Physics (PHYS 1000)

High School Teacher, Auburn Alabama

- Conduct lecture, lab, and recitation for home-school students
  - Chemistry 2006-2007 (18 students)
  - Physics 2007-2008 (10 students)

Math & Science Teacher, Eatonton Georgia (2000-2001)

- Georgia Public Schools, Putnam County
  - Middle and High School

Co-Instructor, Auburn University (Fall 1999)

- Freshman Year Experience (U 100)

OTHER TEACHING EXPERIENCE

Graduate Teaching Assistant in Physics, Auburn University

- Lab Instructor: Physics for Scientists and Engineers I and II (Fall 2001 and Spring 2002)
- Lab Instructor: Foundations of Physics (2002-2004)

Assistant to Academic Support Coordinator, Auburn University (1998-2000)

- Coordinated and promoted the Study Partners Program, SI Program, and Study Skills Classes
- Conducted academic lectures
- Conducted training sessions

Supplemental Instruction (SI) Supervisor, Auburn University (1998-1999)

- Supervised and organized SI Labs which involve collaborative learning techniques and transferable study skills

Study Partners Program, Auburn University (1994-2000)

- Program Supervisor
- Physics Tutor

OTHER TEACHING EXPERIENCE (CONTINUED)	**Volunteer at Winder-Barrow High School,** Winder Georgia (Spring 2000) • Served as selected subject speaker and assisted with lab experiments in Physics and Biology courses
TEACHING AWARDS	**Graduate Teaching Assistant of the Year,** Auburn University College of Sciences and Mathematics (2002-2003) **Graduate Teaching Assistant of the Year**, Auburn University Physics Department (2001-2002)
Professional Engineering Experience	**Fusion Energy Research Laboratory Engineer**, Auburn University (Summer 2008) • Designed and built the cooling system for the Compact Toroidal Hybrid (a system that magnetically confines high temperature plasma) • Built a capacitor bank used to dump excess radiation energy • Built a klystron based microwave generation system
SCIENTIFIC RESEARCH	**Professional Research,** Presbyterian College (2008-Present) - All of these projects heavily involve PC students in all phases of the scientific method • Researching energy efficient designs in household renovations o Received a Development of Energy Efficient Design (DEED) Grant from the American Public Power Association and Piedmont Municipal Power Association, City of Clinton, and Presbyterian College ($40,000 + $20,000 'in-kind support') • Metallic whisker formation and application o Supported in 2010 by Center for Advanced Vehicle Electronics in Extreme Environments (CAV3E) o Collaborators include: Air Force Institute of Technology, FormFactor Inc., Auburn University Physics, Mechanical, and Electrical Engineering, University of South Carolina Microscopy, and CAV3E • Dynamic braiding analysis o Collaborators include Highland Industries and Auburn University Polymer and Fiber Engineering • Equipment and techniques utilized o Scanning Electron Microscope (SEM) o Focused Ion Beam (FIB) o Energy Dispersive X-Ray Spectroscopy (EDX) Mapping o Beam Bending Techniques o Interferometer o Surface Profiler o Braiding Machine o Machine Vision Techniques

SCIENTIFIC RESEARCH (CONTINUED)

Graduate Research Assistant, Auburn University (2001-2008)

- Member of CAV3E, a National Science Foundation (NSF) research center focusing on harsh environment electronics
- State-of-the art research techniques and skills
  - Electron Microscopy (SEM)
  - Energy Dispersive X-Ray Spectrometer (EDX)
  - Backscattering Microscopy (BSE)
  - Auger Electron Microscopy (AES)
  - Atomic Force Microscopy (AFM)
  - Polarized Light Microscopy
  - ERDAS Imagine® Analysis
  - Cylindrical Magnetron Sputtering
  - Various thin film evaporative and sputtering techniques
  - Electron microscopy sample preparation techniques
  - Wetting Balance
  - Chemical and Electrochemical Etching
- Collaborated with engineering and physics students and faculty to gather, interpret, and analyze data
- Studied various aspects of the feasibility of using lead-free solders in harsh environment electronics. Specifically:
  - Metallic whisker growth
  - Intermetallic layer growth and composition
  - Intermetallic layer roughness and correlation to growth
  - Wetting Characteristics
- Presented research results to industrial partners bi-annually
- Wrote research monographs which contained the data and conclusions from my various studies to CAV3E's member companies

