Supapan Seraphin

Department of Materials Science and Engineering
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CHRONOLOGY OF EDUCATION

B.S. Chemistry, Mahidol University, Bangkok, Thailand 1976 - 1980
M.S. Energy Technology, King Mongkut's Institute of Technology, Bangkok, Thailand 1980 - 1983
Thesis *"Black Chrome Selective Surfaces for Solar Thermal Energy Conversion: Preparation and Optical Properties"* supervised by K. Kiratikara
Ph.D. Materials Science and Engineering, Arizona State University, Tempe, Arizona 1987 - 1990
Dissertation *"Effect of Processing Conditions on the Microstructure of Oxygen Implanted Silicon-on-Insulator Material"* supervised by S.J. Krause
Certificate, Summer Institute Higher Ed Administration Women, Bryn Mawr College, PA 7/1998

EMPLOYMENT

Department of Materials Science and Engineering, University of Arizona, Tucson, AZ
Responsible for research, teaching, and service

Professor 2002 - present
Associate Professor 1996 - 2001
- Conduct research on Carbon Nanotubes and Oxygen Implanted Silicon-on-Insulator
- Direct and coordinate the Research Experience for Undergraduate program
- Initiated the Women in Engineering program in 1999

Assistant Professor 1990 - 1996
- Developed and implemented a course on Microstructural Characterization
- Established the electron microscope laboratory

Director, Electron Microscope Facilities for Materials Research 1990 - present
- Set-up a high-resolution TEM, SEMs, and created a computer network lab for education
- Provide structural microanalysis to materials researchers on campus and industries

College of Optical Sciences, University of Arizona, Tucson, AZ
Professor 2008 – present
Department of Agriculture Bio Systems Engineering, College of Agriculture and Life Sciences
Professor 2008 - present

Visiting Professorship
Hong Kong University of Science & Technology, Hong Kong fall 1996
Federal Swiss University of Technology, Lausanne, Switzerland fall 1997, summer 1998/1999
Chiang Mai University, Chiang Mai, Thailand fall 2004

Department of Materials Science, Kyoto University, Japan 1985 - 1987
Monbusho Research Fellow Studied intergranular corrosion in stainless steel

School of Energy & Materials, King Mongkut's Institute of Technology, BKK, Thailand 1983 - 1985
Lecturer Performed the scale-up of the electroplating lab for solar selective surfaces and characterized the chemical compositions and the radiative properties of thin films

HONORS AND AWARDS

- Fulbright Foreign Scholarship, 2011-2012
- Ben's Bell Award for promoting kindness and community, 2011
- Diversity Excellent Award, University Women in Science and Engineering, 2009
- Da Vinci Fellow, College of Engineering Outstanding Faculty Award 2007
- Outstanding Faculty Award, Asian American Faculty, Students and Alumni Assoc., 2007
- University of Arizona Faculty Fellow 2001 - present
- College of Engineering, Award for Excellence at the Student Interface 2001, 2002, 2009
- NSF Committee of Visitors to review the Division of Materials Research, April 2002
- Technical Advisory Board, National Nanotechnology Center, Thailand, 2005
- Technical Advisory Board, National Metal & Materials Technology Center, Thailand, 1996 - 2000
- Norbert I. Kreidl MSE Department Award for Outstanding Teaching, 1997
- Director, NSF REU Site since 1994, NSF International REURET Site since 2003
- Fellow, Alfred P. Sloan Foundation, 1993
- Presidential Student Scholar, Electron Microscopy Society of America, 1989

COURSES TAUGHT

- MSE 480/580 Experimental Methods for Microstructural Analysis (required)
- MSE 489/589 Transmission Electron Microscopy of Materials (elective)
- MSE 498 Senior Design Project (supervise individual students on research projects)
- MSE 491 Preceptorship: Individual practice in actual service for MSE 331R (elective)
- MSE 531 Engineering Materials and Selections (online course offered in 2002)
- MATL 510 Fundamentals of Materials Science and Engineering (elective) (Hong Kong University)
- MATL 530 Materials Characterization (required) (Hong Kong University)
- MSE 331R Fundamentals of Materials for Engineers (required)
- ENGR 211R Basics Materials Science and Engineering (1 unit online course)
- MSE 110 Introduction to Solid State Chemistry (Honor recitation section)
- ENGR 102 Engineering Design and Problem Solving (required)
- UNVR195a Freshman Colloquium (Keys to Engineering Success)

Guest Lectures

- ENGR 102 Open House and Mini Lecture (1998, 1999)
- MSE 110 Lecture on Materials Characterization (spring 1998)
- MSE 444 Design Competition, Member of Jury (spring 1996)

PUBLICATIONS

A Chapter in Materials Science Handbook
G.W. Chandler and **S. Seraphin**, "Scanning Electron Microscopy," Methods in Materials Research: A Current Protocols Publication, Editor-in-Chief: Elton N. Kaufmann, John Wiley & Sons, Inc., 2000, Unit 11a.1 (14 pages)

Refereed Journal Articles since 2004
Significance of authorship: first author is the major contributor. Graduate students marked with $^{+}$.

