CURRICULUM VITA OF RALPH H. ZEE

Acting Associate Provost and Vice President for Research
Professor of Mechanical Engineering and Associate Dean for Research
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EDUCATION

- PhD 1981 Materials Science, University of Wisconsin-Madison
- MS 1977 Materials Science, University of Wisconsin-Madison
- MS 1975 Physics, University of Wisconsin-Madison
- BS 1974 Physics, University of Wisconsin-Whitewater (magna cum laude)

EXPERIENCE AND EMPLOYMENT RECORD

- 2007-present: Acting Associate Provost and Vice President for Research, Auburn University
- 2001-present: Professor and Associate Dean for Research, College of Engineering, Auburn University
- 1996-2001: Alumni Professor, Mechanical Engineering, Auburn University
- 1994-present: Professor Mechanical Engineering, Auburn University
- 1990-1994: Associate Professor, Mechanical Engineering, Auburn University
- 1986-1990: Assistant Professor, Mechanical Engineering, Auburn University
- 1981-1986: Staff Research Scientist, Chalk River Laboratories, Canada.
- 1976-1981: Research Assistant Materials Science, University of Wisconsin-Madison.

HONORS AND AWARDS

- President of the Auburn Research and Technology Foundation, 2007-present
- Member of the Board of Directors of AETOS Technologies, Inc. 2007-present
- Member of the Board of Directors of the National Center for Asphalt Technology, 2007-present
- Alumni Professorship, Auburn University, 1996-2001.
- Recipient of the 1990 Ralph R. Teetor Educator Award Sponsored by the SAE (Society for Automotive Engineers, a major international professional society for the advancement of mobility on land, sea, air and space).
- A recipient of 1995 Auburn University College of Engineering Birdsong Teacher Merit Award.
- Recipient of the 1989 Outstanding Materials Engineering Professor of the Year.
- Recipient of the 1990 Outstanding Materials Engineering Professor of the Year.
- Recipient of the 1995 Outstanding Materials Engineering Professor of the Year.
- Recipient of the 2001 Outstanding Materials Engineering Professor of the Year.
- Auburn Civitan of the Year Award, 1987-88.
- Auburn Civitan of the Year Award, 1995-96.
- Invited keynote speaker for the 1993 Alabama State Science Teacher Conference.
- Education programs featured in

  - Montgomery Advertiser, January 31, 1996
  - Jefferson County Education Science News, March-April, 1995
  - Gadsden Times, March 6, 1996
  - Birmingham Post Herald, February 17, 1995
  - Birmingham Channel 42 TV News, February 14, 1995
  - Lee County Eagle, August 25, 1993
  - Wetumpka Herald, August 19, 1993
  - Auburn University Report, August 16, 1993
- Research programs featured in
  - Auburn University Plainsman, February 22, 2001
  - Birmingham Post Herald, February 11, 2001
  - Auburn University Research News, January 2001
  - Opelika-Auburn News, July 13, 1998
  - Opelika-Auburn News, July 3, 1998
  - Auburn University Report, February 24, 1997
  - Auburn University Report, July 29, 1996
  - Opelika-Auburn News, June 14, 1996
  - Opelika-Auburn News, June 13, 1996
  - Auburn University Report, May 3, 1993
- Founding member of Alabama Materials Research Society.
- Service Award from CRDF (2005)
- Elected (by Division Director) as a team member of Unit 2000, an advanced technology development committee of Chalk River Nuclear Laboratories to identify critical technologies for the twenty-first century, 1985-1986, Canada.
- Project director of the Radiation Effect Task of Canadian Fusion Fuel Technology Projects (the Canadian National Fusion Program) 1984-1986, Canada.

HONORS AND AWARDS RECEIVED BY STUDENTS SUPERVISED BY R. ZEE

- Auburn University Graduate School Fellowship awarded to Ms. Jessie Zhang, 1999.
- NASA Graduate Fellowship awarded to Ms. Angela Mount in 1989-1990 to study the dynamics of fragmentation and energy loss during high velocity impact.
- DOE/EPSCoR Graduate Fellowship awarded to Robin Carleton in 1993 to study the grain boundary chemistry of high temperature alloys. Program still in progress.
- Mr. Camerson Moore was awarded the Department of Energy's Science and Engineering Semester Program, 8/93-12/93. He is presently at Battelle Northwest Laboratory.
- Ms Robin Carleton was a recipient of the Society of Plastic Engineers' Fellowship for Graduate Study in 1992. She was a guest of the SPE meeting in Detroit to receive this National Award.
- Dr. Jun Liu was the winner of the Manuel Lujan Jr. paper award of the 1995 International Symposium on Space Power and Propulsion. This is a national award.
- Ms. Jessie (Chen) Zhang received the Auburn University Graduate Fellowship for 1999-2002.

SUMMARY OF RESEARCH ACCOMPLISHMENTS

- Ralph Zee is the author and coauthor of over 100 publications of which 80% are refereed articles (see Research Publication Section). He has been active in organizing conferences and making presentations in national and international conferences. He also participates in the technical review process of journals, research projects and proposals.
- During his tenure at Auburn, 13 PhD and 34 Masters degrees have been awarded to students under the direct supervision of Ralph Zee. In addition, he has been responsible for the work of 7 full time research associates, and the senior design projects of 36 undergraduate students. Ralph Zee has also served on the committees of 34 PhD and 40 Masters students (all successfully completed).
- For the past fifteen years, Ralph Zee has been responsible as principal investigator for the acquisition and implementation of externally funded research projects in excess of $10,000,000. Additionally, he is Co-PI and associate investigator of projects in excess of $12,000,000.
- Ralph Zee served as the Project Director of an NSF/Alabama EPSCoR project in Smart Materials from 1995-2000. This is a project involving 5 Alabama universities (AU, UAB, Tuskegee, USA and Alabama A&M) and a consortium of industrial partners. The investigators are from a variety of disciplines.
- Since 1989, Ralph Zee has established a research group in high temperature materials for space power generation under the sponsorship of the U.S. Air Force, Defense Special Weapons Agency, Department of Energy and industry such as General Atomics, Orion International, Boeing North America and most recently Universal Energy Systems. Auburn University is now the only U.S. producer of refractory alloy single crystals, and is now participating in numerous joint research projects with the industries, such as General Atomics and Babcock & Wilcox in the development of high temperature materials for space power generation and propulsion applications.
- Ralph Zee is actively seeking methods to integrate research, education and industrial relevancy in graduate education and he is a firm believer of experience-based research. He has been instrumental in arranging for both undergraduate and graduate students to conduct portions of their studies at industrial sites. This is beyond the scope of the traditional co-op program. Three of his graduate students (Jon Cohron, A.N. Gubbi and Jack Liao) have obtained their PhDs by conducting part of their research programs at Lockheed Martin Energy Systems at Oak Ridge National Laboratory. Similarly Robin Carleton and Jessie Zhang have successfully completed their MS by performing their research at Lockheed Martin and Johnson Controls in Milwaukee respectively. At present Mark Borowicz is expected to receive his PhD via this program in May 2002.

SUMMARY OF ADMINISTRATIVE EXPERIENCE

- Acting Associate Provost and Vice President for Research, 2007-present: Promote and administrate organized research for the university
- Associate Dean for Research, College of Engineering, 2001-present: Promote and administrate various research programs in engineering and coordinate with other programs on campus and off.
- In additional to single investigator research, Ralph Zee has also gained extensive administrative experience through the proposal, organization and implementation of

several large joint research projects. Ralph Zee is the Project Director of an NSF/Alabama EPSCoR program (1995-2000), a joint research project in smart materials involving five universities (AU, UAB, UA, Tuskegee, USA and Alabama A&M), and over 20 faculty investigators across a wide range of disciplines from Physics to Chemistry to different aspects of engineering. The overall project cost is $3,000,000.

- In a different major project, since 1989 Ralph Zee is the principal investigator of a DOD program in high temperature materials for space power systems. The total funding for this project is in excess of $3,000,000. Ralph Zee has been active in securing funding from different sources (DOD, DOE and private industry) in the area and coordinated the effort of a group of nine faculty investigators from a variety of disciplines over the last decade (Drs. Chin, Gale, Wilcox, Fergus, Thakur, Harris, Jang, Kowbel and Yang). These coordinated projects also involve the collaboration of scientists from government laboratories (such as Drs. Easo George and Glenn Romanoski of Oak Ridge) and private industry (such as Mr. Lester Begg of General Atomics, Dr. Chi Law of United Technologies and Dr. Ed Cady of Boeing).

EDUCATION ENHANCEMENT PROGRAMS

The following programs are conceived and implemented by Ralph Zee. Responsible as PI of externally-funded ***education*** projects in excess of $615,000. Many of these education programs were featured in Montgomery Advertiser, Birmingham Post Herald, Gadsden Times and Birmingham Channel 42 TV News 2/14/95. (Records of News Releases on file).

- "MTL501: Materials Engineering Physics for Teachers". This is a new course specifically designed to provide better training for our future science and math teachers. It is team taught by Ralph Zee and William Baird (College of Education) and Energy-related topics in automobiles and homes were employed.
- "Energizing Physics Teachers for the Twenty First Century." NSF Division of Undergraduate Education has just awards Dr. Zee and Dr. Baird (of Education) a $200,000 grant to advance the way engineers and educations work together to teach science. Part of the emphasis of this program is to develop a set of CD-ROMs for engineering education.
- "Miracles of Materials, Mr. Zee's Neighborhood": This is a K-12 science enrichment program designed and implemented by Zee during the past five years and is still continuing. This program is funded by NSF/Alabama EPSCoR.
- "Summer Workshops for Teachers and Students". This program is designed for high school teacher-student teams to provide these teams with hands-on experience in scientific research. Funds for the workshops were provided by NSF/Alabama EPSCoR. Workshops were held every summer beginning in 1993. The workshop held in 1997 was extended to involve significant industrial contributions.
- "Summer Workshop for Teachers". This program is funded by the Eisenhower Foundation administrated by the Alabama Commission on Higher Education.
- As a result of his contribution to education, Ralph Zee was appointed the Alumni Professorship in 1996 (a five-year appointment), he was the recipient of the 1990 Ralph R. Teetor Educator Award Sponsored by the SAE, the 1995 Birdsong Teacher Merit Award (Auburn Engineering), recipient of the 1989 Outstanding Materials Engineering

Professor of the Year, recipient of the 1990 Outstanding Materials Engineering Professor of the Year, recipient of the 1995 Outstanding Materials Engineering Professor of the Year. He was also the invited keynote speaker for the 1993 Alabama State Science Teacher Conference.