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PUBLICATIONS

M.J. Isaac, C.L. Rodekohr, D. Branscomb, ***"Mathematical Analysis of Rope Braiding,"*** Proceedings of the ASME Early Career Technical Journal, Volume 11, Section 5, pg. 211-218, November 2012

A. Yuill, C. Plunket, D. Branscomb, C. Rodekohr, ***"Development, Testing, and Comparison of a Regular Braided Eye Splice,"*** Proceedings of the ASME Early Career Technical Journal, Vol. 11, Section 7, pg. 266-269, November 2012

C. Plunket, A. Yuill, D. Branscomb, C.L. Rodekohr, ***"Development and Testing of a Diamond Braided Eye Splice,"*** Proceedings of the ASME Early Career Technical Journal, Vol. 10, Section 2, pg. 99-104, November 2011

PUBLICATIONS (CONTINUED)

C.L. Rodekohr, G.T. Flowers, M.J. Bozack, R. Jackson, R. Martens, Z. Zhao, E.R. Crandall, V. Starman, T. Bitner, and J. Street, ***"Correlation of Intrinsic Thin Film Stress Evolution and IMC Growth with Whisker Growth,"*** Proceedings of the 57th IEEE Holm Conference on Electrical Contacts, pg. 205-211, September 2011

C.L. Rodekohr, G.T. Flowers, M.J. Bozack, J.C. Suhling, D.A. Rodekohr, ***"The Effects of Surface Finish Roughness on Intermetallic Layer Growth, Intermetallic Interface Roughness, and Solder Joint Reliability,"*** Proceedings of the 56th IEEE Holm Conference on Electrical Contacts, pg. 452-456 September 2010

M.J. Bozack, E.R. Crandall, C.L. Rodekohr, R.N. Dean, G.T. Flowers, J.C. Suhling, ***"High Lateral Resolution Auger Electron Spectroscopic (AES) Measurements for Sn Whiskers on Brass,"*** IEEE Transactions on Electronics Packaging Manufacturing – Special Section on Tin Whiskers, Vol. 33, No. 3, pg. 198-204 July 2010

C.L. Rodekohr, G.T. Flowers, M.J. Bozack, R.N. Dean, R.L. Jackson, P. Lall, ***"Influence of Quantifiable Extrinsic Stresses on Tin Whisker Growth,"*** Proceedings of the ASME 2009 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference, Vol. 1: 22nd Biennial Conference on Mechanical Vibration and Noise, pg 827-832, September 2009

R. Dean, J. Weller, M. Bozack, C. Rodekohr, B. Farrell, L. Jauniskis, J. Ting, D. Edell, J. Hetke, ***"Realization of Ultra Fine Pitch Traces on LCP Substrates,"*** IEEE Transactions on Components and Packaging Technologies, Vol. 31, Issue 2, pg. 315-321

C.L. Rodekohr, M.J. Bozack, G.T. Flowers, ***"Auger Electron Spectroscopic (AES) Measurements on High Aspect Ratio Sn Whiskers,"*** Proceedings of the 54th IEEE Holm Conference on Electrical Contacts, pg. 232-237, 2008

C.L. Rodekohr, M.J. Bozack, G.T. Flowers, ***"Influence of Substrate Surface Roughness on Sn Whisker Growth,"*** Proceedings of the 54th IEEE Holm Conference on Electrical Contacts, pg. 245-248, 2008

C.L. Rodekohr, M.J. Bozack, G.T. Flowers, ***"Material Factors Influencing Metallic Whisker Growth,"*** (Ph.D. Dissertation August 2008, http://etd.auburn.edu/etd/handle/10415/1009)