- College coordinator for SECME (SouthEastern Consortium for Minorities in Engineering). He is also the coordinator for the Department of Mechanical Engineering for MITE (Minority Introduction to Engineering). The emphasis of SECME and MITE is to enhance the participation of minorities in engineering programs.

PROFESSIONAL INVOLVEMENT

- Various review panels for NSF.
- Proposal reviewer for Civilian R&D Foundation, an organization to fund research in the Former Soviet Union to prevent weapons proliferation, 2000 - present.
- Session chairman for the Intermetallic session of the Fifth IUMRS International Conference on Advanced Materials, June 13-18, 1999, Beijing, China.
- Session chair for B1: "Processing of New and Advanced Materials in the Fourth Asia Pacific Conference on Materials Processing," May 19-21, 1999 in Singapore.
- Session co-chairman for "Materials Processing Fundamentals: Spray Forming and Thin Films" in the 1999 TMS Annual Meeting, March 15, 1999 in San Diego, CA.
- Co-organizer and session chairman (with Barry Miles of Babcock and Wilcox) for the High Temperature Materials for Orbital Transfer Vehicle Session of the 15th International Symposium on Space Power and Propulsion to be held in Albuquerque, NM February 1-4, 1999.
- Session chairman for "Interstitial and Substitutional Solute Effects in Intermetallics: Iron Aluminides" in the 1998 TMS Fall Meeting, October 11-15, 1998 in Chicago, IL.
- Member of the Nuclear Working Group of Interagency Power Group (a DOD multi-agency working group for technology guidance (1992 to present).
- Member of the Lujan Jr Student Paper Award Committee, Space Power and Propulsion Symposium, 1996-present.
- Session chairman for the Smart Materials Symposium of the 1996 MRS Meeting in Boston (December 1996).
- Organizer and session chairman for the High Temperature Materials Session of the 14th International Symposium on Space Power and Propulsion held in Albuquerque, NM in January 1997.
- Session chairman for the Smart Materials session of the Alabama Materials Research Conference, Huntsville, 1997.
- Member of the technical review team for the AMTEC program at Jet Propulsion Lab (1994 to 1995).
- Member of the technical review team for the Basic Energy Sciences Programs of the Department of Energy (1993 to 1994).
- Member of the working group for ceramic insulators for the Thermionics Program, (1993 to 1994).
- Organizer and session chairman on NDE technology in the 1989 AIME Annual Meeting at Las Vegas in February 1989.

- Session Chairman for the 1988 SAE Conference on Future Transportation Technology, San Francisco, CA, August 8-11, 1988.
- Member of the U.S.-Chinese Cooperative Program for Materials Exchange, 1990-91.
- Technical Reviewer for Journal of Applied Physics, Polymer Composites, Materials Research Society, Journal of Nuclear Materials, JPL, American Welding Society, American Standard for Testing of Materials, City University of Hong Kong, Hong Kong University, Army Mechanics Symposium, State Education Board of Idaho, Canadian Metallurgical Quarterly, International Conference on Fusion Reactor Materials, Addison Wesley Longman Publishing, AIAA, National Science Foundation, Civilian Research and Development Foundation for former Soviet Union.
- Member of the following professional societies Sigma Xi (honor society for scientific researchers), Sigma Pi Sigma (honor society for physicists), Alabama Science Teacher Association, TMS (The Minerals, Metals and Materials Society), Materials Research Society.
- Session chairman for the session on "Bulk Forming, a Kobayashi Special Session," of the Fifth Asia Pacific Conference on Materials Processing" 2001, Seoul Korea.
- Member of the Gorgas Student Science Competition of the Alabama Academy of Science.

AUBURN UNIVERSITY SERVICE

- Co-chair of University Committee for Alternative Energy (2006- present)
- Lead judge for the 2001 and 2002 Alabama BEST Program, a statewide high school robotic competition.
- Member of the Patent and Disclosure Committee (2001-2005).
- Chair of University Academic Honesty Committee (1999-2002).
- Member of the Steering Committee for SACS. Chair of Education Support Services Committee of the University SACS (Southern Association of Colleges and Schools) Accreditation Self Study (2000-2004).
- University Search Committee for Dean of Libraries (2002)
- University Search Committee for Interim Provost (2001)
- University Faculty Senator representing the Department of Mechanical Engineering (1999-2001). Resign from the position due to appointment to the Dean's office.
- University Enrollment Management Committee (2000-continuing).
- University Graduate Council (1998-2001).
- University Graduate Curriculum Committee (1998-2001).
- University Program Management Council for the VP Research (2000-continuing)
- University Patent and Invention Disclosure Committee (2001-continuing)
- University Vice President for Research Industrial Committee (1999-2000)
- University Research Planning Committee (2001-continuing).
- Committee on Distance Learning and Education, VP of Extension (2000-continuing)
- University Outstanding Graduate Student Selection Committee (1999).
- University Graduate Faculty Lecturer Committee (1999).
- University Instrumentation Committee (1998-2001).
- University Graduate Enrollment Commission (1999-present).

- University Senate Academic Standards Committee (1997-2000).
- University Radiological Safety Committee (1989-1991).
- University Research Grant-in-Aid Committee (1996).
- University Graduate Program Committee of SACS (Southern Association of Colleges and Schools) Self-Study (1991-1993).
- University Alumni Professorship Selection Committee (1997-2000).
- Rural School Study (VP Extension Office, 1996-1997).
- Coordinator for SECME (Southeastern Consortium for Minorities in Engr)(1995-1998).
- Department coordinator for MITE (Minority Introduction to Engineering)(1991-2000).
- College of Engineering Freshman Engineering Experience Committee (1997-1999).
- Department of Mechanical Engineering Resource Committee (1996-1998).
- Faculty advisor to the Auburn Materials Society (1986-1993).
- Materials Engineering Faculty Search Committee (1987 and 1992).
- Materials Engineering Graduate Admissions Committee (1990-2000).
- Chair of Materials Engineering Graduate Examination Committee (1989-1992)

SOCIAL INVOLVEMENT

- Member of the Juvenile Conference Committee of the Alabama Judicial Volunteer Program. This is a pilot program in Alabama where citizens are trained and are directly involved in solving juvenile problems in the court. Ralph Zee is a member of the first committee formed. The committee meets every two weeks with juvenile offenders to resolve their problems outside the court (1998-2001).
- Treasurer of the Auburn Civitan Club (2000-2004).
- Sgt at Arms of the Auburn Civitan Club (1999-2000).
- Secretary of the Auburn Civitan Club (1998-1999).
- Secretary of the Auburn Civitan Club (1997-1998).
- Treasurer of the Auburn Civitan Club (1994-1996).
- Treasurer of the Auburn Civitan Club (2000-2002).
- Member of the Auburn Civitan Club (1986-present).
- Board of Director, Auburn Civitan Club (1988-present).
- Member of the Advisory Council on the selection of Superintendent for the Auburn City Schools System (1995-1996).

TECHNICAL CONSULTANT FOR

- NSF ATE program in the state of Alabama
- State Education Board of Idaho.
- U.S. Civilian Research and Development Foundation.
- AMTEC program at the Jet Propulsion Laboratory.
- Basic Energy Sciences Programs of the Department of Energy, 1993.
- Norment Industries, Montgomery, AL.
- Battelle Northwest Laboratory, Richland, WA.
- CH2M Hill, Montgomery, AL.
- Pelikan Inc., Franklin, TN.

- Hong Kong higher education system, Hong Kong Research Grant Council.
- Quarles and Brady, Milwaukee, WI.
- Weld Star Technology, Inc, Orlando, FL.
- Stirling Technology, Kennewick, WA.
- Idaho National Engineering Laboratory, ID.
- Lockheed Martin Energy Systems, Inc, Oak Ridge, TN.
- Mark Tanenbaum.
- Westinghouse Bettis Electric Corporation, West Mifflin, PA.
- Schlumberger Water Division, Tallassee, AL.
- SMC South, Auburn.
- Capital Specialty Plastics, Auburn.
- University of Alabama at Birmingham, Birmingham, AL
- Giles Enterprises Inc, Montgomery, AL.
- Beers and Associate, Montgomery, AL.
- Marconi Enterprise, LaGrange, GA.

LABORATORIES ACQUISITIONS AND IMPROVEMENTS

Responsible for securing the funding and the physical implementation of five separate laboratories to enhance undergraduate and graduate level laboratory education. These laboratories are presently used for research as well as for teaching purposes. A description of these laboratories follows:

- X-Ray Diffractometers: a laboratory was established to house two x-ray diffractometer units (one of which is dedicated for high temperature). These units were purchased through a University Instrumentation Grant from DOD at a cost of $220,000. Oversaw the purchase, installation and acceptance of these instruments and am also responsible for the operation of these instruments together with the transmission electron microscope. This facility is being used in undergraduate and graduate level x-ray diffraction labs.
- X-Ray Cameras: Funding for the purchase of a complete set of x-ray cameras (a total of $50,000) was secured in fiscal year 1988-1989. This x-ray laboratory is separate from the x-ray diffractometer unit above and is dedicated to teaching. This instrument is being used in undergraduate and graduate level x-ray diffraction labs.
- Rapid Heat/Quench Gleeble (Dynamic Thermal-Mechanical Test System): Responsible for securing funding (with Dr. Chin) for an instrumentation grant from the Department of Energy to establish a rapid heat/quench Gleeble unit at Auburn. The award amounts to a total of over $250,000. This facility is being used in undergraduate design lab.
- High Temperature Materials Processing Lab: Received a significant grant from the Air Force to establish a high temperature materials testing laboratory. A total of $600,000 was allocated for equipment purchases, including three ultra high vacuum testing facilities and a single crystal growth unit.
- Surface Studies: Responsible for securing funding for a $48,000 equipment grant from NSF-Alabama EPSCoR to establish a laboratory to conduct experiments for high temperature emissivity. New experiments are now being planned to use this facility for undegraduate physical metallurgy classes with labs.
- Tandem Accelerator for Ion Beam Analysis: Responsible for coordinating with

investigators in College of Science and Mathematics in obtaining an NSF grant (in the amount of $500,000) to purchase a tandem accelerator. This facility is now in place and Ralph Zee is a major user of this facility.

- Wilmore Renovation: Ralph Zee is a member of the team for securing funding from NSF's Office of Science and Technology Infrastructure to renovate the Wilmore facilities. This amounts to $2,000,000 of NSF funds and over $5,000,000 of match.

GRADUATE STUDENTS SUPERVISED (GRADUATED WITH R. ZEE AS ADVISOR)

Ph.D.	Year	Topic
Jyun Jye Liao	1992	Iridium alloys
Chung Yu Hsieh	1992	Impact dynamics
Wei Y. Wu	1994	Radiation effects in insulators
A.N. Gubbi	1994	Ternary iridium
Yo Ozaki	1994	Thermal characteristics of tungsten alloys
John Liu	1995	Single crystals
Peter Hong Gao	1997	Creep deformation
Jonathan Cohron	1997	Deformation in intermetallic compounds
George Xiao	1999	Processing/deformation intermetallic compound
David Edwards	1999	Absorbed dose determination of x-ray spectra
Jessie Zhang	2000	Shape memory alloys
Jinglong Li	2000	Interdiffusion of rhenium and carbon
Mark Borowicz	2002	Directional solidification of Mo-Si alloys

Master	Year	Topic
Brent Mills	1987	Metallic processing
Jack Liao	1989	Molybdenum based alloys
Jyh Jong Chen	1989	Casting of polymeric materials
K. Liaw	1989	Carbide materials
H.C. Lin	1989	Electrotransport
Leslie Curtis	1990	Space impact
Brent K. Mills	1990	Corrosion
R. Subramaniam	1990	Insulating polymers
Chi Cheng Yang	1990	Titanium carbides
Chen Jong Wang	1990	Impact in composites
Penelope Sims	1991	Bearing stress
Ramesh Iyer	1991	Particle filled epoxy
Y.F. Chen	1991	Stress induced martensite
Paul LeMaster	1992	Space impact
Yen-Pin Tsao	1992	Polymeric materials
Angela Mount Nolen	1994	Space environmental effects
Stephen Richardson	1994	Debris cloud analysis
Qiang Shen	1994	Degradation of elastomer
Rohit Inamdar	1994	Hydrogen effects
Mitchell Mendrek	1994	Aluminum for space application
Gary Crawford	1994	Micrometeroid impact

Robin Carleton	1995	Intermetallic compounds
Thomas Caldwell	1995	Nuclear analysis
Chen (Jassie) Zhang	1996	Shape memory alloys
Thomas Owens	1997	Development of aluminum alloys
Louis Strutzenberg	1997	Crystal growth in space
Phani Sankuralri	1998	Energy storage materials
Stephen Davis	1998	Corrosion
Venkata Koppaku	1999	Sun Solaris Servers
Regenia Sanders	1999	Smart materials for deicing
Manisha Sharma	1999	Prototype Remote Corrosion Monitoring Sensor
Weiming He	2000	Closed CVD Processing of Tungsten
Hong Ta Ma	2002	Impedance measurement for bacteria detection
Kashyap Yellai	2003	Carbon materials for HT insulation

FULL-TIME RESEARCH ASSOCIATES SUPERVISED BY R. ZEE

Jian Hu (1998 - 2002)
David Lindahl (2001 – 2002)
Shrym Gale (1996 - 2001)
Jeffrey King (1998 - 1999)
Jamie Cooney (1998 - 1999)
Don Sirois (1990-1995)
Y.H. Huang (1987-1989)

GRADUATE STUDENTS PRESENTLY SUPERVISED BY R. ZEE

Ph.D.
John Merrill

GRADUATE STUDENTS (COMPLETED WITH R. ZEE AS COMMITTEE MEMBER)

Ph.D.	Year
Y.K. Lieu	1988
In Tak Nam	1988
Hua Tay Lin	1989
Tao Chang	1990
Bor P. Jang	1990
Po Shou Chen	1990
S. Nagarajan	1991
L.R. Hwang	1991
Chung K. Lee	1992
Todd Owens	1992
Gopal Rao	1992
J.Y. Liu	1993
Z.W. Chiou	1994
Mark Muszynski	1996
R. Beshear (outside reader, Physics)	1996
Li-Ren Zhao	1996

L. Zhou	1996
Suresh Raghavan	1996
C.A. Wang	1996
Subodh Govardha	1996
Paul Munafo	1996
S.F. Chen	1997
Probal Banajee	1997
Clyde Wikle	1998
Z.C. Lin	1998
Fuhu Chen	1998
Weili Yu	1999
Tom Oder (outside reader, Physics)	1999
Michael Lewandowski	2000
S.C. Kottilingam	2001
Kirby Lawless	2001
Lichun Li	2002
Joseph Merrett (outside reader, Physics)	2002
Harry Whitesell	2002
Claude Bailey	2002

Master	Year
Jie Chen	1988
Carolyn Kurgan	1988
Chih Wen Liu	1988
Gopal Rao	1988
Li Ching Chen	1988
Weihua Chen	1988
Jihn Yu Liau	1988
Rong Nan Pai	1989
Chung K. Lee	1989
M. Cholakara	1989
Yoon K. Liaw	1989
Tung Liang Lin	1989
M. David Shelby	1989
Junny H. Hsieh	1989
James Turner	1989
L. Santanam	1990
V. Chellappa	1990
Chin An Wang	1990
Yi Yu Shi	1990
Song Fon Chen	1990
Chih-Pen Chung	1990
S.L Wur (Physics)	1991
Yixing Lin	1991
Kung Ker Feng	1991

M.P. Hatfield	1991
S. Govardha	1992
Steve Shore	1992
W. Nancy Yu	1993
Bryan Ambrose	1993
Jon Cohron	1993
John Merrill	1993
L. Ng	1994
Brian Wilson	1994
R. Nemani	1995
S. Hui	1996
Doug Thornton	1996
Dan Sutherland	1998
Bing Dang	2000
Nagesh Potluri	2001
Fei Ding	2002

UNDERGRADUATE STUDENT SENIOR PROJECTS SUPERVISED BY R. ZEE

Students	Year
Chadwick Hawley	1987
Maggie Kahl	1988
Neil Baker	1988
Frank Sides	1988
Carol Nelson	1988
Angela Mount	1989
Jennifer Chin	1989
Penelope Sims	1989
Jeffrey Horn	1990
Paul LeMaster	1990
Tai Ngin	1990
Malcolm Stephens	1990
Terry Adams	1990
Camerson Moore	1991
Gary Crawford	1991
Anthony Miller	1991
Deborah Houston	1991
John Dispennette	1991
William Cox	1991
Thomas Gent	1991
Robin Carleton	1992
Darren Poore	1992
Erin Hulsey	1992
Michael Mrachek	1992
Michael Warren	1992
Rodney Shaw	1993

Brian Jackson	1993
Carol Bowie	1995
Candience Hitson	1996
Megan Golding	1996
Melissa Davis	1997
Wesley Williams	1997
Kris Williams	1998
Pat Hamer	1998
Michael Ramsay	1998
Deta Adams	1999

RESEARCH PUBLICATIONS (* represents students)

1. H.P. Gao* and R.H. Zee, "Effects of Rhenium on Creep Resistance in Tungsten Alloys," Journal of Materials Science Letters 20 (2001) pp. 885-887.

2. R.H. Zee, G. Romanoski, H.S. Shyam and H. Wang, "Processing and Thermal Properties of Filament Wound Carbon-Carbon Composites for Impact Shell Application," American Institute of Physics Publications Number 552 (2001) pp. 727-732.

3. H. Ma*, J. Hu and R.H. Zee, "Growth of Nb-O Single Crystals using Electron Beam Zone Melting," American Institute of Physics Publication Number 552 (2001) pp. 1125-1130

4. R.H. Zee, Z. Xiao*, B.A. Chin and J. Liu, "Processing of Single Crystals for High Temperature Applications," Journal of Materials Processing Technology, 113 (2001) pp. 75-80.

5. H.C. Wikle*, S. Kottilingam*, R.H. Zee and B.A. Chin, "Infrared Sensing Techniques for Penetration Depth Control of the Submerged Arc Welding Process," Journal of Materials Processing Technology, 113 (2001) pp. 228-233.

6. R.H. Zee and G. Romanoski, "A Filament Wound Carbon-Carbon Composite for Impact Shell Application," American Institute of Physics Publication Number 504 (2000) pp. 1488-1493.

7. Z.C. Lin, W. Yu, R.H. Zee and B.A. Chin, "CuAlPd Alloys for Sensor and Actuator Applications," Intermetallics 8 (2000) pp. 605-611.

8. Z. Xiao*, R.H. Zee and L.L. Begg "Processing Tungsten Single Crystal by Chemical Vapor Deposition," American Institute of Physics Publication Number 504 (2000) pp. 1454-1457.

9. R.H. Zee, Z. Xiao*, and J. Liu*, "Processing and Growth of Refractory Single Crystals,"

Proceedings of the Society for the Advancement of Material and Process Engineering, Long Beach, CA 2001, pp 249-258.

10. R.H. Zee and J. Li*, "Diffusion Analysis of Rhenium in Graphite using Rutherford Backscattering Spectroscopy," Defect and Diffusion Forum, 194-199 (2001) pp. 85-90.

11. R.H. Zee, Z. Xiao*, H.S. Gale, B.A. Chin and L.L. Begg, "Processing of Tungsten Single Crystals by Chemical Vapor Deposition," Electrochemical Society Proceedings Volume 2000-13 (2000) pp. 571-578.

12. J. Liu*, R.H. Zee and B.A. Chin, "Processing and High Temperature Properties of Refractory Alloy Single Crystals," Journal of Materials Processing Technology 89-90 (1999) pp. 425-431.

13. C. Zhang*, P.E. Thoma and R.H. Zee, "Surface Evolution of NiTi and NiTiHf Thin Films," accepted for publication in the 2000 Materials Research Society Symposium Proceedings, Boston MA 2000. Paper 6.38.

14. C. Zhang*, P.E. Thoma and R.H. Zee, "High Hf Content NiTiHf Shape Memory Films," Proceedings for the 1999 Materials Research Society Smart Materials Symposium LL, MRS Proceedings Volume 604, pp. 129-134.

15. H.C. Wikle*, B.A. Chin and R.H. Zee, "A Sensing System for Weld Process Control," Journal of Materials Processing Technology 89-90 (1999) pp. 254-259.