INTERNAL PUBLICATIONS	C.L. Rodekohr, M.J. Bozack, ***"IMC Growth and Roughness on Ultra-Smooth and Commercial Board Finishes Using Pb-Free Solders,"*** Auburn University/ CAVE (Fall 2007)
	C.L. Rodekohr, M.J. Bozack, ***"Identification and Growth of Intermetallic Compounds in Pb-Free Solder Alloy Systems,"*** Auburn University/ CAVE (Spring 2005)
	C.L. Rodekohr, M.J. Bozack, ***"Foundations of Physics Lab Manual,"*** Auburn University (Fall 2002)
STUDENT PRESENTATIONS	P. Sanders, C.L. Rodekohr, ***"The True Green Project: Household Heat Flow,"*** Presbyterian College Summer Fellows Symposium Summer 2013
	P. Gurung, C.L. Rodekohr, ***"Analytical and Empirical Analysis of Rope Braiding,"*** Presbyterian College Summer Fellows Symposium Summer 2013
	J. Hoffbauer, C.L. Rodekohr, ***"The True Green Project:Energy Usage of Refrigerators,"*** Presbyterian College Summer Fellows Symposium Summer 2013
	M. Morgan, C.L. Rodekohr, ***"The True Green Project: Environmental Considerations,"*** Presbyterian College Summer Fellows Symposium Summer 2013
	M. J. Isaac, C.L. Rodekohr, ***"Mathematical Analysis of Braided Rope,"*** Presbyterian College Summer Fellows Symposium Summer 2012 and ASME Early Career Technical Conference and Honors Day Symposium Spring 2013
	E.R. Woodard, C.L. Rodekohr, ***"The True Green Project: Solar Panels,"*** Presbyterian College Summer Fellows Symposium Summer 2012 and Honors Day Symposium Spring 2013
	P. Sanders, C.L. Rodekohr, ***"True Green Project: Water Heaters and HVAC,"*** Presbyterian College Summer Fellows Symposium Summer 2012 and Honors Day Symposium Spring 2013
	H. Carson, C.L. Rodekohr, ***"Tin Whisker Growth vs. Stress and IMC Evolution,"*** Presbyterian College Summer Fellows Symposium Summer 2012
	E.R. Woodard, C.L. Rodekohr, ***"The True Green Project: Household Heat Flow,"*** Presbyterian College Summer Fellows Symposium Summer 2011 and Honors Day Symposium Spring 2012 and Big South Undergraduate Research Symposium Spring 2012
	C.L. Burch, C.L. Rodekohr, ***"The True Green Project: Water Heaters and Solar Irradiance,"*** Presbyterian College Summer Fellows Symposium 2011 and Honors Day Symposium Spring 2012 and Big South Undergraduate Research Symposium Spring 2012

STUDENT PRESENTATIONS (CONTINUED)

J. Street, C.L. Rodekohr, ***"Tin (Sn) Whiskers: The Relation Between Internal Stress and Whisker Growth,"*** Presbyterian College Summer Fellows Symposium Summer 2009 and Honors Day Symposium Spring 2010 and Big SURS Spring 2010 and South Carolina Independent Colleges and Universities Symposium on Undergraduate Research Symposium, Spring 2010

T. Bitner, C.L. Rodekohr, ***"Impact of Intermetallic (IMC) Layers on Tin Whisker Growth,"*** Presbyterian College Summer Fellows Symposium 2009 and Honors Day Symposium Spring 2010

A. Knaak, C.L. Rodekohr, ***"Making a House Green,"*** Presbyterian College Honors Day Symposium Spring 2010 and Piedmont Municipal Power Association Business Meeting Spring 2010

J. Painter, C.L. Rodekohr, ***"Design and Construction of a Shoe Lifetime Indicator,"*** PC Physics Department Honors Presentation Spring 2009

RESEARCH POSTER PRESENTATIONS

"Results of Influence of Applied Stress on Whisker Growth," CAVE Review, Spring 2008

"Results of Whisker Growth on Various Sputtered Metals Deposited on Brass," CAVE Review, Spring 2008

"Influence of Applied Stress on Whisker Growth," CAVE Review, Fall 2007

"Whisker Growth on Various Sputtered Metals Deposited on Brass," CAVE Review, Fall 2007

"Whisker Growth on Metallic Substrates Other than Brass," CAVE Review, Spring 2007

"Influence of Surface Roughness on Sn Whisker Growth," CAVE Review, Fall 2006

"Influence of Surface Roughness on IMC Growth," CAVE Review, Fall 2006

"Role of Surface Oxides on Sn Whisker Growth," CAVE Review, Fall 2006

"Comparison of IMC Growth on Ultra-Smooth and Commercial Board Finishes Using Pb-Free Solders," CAVE Review, Spring 2006