16. C. Zhang*, P. Thoma, B. Chin and R.H. Zee, "Martensitic and R-Phase Transformations in Ni-Ti and Ni-Ti-Hf," Transactions of Nonferrous Metals Society of China, Volume 9 (1999) pp. 55-64.

17. J. Li* and R.H. Zee, "An Analysis on Diffusion of Rhenium in Poco Graphite at 1373K," American Institute of Physics Publication Number 458 (1999) pp. 679-684.

18. S.M. Borowicz*, L. Heatherly, R.H. Zee and E.P. George, "Directional Solidification of Mo_5Si_3 - $MoSi_2$ Eutectic," in High Temperature Ordered Intermetallic Alloys, edited by George, Mills, Yamaguchi, Materials Research Society Symposium Proceedings Volume 552 (1999) Part V – KK5.28.

19. C. Zhang*, P. Thoma, B. Chin and R.H. Zee, "Transformation Behavior in NiTi-based Shape Memory Alloys," Titanium '98 Proceedings of the Xian International Titanium Conference (published by International Academic Publishers), edited by Zhou, Eylon, Lutjering and Ouchi (1999) pp. 1049-1054.

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Lectures and Presentations (Science education presentations as indicated)

1. R.H. Zee, "The Materials Issues for Power in Space," invited seminar at the University of Alabama in Huntsville, July 19, 2001.

2. R.H. Zee, "The Materials Issues for Power in Space," invited seminar in the Industrial Engineering Department in the Chinese University of Hong Kong, July 4, 2001.

3. R.H. Zee, “Power and Propulsion Issues in Space,” presented as an invited division seminar at Marshall Space Flight Center Microgravity Directorate, April 2, 2001

4. W. Baird and R.H. Zee, “Physical Science and Teacher Education: Preservice Education that Models the Standards AETS,” presented at the 2001 National Science Teachers Association Conference in St. Louis March 21-25, 2001.

5. H. Ma*, J. Hu and R.H. Zee, “Growth of Nb-O Single Crystals using Electron Beam Zone Melting,” presented at the 2001 Space Technology and Applications International Forum, Albuquerque, NM February 2001.

6. R.H. Zee, G. Romanoski, H.S. Shyam and H. Wang, “Processing and Thermal Properties of Filament Wound Carbon-Carbon Composites for Impact Shell Application,” presented at the 2001 Space Technology and Applications International Forum, Albuquerque, NM February 2001.

7. R.H. Zee, Z. Xiao*, and J. Liu*, “Processing and Growth of Refractory Single Crystals,” accepted for presentation in the Conference of the Society for the Advancement of Material and Process Engineering, Long Beach, CA, May 2001.

8. R.H. Zee, Z. Xiao*, B.A. Chin and J. Liu, “Processing of Single Crystals for High Temperature Applications,” accepted for presentation in the Fifth Asia Pacific Conference on Materials Processing, Seoul Korea, June 2001.

9. H.C. Wikle*, S. Kottilingam*, R.H. Zee and B.A. Chin, “Infrared Sensing Techniques for Penetration Depth Control of the Submerged Arc Welding Process,” accepted for presentation in the Fifth Asia Pacific Conference on Materials Processing, Seoul Korea, June 2001.

10. R.H. Zee, Z. Xiao*, H.S. Gale, B.A. Chin and L.L. Begg, “Processing of Tungsten Single Crystals by Chemical Vapor Deposition,” presented at the 197th Electrochemical Society Meeting, Toronto, Canada, May 2000.

11. H. Zee and J. Li*, “Diffusion Analysis of Rhenium in Graphite using Rutherford Backscattering Spectroscopy,” presented at the 5th International Conference on Diffusion in Materials (DIMAT2000) in Paris, July 2000.

12. R.H. Zee and L.L. Begg, “The Use of Tungsten Alloy Single Crystals for Penetrators,” presented to the scientists at Army Research Laboratory, Aberdeen Proving Grounds, Maryland, April 12, 2000.

13. ***(Science Education Presentation):*** W.E. Baird and R.H. Zee, “Energy Education Used in Developing a Secondary Content/Methods Course,” Presented at the annual meeting of the Association for the Education of Teachers in Science Akron, Ohio, January 2000.

14. ***(Science Education Presentation):*** W. E Baird, S. Bowling and R.H. Zee, "Energy Education as the Theme for a Secondary Content/Methods Course," Presented as an A.E.T.S. session at the annual meeting of the National Science Teachers Association, Orlando, Florida, April 2000.

15. R.H. Zee and G. Romanoski, "A Filament Wound Carbon-Carbon Composite for Impact Shell Application," presented at the 2000 Space Technology and Applications International Forum, Albuquerque, NM February 2000.

16. Z. Xiao*, R.H. Zee and L.L. Begg "Processing Tungsten Single Crystal by Chemical Vapor Deposition," presented at the 2000 Space Technology and Applications International Forum, Albuquerque, NM February 2000.

17. C. Zhang*, P.E. Thoma and R.H. Zee, "High Hf Content NiTiHf Shape Memory Films," presented at the 1999 Materials Research Society Conference, Boston MA, December 1999.

18. C. Zhang*, P.E. Thoma and R.H. Zee, "High Hf Content NiTiHf Shape Memory Films," presented at the 1999 Materials Research Society Conference, Boston MA, December 1999.

19. ***(Science Education Presentation):*** W.E. Baird and R.H. Zee, "Team Projects: A Taste of Real Science in our Content/Methods Course," Presented at the annual meeting of the Association for the Education of Teachers in Science, Austin, Texas, 1999.

20. ***(Science Education Presentation):*** W.E. Baird and R.H. Zee, "Practical Applications of Heat Radiation and Conduction: Why does my attic get so hot, and what can I do about it?" Presented at the annual meeting of the Alabama Science Teachers Association, Hoover High School, Birmingham, Alabama October 1999.

21. J. Liu*, R.H. Zee and B.A. Chin, "Processing and High Temperature Properties Of Refractory Alloy Single Crystals," presented at the Fourth Asia Pacific Conference on Materials Processing, Singapore, May 19-21, 1999.

22. H.C. Wikle*, B.A. Chin and R.H. Zee, "A Sensing System for Weld Process Control," presented at the Fourth Asia Pacific Conference on Materials Processing, Singapore, May 19-21, 1999.

23. R.H. Zee, "The Materials Issues for Power in Space," invited seminar in the Materials Science and Education Department in the City University of Hong Kong, May 17, 1999.

24. R.H. Zee, "The Materials Issues for Power in Space," presented as a seminar at the University of Alabama in Huntsville, May 5, 1999.

25. J.S. King*, R.H. Zee and W.F. Gale, "Growth and Joining of Single Crystal Refractory Alloys," 1999 Metallic Materials Contractor Meeting, AFOSR, San Diego, CA March 4-5, 1999.

26. C. Zhang*, P. Thoma and R.H. Zee, "Effect of Deposition and Post Heat Treatment on NiTi Shape Memory Alloy Thin Films," presented at the 1999 TMS Annual Meeting, San Diego, CA. March 1-4, 1999.

27. R.H. Zee, "Roundtable: University-Industrial Interaction: Achievements and Perspectives for the Future," Alabama 1999 EPSCoR Conference, Feb 24-25, 1999.

28. J. Li* and R.H. Zee, "An Analysis on Interdiffusion of Rhenium and Poco Graphite," presented at the 1999 Space Technology and Applications International Forum, Albuquerque, NM January 1999.

29. ***(Science Education Presentation):*** W. Baird and R.H. Zee, "Team Projects: A Taste of Real Science in our Methods/Content Course, " presented in the 1999 American Education Teachers Society (AETS) International Meeting, January 14-17, Austin TX.

30. S.M. Borowicz*, L. Heatherly, R.H. Zee and E.P. George, "Directional Solidification of Mo_5Si_3-$MoSi_2$ Eutectic," presented in the 1998 Materials Research Society Fall Meeting in Boston, November 30 - December 4, 1998.

31. C. Zhang*, P. Thoma and R.H. Zee, "Effect of Deposition and Post Heat Treatment Temperature on NiTi Shape Memory Alloy Thin Films," presented in the 1998 Materials Research Society Fall Meeting in Boston, November 30 - December 4, 1998.

32. J. Li*, M.J. Bozack and R.H. Zee, "A Direct Evidence of Segregation of Carbon at Rhenium Surface, " presented in the 1998 Materials Research Society Fall Meeting in Boston, November 30 - December 4, 1998.

33. R.H. Zee, "Power and Propulsion in Space," presented at the Auburn University's Inter-Disciplinary Engineering and Science Seminar, October 20, 1998.

34. J.W. Cohron*, E.P. George and R.H. Zee, "Effects of Interstitial Boron and Alloy Stoichiometry on Environmental Effects in FeAl," presented at the 1998 TMS Fall Meeting, Chicago, IL October 11-15, 1998.

35. C. Zhang*, P. Thoma, B. Chin and R.H. Zee, "Transformation Behavior in NiTi-based Shape Memory Alloys," presented in the 1998 Xian International Titanium Conference, September 15-18, 1998, Xian China.

36. R.H. Zee, "Power and Propulsion in Space - The Materials Issue," presented as an invited seminar to the College of Engineering in the University of Hong Kong, September 11, 1998.

37. J. Li* and R.H. Zee, "An Algorithm for RBS Analyses of Annealed Samples," presented at the Alabama Materials Research Meeting, Birmingham, AL, September 1998.

38. Z. Xiao* and R.H. Zee, "Effects of Superheat and Growth Rate on the Crystal Growth Behavior of Ni_3Al," presented at the Alabama Materials Research Meeting, Birmingham, AL, September 1998.

39. C. Zhang*, P.E. Thoma, J.B. Boehm and R.H. Zee "Effect of Hf, Heat Treatement and Cycling under an Applied Stress on the Transformation of Cold Worked NiTi Based Alloys," presented at the Alabama Materials Research Meeting, Birmingham, AL, September 1998.

40. Z. Xiao* and R.H. Zee, "Effects of Superheat and Growth Rate on the Crystal Growth Behavior of Ni_3Al," presented at the Third Pacific Rim International Conference on Advanced Materials and Processing, Honolulu, Hawaii, July 12-16, 1998.

41. C. Zhang*, P. Thoma, B. Chin and R.H. Zee, "Martensitic and R-Phase Transformations in Ni-Ti and Ni-Ti-Hf," presented in the Third International Workshop on Ordered Intermetallic Alloys and Ceramics, April 1998, Hangzhou, China.

42. ***(Science Education Presentation):*** R.H. Zee, "Smart Materials and Infrastructure," presented at the Annual Alabama EPSCoR Conference, April 15-16, 1998, Tuscaloosa, Alabama.

43. R.H. Zee, "System for First Responders," presented to the Fort McClellan group in Anniston, April 17, 1998.

44. R.H. Zee, "Next Generation Detection System for Chemical and Biological Warfare," presented at the U.S. Army Natick Laboratory, Biotechnology Division Seminar, Feburary 26, 1998.

45. Z. Xiao* and R.H. Zee, "Ductility of Ni_3Al Single Crystals at Elevated Temperature - Effects of Preoxidation," presented at the 127 Annual TMS Meeting, February 15-19, 1998.

46. J. Li* and R.H. Zee, "Interdiffusion of Rhenium and Poco Graphite," presented at the 1998 Space Technology and Applications International Forum, Albuquerque, NM January 1998.

47. C. Zhang*, P. Thoma and R.H. Zee, "Influence of TMP on Martensitic and R-Phase Transformation of Ni-Ti and Ni-Ti-Hf SMA," presented at the International Conference on Thermomechanical Processing of Steels and Other Materials (THERMAC 97) in Wollongong, Australia.

48. ***(Science Education Presentation):*** W.E. Baird and R.H. Zee, "The Electric Pickles," presented at the Alabama Science Teacher Association Conference in Birmingham, AL, October 1997.

49. J. Li* and R.H. Zee, "An Algorithm for Interpreting RBS Spectra," presented at the Alabama Materials Research Meeting, Huntsville, AL, September 1997.

50. C. Zhang* and R.H. Zee, "The Influence of Hafnium Content, Cold Working, and Heat Treatment on the R-Phase Transformation of NiTi Based SMA," presented at the Alabama Materials Research Meeting, Huntsville, AL, September 1997.

51. Z. Xiao* and R.H. Zee, "Ductility of Ni_3Al Single Crystals at Elevated Temperature - Effects of Preoxidation," presented at the Alabama Materials Research Meeting, Huntsville, AL, September 1997.

52. C. Zhang*, R. Zee and P. Thoma, "Effect of Hafnium, Heat Treatment and Cycling under an Applied Stress on the Transformation of Cold Worked NiTi based Alloys," presented at the 1997 Materials Research Society Fall Meeting, Boston, MA.

53. R.H. Zee, "Use of Piezoelectric Materials for Energy Conversion," invited presentation at the Prospector IV Workshop on Human Powered Systems, Durham NC November 3-5, 1997.

54. W. Yeh, C. Patuwathavithane* and R.H. Zee, "Processing of Insulating Thin Films and their Properties," presented at the Third Asia Pacific Conference On Materials Processing, November 12-14 1996, Hong Kong.

55. C. Zhang*, R. Zee and P. Thoma, "The Influence of Hafnium Content, Cold Working, and Heat Treatment on the R-Phase Transformation of NiTi Based Shape Memory Alloys," presented at the 1996 Materials Research Society Fall Meeting, Boston, MA.

56. J. Cohron*, E.P. George, L. Heatherly, C.T. Liu and R.H. Zee, "The Effect of Hydrogen on the Ductility and Fracture Behavior of B-free and B-doped Ni_3Al," presented at the 1996 Fall TMS meeting in Cincinnati OH October 1996.

57. C. Zhang*, P. Thoma and R.H. Zee, "Development of Ni-Ti Based Shape Memory Alloys for Actuation and Control," presented at the 31st Intersociety Energy Conversion Engineering Conference, Washington DC, August 1996.

58. C. Zhang*, P. Thoma and R.H. Zee, "Influence of Thermal-Mechanical Processing on Martensitic Transformation of NiTi and NiTiHf Shape Memory Alloys," presented at the International Conference on Displacive Phase Transformations and their Applications in Materials Engineering in Honor of Professor C.M. Wayman on the Occasion of his Retirement, University of Illinois, Urbana IL, May 8-9 1996.

59. ***(Science Education Presentation):*** R.H. Zee, "Building Industrial-University Collaborative Research and Education Infrastructure," presented at the Alabama EPSCoR Meeting, Tuscaloosa, AL, April 8-9, 1996.

60. ***(Science Education Presentation):*** W.E. Baird and R.H. Zee, "Engineering Physics for Teachers: A Project Based Integrated Science Course," presented as a contributed paper in the Proceedings of the Annual Meeting of the Association for the Education of Teachers in Science, Seattle WA, January 1996.

61. C. Patuwathavithane*, W. Yeh and R.H. Zee, "Radiation Induced Conductivity in Ceramic Insulators," presented at the 13th Symposium on Space Nuclear Power and Propulsion, January 1996, Albuquerque, NM.

62. C. Zhang*, R. Zee and P. Thoma, "Introduction of NiTi Based Shape Memory Alloys," presented at the 1996 Alabama Materials Research Conference, Auburn, AL.

63. Z. Xiao* and R. Zee, "The Plasticity of Intermetallic Compound Ni_3Al Single Crystals," presented at the 1996 Alabama Materials Research Conference, Auburn, AL.

64. S. M. Borowicz* and R. Zee, "Development of Blanket Materials for Premature Infants," presented at the 1996 Alabama Materials Research Conference, Auburn, AL.

65. J. Li*, W. Yeh, S. Gale and R. Zee, "Diffusion of Rhenium in Graphite Studied by RBS," presented at the 1996 Alabama Materials Research Conference, Auburn, AL.

66. S. Phani* and R. Zee, "Thermal Energy Storage using Phase Change Materials," presented at the 1996 Alabama Materials Research Conference, Auburn, AL.

67. R. Carleton*, E.P. George and R.H. Zee, "Vacancies as a Source of the Strength Anomaly in FeAl," presented at the Symposium on Strengthening and Toughening Mechanisms in High Temperature Materials, TMS Fall Meeting / ASM Materials Week, Cleveland, OH, October 29 - November 2, 1995.

68. H.P. Gao and R.H. Zee, "The Significance of Single Crystalline Structure in High Temperature Applications," presented at the 1995 ASME Winter Annual Meeting, San Francisco, CA, November 12-17, 1995.

69. H.P. Gao*, R.H. Zee and W. Yeh, "The Consideration of Dispersion Strengthened Refractory Alloys in the Commerical Sector," presented at the 1995 ASME Winter Annual Meeting, San Francisco, CA, November 12-17, 1995.

70. ***(Science Education Presentation):*** R.H. Zee, "Minority Education Effort at Auburn University," presented at the Mobile County SECME (SouthEastern Consortium for Minorities in Engineering) Workshop held at the University of South Alabama, October 20, 1995.

71. ***(Science Education Presentation):*** L. Meadows, R.H. Zee and P. O'Neal, "Alabama Collaborative for Excellence in Teacher Preparation," NSF site visit, Arlington, VA, October 1995.

72. C. Patuwathavithane, W. Yeh and R.H. Zee, "Conductivity in Ceramic Insulators," Ninth Annual Alabama Materials Research Conference, Birmingham, AL, September 1995.

73. V. Koppaku* and R.H. Zee, "Fabrication of Ductile Alumina using Transformation Toughening," Nineth Annual Alabama Materials Research Conference, Birmingham, AL, September 1995.

74. Z. Xiao* and R.H. Zee, "Processing of Refractory Single Crystals," Nineth Annual Alabama Materials Research Conference, Birmingham, AL, September 1995.

75. R.H. Zee, "Composite Research in Alabama," poster presentation at the EPSCoR Conference in Jackson Hole, WY, September 1995.

76. ***(Science Education Presentation):*** R.H. Zee and W. Baird, "Hands-on Science on a Shoe String Budget," presented at the Alabama Science Teacher Association Conference in Birmingham, AL, September 1995.

77. J. Liu* and R.H. Zee, "Preparation and Properties of Molybdenum Based Single Crystals," presented at the Second International Conference on Heat Resistant Materials, Gatlinburg, TN, September 11-14, 1995.

78. R.H. Zee and J. Liu*, "Processing of Molybdenum-Based Alloy Single Crystals," presented at the Second Pacific Rim International Conference on Advanced Materials and Processing, Korea, June 18-22, 1995, Korea.

79. ***(Science Education Presentation):*** R.H. Zee, "What Professional Engineers Can Do," presented at A Professional Engineer Dinner at Birmingham, AL, June 1995.

80. R.H. Zee, "Thermionic Materials for DOE," presented as an invited seminar at DOE Headquarters, Germantown, MD, January 26, 1995

81. Yo Ozaki* and R.H. Zee, "Lifetime of Advanced Material Components in Space Nuclear Systems due to Prolong Exposure," 12th Symposium on Space Nuclear Power and Propulsion, Albuquerque, NM, January 1995.

82. H.P. Gao* and R.H. Zee, "Modeling the High Temperature Creep Deformation in Single Crystalline Tungsten Alloys," 12th Symposium on Space Nuclear Power and Propulsion, Albuquerque, NM, January 1995.

83. J. Liu* and R.H. Zee, "Preparation of Molybdenum Base Alloy Single Crystals," 12th

Symposium on Space Nuclear Power and Propulsion, Albuquerque, NM, January 1995.

84. ***(Science Education Presentation):*** R.H. Zee, "Institutional Practices and Policies to Build Collaborative Research, A Case Study," invited presentation at the 10th Annual NSF/EPSCOR Conference at Jackson, MS, December 1994.

85. ***(Science Education Presentation):*** R.H. Zee, "Miracles of Materials Outreach Effort," presented at the Alabama Science Teacher Association Conference in Birmingham, AL, September 1994.

86. C. Zhang*, D. Sirois and R.H. Zee, "Thin Film Coating of Shape Memory Alloys," Eighth Annual Alabama Materials Research Conference, Tuscaloosa, AL, September 1994.

87. J. Hammond* and R.H. Zee, "Titanium Aluminide Metal Matrix Composites," Eighth Annual Alabama Materials Research Conference, Tuscaloosa, AL, September 1994.

88. C. Patuwathavithane* and R.H. Zee, "Radiation Induced Conductivity in Alumina," Eighth Annual Alabama Materials Research Conference, Tuscaloosa, AL, September 1994.

89. P.H. Gao* and R.H. Zee, "Modeling the Creep Deformation in Tungsten Alloys," Eighth Annual Alabama Materials Research Conference, Tuscaloosa, AL, September 1994.