"Preparation of Ultra-Smooth Surface Finishes for IMC Growth Using Pb-Free Solders," CAVE Review, Fall 2005

"Reproducibility of Whisker Growth vs. Film Stress State on Brass," CAVE Review, Fall 2005

"Growth Mechanism of Sn Whiskers," CAVE Review, Spring 2005

RESEARCH POSTER PRESENTATIONS (CONTINUED)

"Problems in Measuring Isothermally Grown Intermetallic Compounds on Highly Reactive Ni-Au Board Finishes," CAVE Review, Spring 2005

"Isothermal Growth of Intermetallic Compounds in Pb-Free Solder Alloy Systems," CAVE Review, Fall 2004

"Identification and Growth of Intermetallic Compounds in Pb-Free Solder Alloy Systems," CAVE Review, Fall 2003

"Growth Kinetics and Diffusion Mechanisms for Pb-Free Intermetallics," CAVE Review, Fall 2003

SERVICE TO PRESBYTERIAN COLLEGE

Dual Degree Coordinator (2008-Present)

- Formed Dual Degree Partnership with Georgia Institute of Technology, 2013
- Formed Dual Degree Partnership with University of South Carolina 2009
- Designed *"PHYS 260 Engineering Physics"* and associated lab to aid students in the transfer process

Society of Physics Students Advisor 2008-Present

- Two Paper Airplane Contests
- Trebuchet Contest
- Biannual Astronomy Night
- Annual 'Town Hall Meeting' and 'Shin-dig' as well as 'Croquet Day' for Alumni during the Homecoming weekend

Formed partnership with Laurens Academy

- Providing quality physics instruction for LA
- Providing teaching experience/internships for PC physics majors

Advising

- Freshman Advisor 2009, 2010, 2011, 2012, and 2013
- Average ~ 40 advisees per year
- Also advise dual degree students while at their engineering school

Student recruiting

- Regularly participate in football recruiting day, open house events, individual student and parent visits, potential students regularly attend my classes as part of the recruiting process

Quattlebaum Interviewer: 2009, 2010, 2011, 2012, and 2013

Served on Honor Council: 2009-2010

Service to Presbyterian College (Continued)

The Committee on Athletic Activities

- Chair 2010-2011, 2011-2012
- Served 2009-2012
- During NCAA Division 1 accreditation process

The Academic Affairs Committee

- Served 2012-2014

The General Education Committee

- Served 2012-2014
- Secretary 2013-2014

The Policy Advisory Board: Class Schedule Analysis

- Served 2013

Session Presider for PC Honors Day Symposium 2011, 2012, 2013

Led visiting professor search: 2012-2013

Led search for adjunct professor positions

- Adjunct searches: 2009-2010, 2011-2012, 2012-2013

Built Rubens Tube for Physics department

- Used throughout the year to demonstrate sound waves visually
- This Rubens tube is unique in its ability to also demonstrate the phenomena of "beats."

Contributed to "Electrons and Pixels" (The PC Physics Newsletter)

Volunteer for Assessment Spring 2013 and 2014

Designed, distributed, and analyzed both student and alum surveys for the SACs review of PC's Physics department

Aided in the EPA's assessment of PC's physics department

Service to Community

True Green Project Director

- Built a web based tool that can be used by any home owner across the country to calculate customized renovation impacts (both financial and environmental) and thus make wise renovation decisions
- http://truegreen.presby.edu

Homeschool Science Olympiad Team Coordinator, Spring 2013-2014

- Work with middle school aged children and their parents to prepare the students for the Science Olympiad

SERVICE TO COMMUNITY (CONTINUED)

Lead a bi-monthly age-integrated home Bible study, 2010-Present

Deacon of Cornerstone Baptist Church, 2013-Present

Traveled with a local church to aid rebuilding efforts after tornado destruction near Adairsville Georgia, Summer 2013

Co-Vice President (with my wife, Rachel) of Christian Home Educators of Laurens County (CHELC), 2010-2011, 2011-2012

Volunteered to coach members of Clinton High School's (CHS) Science Olympiad team, 2010-2011, 2011-2012

- My group placed 2nd in the state in their event in 2012

Coordinated members of SPS to help CHS's Science Olympiad team with other events, 2012-2013