90. Y. Ozaki*, J. Cohron* and R.H. Zee, "Thermal and Hydrogen Effects on Emissivity of Refractory Metals and Carbides," Eighth Annual Alabama Materials Research Conference, Tuscaloosa, AL, September 1994.

91. R.H. Zee, "High Temperature Materials Development for Energy Applications," invited seminar at Idaho National Engineering Laboratory, July 13, 1994.

92. C. Patuwathavithane*, W.Y. Wu and R.H. Zee, "Radiation Induced Conductivity in Alumina," 17th International Symposium on the Effects of Radiation on Materials, Sun Valley, Idaho, June 1994.

93. R. Carleton*, R.H. Zee and E.P. George, "Effects of Boron and Stoichiometry on the Fracture of FeAl at Elevated Temperature," First Annual Alabama EPSCOR Colloquium, April 26, 1994, Tuscaloosa, AL.

94. W. Wu, C. Patuwathavithane* and R.H. Zee, "Radiation Induced Conductivity in Ceramic Insulators for Thermionic Systems," 11th Symposium on Space Nuclear Power and Propulsion, Albuquerque, NM, January 1994.

95. J. Cohron*, Y. Ozaki*, R.H. Zee and B.A. Chin, "Reactivity of Refractory Carbides with Hot Hydrogen," 11th Symposium on Space Nuclear Power and Propulsion, Albuquerque,

NM, January 1994.

96. ***(Science Education Presentation):*** R.H. Zee, "Miracles of Materials, a Science and Engineering Outreach Program in Alabama," Ninth Annual EPSCoR Conference, November 7-10, 1993, Rapid City, South Dakota.

97. A.N. Gubbi*, R.H. Zee, E.P. George, E.H. Lee and E.K. Ohriner "Effects of Cerium on High Temperature Impact Ductility and Fracture of Iridium alloys," 1993 Fall Meeting of TMS, Pittsburgh, PA, Oct 18-22, 1993.

98. J. Cohron*, R.H. Zee and B.A. Chin, "Degradation of Refractory Metal Carbides by Hot Hydrogen," Sixth International Conference on Fusion Reactor Materials, Stresa, Italy, September, 1993.

99. S. Chen*, W. Yu*, R.H. Zee and B.A. Chin, "Creep, Thermal Cycle and Tensile Properties of Nb-1Zr to Stainless Steel Transition Joints," 6th International Conference on Fusion Reactor Materials, Stresa, Italy, September 1993.

100. ***(Science Education Presentation):*** R.H. Zee, "Miracles of Materials - Mr. Zee's Neighborhood" keynote address at the 1993 Alabama Science Teacher Association (ASTA) Annual Conference, September 1993 in Birmingham, AL.

101. R.H. Zee and Q. Shen*, "Evaluation of Degradation Effects of Space Environment on Elastomeric Materials," Seventh Annual Alabama Materials Research Conference, Normal, AL, September 1993.

102. S. Chen*, W. Yu*, R.H. Zee and B.A. Chin, "Creep, Thermal Cyclic and Tensile Properties of Nb-1Zr to Stainless Steel Transition Joint," Seventh Annual Alabama Materials Research Conference, Normal, AL, September 1993.

103. P. Gao* and R.H. Zee, "High Temperature Mechanical Properties of Tungsten Strengthened with 0.4% HfC," Seventh Annual Alabama Materials Research Conference, Normal, AL, September 1993.

104. J. Liu*, R. Wilcox and R.H. Zee, "Single Crystal; Growth of Refractory Alloys by Electron Beam Zone Melting," Seventh Annual Alabama Materials Research Conference, Normal, AL, September 1993.

105. R.H. Zee, "High Temperature Materials for Energy Systems," invited seminar at Westinghouse Bettis Corporation, August 17, 1993.

106. ***(Science Education Presentation):*** R.H. Zee, "Responsibility of Professional Engineers in Education," presented at the State Professional Engineers Conference at Birmingham, AL May 1993.

107. R.H. Zee, W. Wu and C. Patuwathavithane*, "Radiation Induced Effects in Insulators for Thermionic Systems," Second Specialist Conference on Thermionic Energy Conversion, Goteborg, Sweden, May 1993.

108. J.Y. Liu*, W.Y. Wu*, R.H. Zee and B.A. Chin,, "An Investigation of Residual Stress Distributions in Dissimilar C-C Composite to Stainless Steel Joints," 74th Annual AWS Convention and 24th AWS International Brazing and Soldering Conference, Houston, TX, April 1993.

109. G. Crawford*, F. Rose and R.H. Zee, "Morphology Correlation of Craters formed by Hypervelocity Impacts," LEDF Materials Results Conference, October 27-28, 1992, Huntsville, AL.

110. J. Liu*, R. Wilcox and R.H. Zee, "Single Crystal Growth of Refractory Metals by Electron Bombardment," 1992 Annual Alabama Materials Research Conference, October 6-7, 1992, Auburn, Alabama.

111. Q. Shen*, D. Edwards* and R.H. Zee, "Predication of Service Lifetime of Elastomers in a Space Environment," 1992 Annual Alabama Materials Research Conference, October 6-7, 1992, Auburn, Alabama.

112. J.W. Cohron*, R.H. Zee and B.A. Chin, "Materials Degradation by Hot Hydrogen," 1992 Annual Alabama Materials Research Conference, October 6-7, 1992, Auburn, Alabama.

113. W. Wu*, C. Patuwatharithane* and R.H. Zee, "Degradation of Alumina due to Irradiation," 1992 Annual Alabama Materials Research Conference, October 6-7, 1992, Auburn, Alabama.

114. J.Y. Liu*, W.Y. Wu*, S. Chen*, R.H. Zee and B.A. Chin, "Numerical and Experimental Evaluation of Residual Stress Distribution in Dissimilar Material Joints," 1992 Annual Alabama Materials Research Conference, October 6-7, 1992, Auburn, Alabama.

115. S.W. Richardson*, A. Nolen* and R.H. Zee, "Debris Cloud Characterization Through the Use of Momentum Monitoring Devices," 1992 Annual Alabama Materials Research Conference, October 6-7, 1992, Auburn, Alabama.

116. Y. Ozaki* and R.H. Zee, "Microstructure Evolution of Tungsten Dispersion Strengthened with Hafnium Carbides," 1992 Annual Alabama Materials Research Conference, October 6-7, 1992, Auburn, Alabama.

117. W. Yu, W. Wu, R.H. Zee and B.A. Chin, "Properties of Nb-1Zr to Stainless Steel Extruded Transition Joints," 1992 Annual Alabama Materials Research Conference, October 6-7, 1992, Auburn, Alabama.

118. ***(Science Education Presentation):*** R.H. Zee, "An Engineering and Science Outreach

Effort," presented at the Alabama Science Teacher Association Conference in Birmingham, AL, September 1992.

119. W.Y. Wu, B.A. Chin and R.H. Zee, "Radiation Effects in Alumina Insulators during High Temperature Reactor Applications," 16th International Symposium on the Effects of Radiation on Materials, Denver, CO, June 1992.

120. W. Yu*, S. Chen*, R.H. Zee and B.A. Chin, "Creep of Nb-1Zr to Stainless Steel Transition Joint," Third International Conference on Trends in Welding Research, Gatlinburg, TN June 1-5, 1992.

121. P. LeMaster*, R.H. Zee and A. Mount*, "Momentum Distribution in Debris Cloud during Hypervelocity Impact," Paper AIAA 92-1642, Proceedings of the AIAA Space Programs and Technology Conference, March 24-27, 1992, Huntsville, AL.

122. C.Y. Hsieh*, S. Nagarajan* and R.H. Zee, "Infrared Thermographic Analysis of Polymer Composites during Ballistic Impact," 1991 Alabama Materials Research Society Meeting, Birmingham, Oct 1991.

123. S.F. Chen*, R.H. Zee and B.A. Chin, "Refractory Metal to Stainless Steel Joints," 1991 Alabama Materials Research Society Meeting, Birmingham, Oct 1991.

124. R.H. Zee, W.Y. Wu* and B.A. Chin, "Electrotransport and Radiation Effects in Alumina Insulators During High Temperature Reactor Applications," 1991 Alabama Materials Research Society Meeting, Birmingham, Oct 1991.

125. B.A. Chin, Y. Lin* and R.H. Zee, "Novel 3-D TiC Reinforced TiAl and Ti Alloys," 6th Japan Institute of Metals International Symposium on Intermetallic Compounds, Sendai, Japan, June 1991.

126. J.J. Liao*, E.P. George, E.K. Ohriner and R.H. Zee, "Grain Boundary Chemistry of Iridium Alloys Doped with Th, Y, and Lu," 1991 TMS Fall Meeting in Cincinnati, Ohio, Oct 1991.

127. S.F. Chen*, R.H. Zee and B.A. Chin, "Refractory Metal to Stainless Steel Joints," 26th Annual IECEC Conference, 1991, Boston, MA.

128. R.H. Zee, W.Y. Wu* and B.A. Chin, "Electrotransport and Radiation Effects in Alumina Insulators during High Temperature Reactor Applications," Fifth International Conference on Fusion Reactor Materials, Clearwater, FL 1991.

129. S.F. Chen*, R.H. Zee and B.A. Chin, "The Welding of Niobium to Stainless Steel," Fifth International Conference on Fusion Reactor Materials, Clearwater, FL 1991.

130. W.Y. Wu* and R.H. Zee, "Stresses in Alumina Insulator due to Irradiation," 26th Annual

IECEC Conference, 1991, Boston, MA.

131. C.Y. Hsieh*, B.Z. Jang, A. Mount* and R.H. Zee, "Response of Polymer Composites to High and Low Velocity Impact," 22nd International SAMPE Technical Conference, Boston, MA, November 6-8, 1990.

132. R.H. Zee, "Composites for Nuclear Systems, Dream or Reality," invited seminar at the Chalk River Nuclear Laboratories, Canada 8/27/90.

133. Y. Lin*, C.C. Yang*, R.H. Zee and B.A. Chin, "Insitu Formation of TiC Reinforced TiAl, Ti_3Al and Alpha Ti Alloys," Invited talk at the 1990 International Materials Research Conference, Bejing, China, June 1990.

134. R.H. Zee, M.W. Guinan and G.L. Kulcinski, "Radiation Induced Order-Disorder Transformation in CuPd," 15th International Symposium on the Effects of Radiation on Materials, Nashville, TN, June 1990.

135. Y. Lin*, C.C. Yang*, B.A. Chin and R.H. Zee, "TiC Reinforced Metal-Matrix Composite by Solidification," 14th Annual Conference on Composites Materials and Structures, January 17-19, 1990, Cocoa Beach, FL.

136. Y.H. Huang and R.H. Zee, "Structure-Property-Processing Relationships of Dielectric-Filled Epoxy Resin," 45th Fall Scientific Meeting of the American Chemical Society, Midland, MI, November 11, 1989.

137. R.S. Iyer* and R.H. Zee, "Mechanical Properties of Dielectric Filled Epoxy Resin," Alabama Materials Research Conference, Huntsville, AL, September 20-21, 1989.

138. C.J. Wang*, A. Mount*, B.Z. Jang and R.H. Zee, "A Dynamic Study of energy Loss During High Velocity Impact," Alabama Materials Research Conference, Huntsville, AL, September 20-21, 1989.

139. R.H. Zee, C.J. Wang*, A. Mount* and B.Z. Jang, "A Dynamic Study of Energy Loss During High Velocity Projectile Impact," Symposium on Solid Mechanics, May 16-18, 1989, Newport, RI.

140. R.H. Zee, "Electrotransport of Co, Fe and Cr in BCC Zirconium," Alabama Materials Research Conference, Auburn, AL, October 11-13, 1988.

141. M. Belser, C.W. Tanger, T. Roppel, C. Wu, R.H. Zee and Y. Tzeng, "Electrical Contacting Technology for High Temperature Superconductors," Alabama Materials Research Conference, Auburn, Al, October 11-13, 1988.

142. P.J. Kung*, Y. Tzeng, K. Legg*, R.H. Zee, D. Burns and B.H. Loo, "Plasma Assisted Low-Temperature Low Pressure Deposition of Diamond Thin Films," Alabama Materials

Research Conference, Auburn, AL, October 11-13, 1988.

143. L. Chen*, B. Jang, L. Hwang*, J. Hawkes* and R. Zee, "Impact and Penetration Resistance of Fibrous Composites," ANTEC, 1988.

144. R.C. Wilcox, B.Z. Jang, R.H. Zee, Y.K. Liaw* and J.J. Liao*, "C-Mo and C-Zr Alloys for Space Power Systems," Conference on Optoelectronics and Laser Applications in Science and Engineering, Jan 10-15, 1988, Los Angeles, CA.

145. B.Z. Jang, L.C. Chen*, W.K. Shih and R.H. Zee, "Impact Failure Mechanisms in Hybrid Composites," 14th ISFTA.

146. Y.H. Huang, J.J. Chen*, R.H. Zee, P.P. Budenstein and B.Z. Jang, "Casting Composites for Electrical Applications," First Alabama Materials Research Conference, Birmingham, AL, Sept. 29-30, 1987.

147. Y.K. Lieu*, B.Z. Jang and R.H. Zee, "Toughening of Fibrous Composites through Controlled Interlaminar Bonding," First Alabama Materials Research Conference, Birmingham, AL, Sept. 29-30, 1987.

148. R.C. Wilcox, K.C. Yeh, B.Z. Jang, R.H. Zee and B.A. Chin, "The Structure-Property Relationships of the C-Ti Alloy System," First Alabama Materials Research Conference, Birmingham, AL, Sept. 29-30, 1987.

149. R.H. Zee, "Effects of Contamination on Electrotransport Purification," First Alabama Materials Research Conference, Birmingham, AL, Sept. 29-30, 1987.

150. W.C. Chung*, T.C. Chang*, L.R. Hwang*, B.Z. Jang and R.H. Zee, "Failure Mechanisms in Three-Dimensional Composite Materials," First Alabama Materials Research Conference, Birmingham, AL, Sept. 29-30, 1987.

151. Y.K. Liaw*, J.J. Liao*, R.C. Wilcox, B.Z. Jang and R.H. Zee, "Development of Carbon-Zirconium and Carbon-Molybdenum Alloys for High Temperature Applications," First Alabama Materials Research Conference, Birmingham, AL, Sept. 29-30, 1987.

152. G.J.C. Carpenter and R.H. Zee, "Irradiation Growth in Zirconium Single Crystal - A Review." An invited review presentation given at the International Workshop on Mechanisms of Irradiation Creep and Growth, Hecla Island, Manitoba, Canada, June 22-25, 1987.

153. C. Abromeit, R.H. Zee and S.R. MacEwen, "Damage Rate and Isochronal Recovery of 2 MeV Electron Irradiated Zr-Based Alloys," International Conference on Vacancies and Interstitials in Metals and Alloys, Berlin, West Germany, Sept. 1986.

154. R.H. Zee, "Irradiation Growth in Zirconium," Materials Engineering Seminar, Auburn

University, Auburn, AL, June 1986.

155. R.H. Zee, A. Rogerson and G.J.C. Carpenter, "Irradiation Growth in Zirconium," Symposium on Radiation Effects in Materials, Seattle, June 1986.

156. R.H. Zee and G.L. Kulcinski, "Disordering of CuPd by 14 MeV Copper Ions," Second International Conference on Fusion Reactor Materials, Chicago, April 1986.

157. R.H. Zee, M.W. Guinan and J.S. Huang, "Damage Production and Recovery in Zirconium Alloys Irradiated with Fusion Neutrons," Second International Conference on Fusion Reactor Materials, Chicago, April 1986.

158. R.H. Zee, R.C. Birtcher and S.R. MacEwen, "Effects of Solute on Damage Production and Recovery in Zirconium," Second International Conference on Fusion Reactor Materials, Chicago, April 1986.

159. I.J. Hastings, D.G. Burton, A. Celli, R.D. Delaney, P.J. Fehrenbach, L.M. Howe, L.L. Larson, S.R. MacEwen, J.M. Miller, T.A. Naeem, J.A. Sawicki, M.L. Swanson, R.A. Verrall and R.H. Zee, "Canadian Fusion Breeder Blanket Program: Irradiation Facilities at Chalk River," Second International Conference on Fusion Reactor Materials, Chicago, April 1986.

160. R.H. Zee, "Irradiation Growth in Zirconium," Materials Science and Technology Divisional Seminar, Argonne National Laboratory, Jan. 1986.

161. R.H. Zee, "Radiation-Induced Order-Disorder Transformation," invited divisional seminar at Hahn-Meitner Institute, West Berlin, Nov. 1985.

162. R.H. Zee, G.J.C. Carpenter and A. Rogerson, "Irradiation Growth in Deformed Zirconium," TMS-AIME Fall Meeting in Toronto, Ontario, Canada, Oct. 1985.

163. R.H. Zee, J.F. Watters and R.D. Davidson, "On Some Thermodynamic Properties of Zr-Sn and Zr-Ti Systems," TMS-AIME Fall Meeting in Toronto, Ontario, Canada, Oct. 1985.

164. R.H. Zee, "Radiation-Induced Order-Disorder Transformation - Model and Experiment," Materials Science and Technology Divisional Seminar, Argonne National Laboratory, Oct. 1985.

165. R.H. Zee, R.D. Davidson and J.F. Watters, "Diffusion Coefficient and Activity of Tin and Titanium in Zirconium," International Seminar on Solute Defect Interaction: Theory and Experiment, Kingston, Ontario, Canada, Aug. 1985.

166. R.H. Zee, J.F. Watters and R.D. Davidson, "Simultaneous Determination of Diffusion Coefficient and Partial Pressure of Tin and Titanium in Zirconium," TMS-AIME Annual

Meeting in New York City, Feb. 1985.

167. R.H. Zee, S.R. MacEwen and J.F. Watters, “Helium Blistering in Zirconium,” Metal Physics Conference, Kingston, Ontario, Canada, June 1984.

168. R.H. Zee, A. Rogerson, G.J.C. Carpenter and J.F. Watters, “Effect of Tin on Irradiation Growth in Polycrystalline Zirconium,” TMS-AIME Fall Meeting in Phil., Oct. 1983.

169. M.W. Guinan and R.H. Zee, “Damage Production and Recovery in Zirconium Irradiated with Fusion Neutrons,” Third Topical Meeting on Fusion Reactor Materials, Albuquerque, NM, Sept. 1983.

170. R.H. Zee and J.F. Watters, “Effects of Cold Work and Niobium on the Blistering of Zirconium by Helium Atoms,” Third Topical Meeting on Fusion Reactor Materials, Albuquerque, NM, Sept. 1983

171. S.R. MacEwen, R.H. Zee, R.C. Birtcher and C. Abromeit, “Point Defect Production and Annihilation in Neutron Irradiated Zr,” Third Topical Meeting on Fusion Reactor Materials, Albuquerque, NM, Sept. 1983.

172. R.H. Zee and G.L. Kulcinski, “Order-Disorder Transformation in CuPd Induced by 14 MeV Copper Irradiation,” 10th Annual Meeting of the Microscopical Society of Canada, May 1983.

173. R.H. Zee, J.F. Watters, G.J.C. Carpenter and F.A. Schmidt, “Purification of Zirconium by Electrotransport,” Metal Physics Conference, Kingston, Ontario, Canada, June 1982.

174. G.J.C. Carpenter, R.H. Zee, J.F. Watters and A. Rogerson, “Effects of Lattice Defects on Radiation Growth of Zirconium,” Metal Physics Conference, Kingston, Ontario, Canada, June 1982.

175. R.H. Zee, “Radiation-Induced Order-Disorder Transformation,” invited seminar at the Ontario Research Foundation, Mississauga, Ontario, Canada, Feb. 1981.

176. R.H. Zee, “Radiation-Induced Order-Disorder Transformation,” Chalk River Nuclear Laboratories, Chalk River, Ontario, Canada, Dec. 1980.

177. R.H. Zee, “Radiation-Induced Order-Disorder Transformation,” McMaster University, Hamilton, Ontario, Canada, Dec. 1980.

178. R.H. Zee, “Radiation-Induced Order-Disorder Transformation,” Whiteshell Nuclear Research Establishment, Pinewa, Manitoba, Canada, Nov. 1980.

179. R.H. Zee and P. Wilkes, “The Theory of Order-Disorder Phenomena Under Irradiation,” Invited presentation at the TMS-AIME Fall Meeting in Pittsburgh, Oct. 1980.