Member of Cornerstone Baptist Church, 2012-Present

Volunteer physics teacher for CHELC 2011-2012

Volunteered as a "Senior Experience" and "Senior Internship" advisor for a CHS student 2010

Traveled with a local church to provide relief aid to Joplin Missouri after tornado destruction, Summer 2011

INVITED SPEAKER

- Presbyterian College Summer Fellows Luncheon, ***"A Forest View of the True Green Project,"*** Summer 2013
- Holly Ridge Baptist Church, ***"Reconciling Science and The Bible,"*** Winter 2012
- Thornwell Youth Group, ***"Science vs. Bible,"*** Winter 2012
- Presbyterian College Faculty Forum, ***"The True Green Project,"*** Spring 2012
- Cornerstone Baptist Church, ***"The Big Journey,"*** Summer 2013
- New Prospect Baptist Church, ***"Reconciling Science and The Bible,"*** Winter 2011
- Presbyterian College Summer Fellows Luncheon, ***"Overview of Sn Whisker Research,"*** Summer 2009
- CAVE Review: ***"Results of two Sn whisker Studies,"*** Auburn, Alabama (Spring 2008)
- Augusta State University Seminar, ***"Sn Whiskers: Small Phenomena, Big Problem,"*** Augusta Georgia (Spring 2008)
- Abraham Baldwin Agricultural College, ***"Derivation of Centripetal Acceleration,"*** Tifton Georgia (Fall 2007)

INVITED SPEAKER (CONTINUED)

- CAVE Review: ***"Status of Fundamental Whisker Studies,"*** Auburn Alabama (Fall 2007)
- Wesleyan College Physics Seminar: ***"Solder Reliability Issues in the World of Harsh Environment Electronics,"*** Macon Georgia (Spring 2007)
- Health and Human Performance: ***"Cycling,"*** Auburn University (Fall 2005)
- Teaching Technology for Physics Teachers: ***"Classroom Demonstrations,"*** Auburn University (Fall 2004)

PAST ACTIVITIES

Sunday School Teacher, Auburn Alabama (2002-2008)

- Lakeview Baptist Church
- Taught Bible based lessons to junior high and high school students

Bible Study Leader, Auburn Alabama (2002-2008)

- Led a diverse group of college students through a weekly study of God's Word

Member, Lakeview Baptist Church (2001-2008)

Personal Coach, 2005-2013

- 3 Senior Olympic gold medals

Coach, Auburn Flyers Collegiate Cycling Team, Auburn University 2001-2006

- Re-founder of the Cycling Club at Auburn University
- Created daily training programs for each athlete on the team
- Trained with the athletes to provide in-situ instruction
- Instructed athletes on race strategy and techniques
- Traveled with the team to races at many locations
- Provided advice on injuries and how to cope with them
- Mentored athletes in many aspects of life
- 5 Individual NCCA National Collegiate Cycling Championship Qualifiers (road and track 2003-2005)
- 1 Team NCCA National Collegiate Cycling Championship Qualifier (2005)
- SEC Champion Womens Category A
- SEC Runner-up Womens Category B
- 2 SEC Runner-up Mens B

PAST ACTIVITIES (CONTINUED)	**Leader,** Auburn University Moon Buggy Team (2003) Designed the human powered machine used to navigate NASA's lunar terrain-like obstacle course • Coordinated efforts of students from various disciplines to build the moon buggy • Played an integral role in the construction of the machine • Competed as the driver of the moon buggy **Member,** Auburn University Moon Buggy Team (2002)
MAJOR CYCLING ACHIEVEMENTS	• 6th and 8th place at the 2000 Olympic Trials/ National Championships (Points Race and Kilo) • World Record Holder (former) in the mixed pair tandem pursuit • American Record Holder in the mixed pair tandem pursuit • Silver Medal in the 1996 U.S. Olympic Trials/ National Championships (Team Pursuit) • Bronze Medal in the Pan American Championships 1996 (Team Pursuit) • Collegiate All–American 1995, 1996, 1997 • Three Time Collegiate National Champion 1996 (Kilo, Points Race, and Omnium) • Collegiate Cyclist of the year 1996 (Velo News) • Many time Alabama, Georgia, and Nebraska State Champion
FLIGHT EXPERIENCE	**Private Pilots License** • 110 hours of flight time