180. R.H. Zee and P. Wilkes, "The Radiation Induced Order-Disorder Transformation in Cu_3Au," TMS-AIME Annual Meeting in Las Vegas, Feb 1980.

FUNDED RESEARCH AND EDUCATION PROJECTS
Contracts and Grants (Education grants as indicated)
Total of $11,800,000 as PI
Additional $12,000,000 as non-PI

1. *(Education Grant):* "Scholarships for Computer Science and Engineering Students," NSF, $400,000, October 2002 to September 2006. R.H. Zee is the PI.

2. "Alternate Fuel for Cement Processing" DOE-Office of Biomass Program, $1,500,000, July 2005 to September 2008. R.H. Zee is the PI.

3. "Dynamic Rollover Study," FHWA, $1,486,000, October 2002 to September 2005. R.H. Zee is the PI.

4. "Facility Reuse Project," SAIC, June 2002 to June 2003, $190,000. R.H. Zee is the PI.

5. "Tungsten Single Crystal Growth," U.S. Army Picatinny Arsenal (subcontract through General Atomics, total amount of $450,000, 2001-2002. R.H. Zee is the PI.

6. *(Education Grant):* "Energizing Physics Teachers for the Twenty First Century," NSF Division of Undergraduate Education, $200,000, June 1998-June 2002, R.H. Zee is co-PI with Bill Baird.

7. "Manufacturing of Feedstock Tungsten Single Crystal Materials," U.S. Army Picatinny Arsenal, $65,151, 2001-2002. R.H. Zee is the PI.

8. "Thermionic Energy Convertor, 10-100kW," Universal Energy Systems/General Atomics, 2000-2001, $52,833. R.H. Zee is the PI.

9. "Materials Technology Development for the HPALM System," U.S. Air Force Research Laboratory/General Atomics, 2001-2002, $104,800. R.H. Zee is the PI.

10. "Development of High Temperature Materials for Energy Conversion," General Atomics / Defense Threat Reduction Agency, $850,000, 1997-2002. R.H. Zee is the PI.

11. "Iridium Alloys and Intermetallic Compounds," Lockheed Martin Energy Systems, Oak Ridge National Laboratory, $150,355, 1994-2002, R.H. Zee is the PI.

12. "Shape Memory Alloy Research," Johnson Controls Inc, $10,000. R.H. Zee is the PI.

13. "Materials for Thermionic Systems," U.S. Air Force, $2,300,000, 4/89-10/97, R.H. Zee is the PI.

14. "Joining and Interfacial Study of Refractory Alloy Single Crystals for High Temperature Applications," Air Force Office of Scientific Research, $330,000, 1997-2000, R.H. Zee is the PI.

15. "Carbon-Carbon Composites Impact Shell with Controlled Thermal Characteristics for GPHS," Department of Energy, $300,000 for Phase I, 1998-2000. This is a joint program with Oak Ridge National Laboratory with Auburn University being the prime. R.H. Zee is the PI.

16. "Wilmore Laboratory Renovation," NSF Office of Science and Technology Infrastructure, $2,000,000 for 54 months, start date 9/94, B.A. Chin is the PI.

17. "Smart Materials for Transport Control," NSF/Alabama EPSCoR, a state-wide project is for three years (1995-1999 with extension) involving Auburn, UAB, Tuskegee, Alabama A&M, University of South Alabama and Alabama School of Science and Mathematics. R.H. Zee is the PI and the project director of this state-wide effort. Auburn University's effort is $360,000/year for three years.

18. ***(Education Grant):*** "Infrastructure for Education," NSF/Alabama EPSCoR, $255,000, 1995-1999. R.H. Zee is the PI.

19. "Development of Electrode and Electrolyte for AMTEC System," Texas A&M University / Department of Energy, $47,000 for Phase I, May 1998-March 2000. Auburn University is a subcontractor to TAMU. R.H. Zee is the PI for the subcontract.

20. "Materials Research for the Solar Orbital Transfer Vehicle," Boeing North America / U.S. Air Force, $338,200, July 1998-2000. R.H. Zee is the PI.

21. "Self-Monitoring Advanced Remote Technology System (SMART)," U.S. Air Force TRP Program, PI is J.W. Fergus, $2,297,134, 1996-1999.

22. "A Characterization Study of Iridium Alloys," Martin Marietta Energy Systems, $78,000, 10/1/94-11/30/97, R.H. Zee is the PI.

23. "The Use of Smart Materials for the Deicing of Engine Cowl," United Technology Center - Pratt and Whitney, $20,000, 1996-1997. R.H. Zee is the PI.

24. ***(Education Grant):*** "Integrated Science/Mathematics Enhancement Program Based on Materials Technology," Dwight D. Eisenhower Mathematics and Science Education Program, $40,000, 6/1/95-2/28/96.

25. ***(Education Grant):*** "Pre-University Teacher Student and Miracles of Materials Outreach," NSF/Alabama EPSCoR, $53,000, 1/94-8/96.

26. ***(Education Grant):*** "Miracles of Materials, a Science and Engineering Enhancement Program," NSF/Alabama EPSCoR, $27,070, 3/93-9/94.

27. "A Study of High Temperature Behavior in Iridium Alloys," Martin Marietta Energy Systems, $165,000, 12/89-3/94, R.H. Zee is the PI.

28. "Materials Component Study for Space Nuclear Systems," Orion International, $68,000, 10/1/94-12/31/94, R.H. Zee is the PI.

29. "High Temperature Materials Technology Research for Advanced Thermionic Systems," U.S Department of Energy, $120,000, 12/92-12/96, R.H. Zee is the PI.

30. "Grain Boundary Chemistry and Fracture of High Temperature Alloys," U.S. Department of Energy EPSCoR Traineeship, $26,000, 1/93-12/93, R.H. Zee is the PI.

31. "Effect of Hydrogen on the Surface Emissivity of Materials for Nuclear Thermal Propulsion," U.S. Air Force, $150,000, 6/92-10/93, R.H. Zee is the PI.

32. "Physics of Debris Clouds from Hypervelocity Impacts," NASA/Marshall Space Flight Center, $30,000, 4/92-10/93, R.H. Zee is the PI.

33. "A Dynamic Study of Fragmentation and Energy Loss During High Velocity Impact," NASA/Marshall Space Flight Center, $105,000, 8/89-10/93, R.H. Zee is the PI.

34. "Multipurpose High Vacuum Surface Processing System," NSF/Alabama EPSCoR Equipment Grant, $48,285, 1/93-9/93, R.H. Zee is the PI.

35. "Hot Hydrogen Testing of Metallic Turbopump Materials," NASA/Marshall Space Flight Center, $10,000, 5/92-4/93, R.H. Zee is the PI.

36. "Lifetime Prediction of Materials Exposed to the Natural Space Environment," NASA/Marshall Space Flight Center, $50,000, 4/92-4/93, R.H. Zee is the PI.

37. "Hot Hydrogen Testing of Refractory Metal and Ceramics," NASA/Marshall Space Flight Center, $100,000, 2/92-2/93, R.H. Zee is the PI.

38. "Quick Heat Quench Weld Simulation Unit," U.S. Department of Energy, $273,842, 10/1/90-9/30/92, R.H. Zee is Co-PI with B.A. Chin.

39. "Hybrid TiC Composite Alloys," Air Force Office of Scientific Research, $276,000. 12/87-11/90, R.H. Zee is Co-PI with B.A. Chin.

40. "A Study of Fracture Mechanisms in ATD Roller Bearing," NASA, $34,211, 6/89-6/90. R.H. Zee is the PI.

41. ***(Education Grant):*** "NASA Scholarship: A Dynamic Study of Fragmentation and Energy Loss during High Velocity Impact," NASA, $18,000, 6/89-5/90. R.H. Zee is the PI.

42. "Technical Support and Research in the Use of Dielectric Materials," U.S. Army Missile Command, $24,978, 5/89-10/89. R.H. Zee is the PI.

43. "A Study of Helium in the Weldability of Steels," Auburn University Grant-in-Aid, $3,000, 6/1/88-5/31/89. R.H. Zee is the PI.

44. ***(Education Grant):*** "Research Experience for Undergraduates: A Microstructure and Property Investigation of Metal-Based Composites," National Science Foundation, $40,000, 6/87-10/88. R.H. Zee is the PI.

45. "Amorphization of Materials by Heat Treatment-A Novel Approach," Oak Ridge National Laboratory, $1,620, 1/1/88-9/30/88. R.H. Zee is the PI.

46. "Development of Casting Components have High Dielectric Strength," Center for Advanced Technology, U.S. Army Missile Command, $189,000, 1/1/88-9/30/88. R.H. Zee is the PI.

47. "Amorphization of Materials by Heat Treatment," Auburn University Grant-in-Aid, $2,000, 1/1/87-6/30/88. R.H. Zee is the PI.

48. "Development of Casting Components have High Dielectric Strength," Center for Advanced Technology, U.S. Army Missile Command, $395,000, 4/1/87-12/31/87. R.H. Zee is the PI.

49. "Development of Casting Components Having High Dielectric Strength," Center for Advanced Technology, U.S. Army Missile Command, $24,893, 12/1986-3/1987. R.H. Zee is the PI.

50. "Acquisition of a Tandem Accelerator," National Science Foundation Academic Research Infrastructure Program, PI is John Weete, $500,000, 10/95-9/98.

51. "Acquisition of a Transmission Electron Microscope," NSF, $260,000, 1/94-12/96, William Gale is the PI.

52. "Composite Materials: Tailored Interfaces," NSF/Alabama EPSCoR, $1,500,000 per year for three years, 4/92-4/95, B.Z. Jang is the PI.

53. “Chemical Compatibility of Cartridge Materials,” NASA, $62,000, 10/90-9/91. R.C. Wilcox is the PI.

54. “Analysis and Optimization of High Performance Materials,” National Science Foundation/Alabama EPSCoR, $1,250,000, 1986-1991, B.Z. Jang is the PI.

55. “Optimization of Fracture Resistance in Composites,” Army Research Office, $900,000, 10/1/86-9/30/89, B.Z. Jang is the PI.

56. “Carbon-Molybdenum and Carbon-Zirconium Alloys for Space Power Systems,” SDIO, $90,000, 1/87-1/88, R.C. Wilcox is the PI.

57. “C-Mo and C-Zr Alloys for Space Power Systems,” Space Power Institute, $210,000, 1/86-12/87, R.C. Wilcox is the PI.