1. Binh Duong^{+}, Palash Gangopadhyay, Supapan Seraphin, Jayan Thomas, "Multiwall Carbon Nanotubes Grown by Thermocatalytic Cabonization of Polyacrylonitrile," Carbon, 50, 4754-4757 (2012)
2. Michael J. Martinez-Rodriguez, Tong Cui^{+}, Sirivatch Shimpalee, Supapan Seraphin, Binh Duong^{+}, J.W. Van Zee, "Effect of Microporous Layer on MacMullin Number of Carbon Paper Gas Diffusion Layer," J. Power Sources, 207, 91-100 (2012)
3. Timothy Mayhew, Margo Ellis^{+}, Supapan Seraphin, "Steatite and Natural White Chalks in Traditional Old Master Drawings," J. American Inst. Conservation, in press.
4. Johnathon Farmer^{+}, Binh Duong^{+}, Supapan Seraphin, Sirivatch Shimpalee, "Assessing Porosity of Proton Exchange Membrane Fuel Cell Gas Diffusion Layers by Scanning Electron Microscope Image Analysis," J. Power Sources, 197, 1-11 (2012)
5. P. Laokul^{+}, V. Amornkitbamrung, S. Seraphin, S. Maensiri, "Characterization and magnetic properties of nanocrystalline $CuFe_2O_4$, Ni Fe_2O_4, Zn Fe_2O_4 powders prepared by the aloe vera extract solution," Current Appl. Physics, 11, 101-108 (2011)
6. Timothy Mayhew, Margo Ellis^{+}, Supapan Seraphin, "The History, Science, and Technique of Natural Black Chalk in Traditional 14^{th}- 19^{th} Century Old Master Drawings," J. American Inst. Conservation, 49, 83-95 (2010)
7. L. Wang^{+}, Y. Xiong^{+}, Z. Wu^{+}, B. Duong^{+}, S. Seraphin, H. Xin, and L. Chen, "Demetalization of Single-Walled Carbon Nanotube Thin Films with Microwave Irradiation," Applied Physic A-Materials Sc. & Processing , 102, 401-406 (2010)
8. O. Akpa, S. Shoieb, T. Thompson, T. Isaacs-Smith, P. Anderson, S. Seraphin, K. Das, "Chalcopyrite/Si Heterojunctions for Photovoltaic Applications," J. Electronic Materials, 39, 2462-2466 (2010)
9. Carolyn Reynolds, Binh Duong^{+}, and Supapan Seraphin, "Effects of Hydrogen Flow Rate on Carbon Nanotube Growth," J. Undergraduate Research in Physics, Vol. 23, August 27, 2010
10. Tasha Adams, Binh Duong^{+}, and Supapan Seraphin, "Effects of Catalyst Components on Carbon Nanotube Grown by Chemical Vapor Deposition," J. Undergraduate Research in Physics, MS126, January, 17, 2012
11. B. Duong^{+}, S. Seraphin, L. Wang^{+}, Y. Peng, and H. Xin, "Production of predominantly semiconducting double-walled carbon nanotubes," Carbon, 49, 3512-3521 (2011)
12. J. Klinkaewnarong^{+}, E. Swatsitang, C. Masingboon, S. Seraphin, and S. Maensiri, "Synthesis and Characterization of Nanocrystalline HAp Powders Prepared by using Aloe Vera-Plant Extracted Solution," Current Applied Physics, 10, 521-525 (2010)
13. K. Juengsuwattananon and S. Seraphin, Effects of Zeolite A on the microstructure and strength development of blended cement, J. Microscopy Soc. Thailand, 24 (1), 59-63 (2010)
14. Jirapat Ananpattarachai^{+}, Puangrat Kajitvichyanukul, Supapan Seraphin, "Visible light absorption ability and photocatalytic oxidation activity of various interstitial N-doped TiO_2 prepared from different nitrogen dopants," J. Hazardous Materials 168, 253-261 (2009)
15. S. Maensiri, S. Phokha^{+}, P. Laokul^{+}, and S. Seraphin, "Room temperature magnetism in Fe-doped CeO_2 nanoparticles," J. Nanoscience and Nanotechnology, J. Nanoscience and Nanotechnology, 9, 6415-6420, 2009
16. S. Maensiri, P. Laokul^{+}, J. Klinkaewnarong^{+}, S. Phokha^{+}, V. Promarak, S. Seraphin, "Indium oxide (In_2O_3) nanoparticles using Aloe vera plant extract: Synthesis and optical properties," J. Optoelectronics and Adv. Mater., 10, 161-165 (2008)
17. C. Masingboon^{+}, S. Maensiri, T. Yamwong, P.L. Anderson, S. Seraphin, "Nanocrystalline $CaCu_3Ti_4O_{12}$ poweres prepared by egg white solution route: synthesis, characterization and its giant dielectric properties," Applied Phys. A, 91, 87-95 (2008)
18. C. Masingboon^{+}, P. Thongbai, S. Maensiri, T. Yamwong, S. Seraphin, "Synthesis and giant dielectric behavior of $CaCu_3Ti_4O_{12}$ ceramics prepared by polymerized complex method," Mat. Chem. Phys, 109, 262- 270 (2008)
19. Santi Maensiri, Chivalrat Masingboon^{+}, Paveena Laokul^{+}, Wirat Jareonboon, Vinich Promarak, Philip L. Anderson, and Supapan Seraphin, "Egg white synthesis and photoluminescence of platelike clusters of CeO2 nanoparticles," Crystal Growth & Design, 7, 950 (2007)

20. K. Wongsaprom[+], E. Swatsitang, S. Maensiri, S. Srijaranai, and S. Seraphin, "Room Temperature ferromagnetism in Co-doped $La_{0.5}Sr_{0.5}TiO_{3-\delta}$ nanoparticles," Appl. Phys. Letters, 90, 162506 (2007)
21. S. Maensiri, C. Masingboon[+], V. Promarak[+], and S. Seraphin, "Synthesis and optical properties of nanocrystalline V-doped ZnO," Optical Materials, 29, 1700-1705 (2007)
22. S. Maensiri, C. Masingboon[+], B. Boonchom[+], and S. Seraphin, "A simple route to synthesize nickel ferrite ($NiFe_2O_4$) nanoparticles using egg white," Scripta Materialia, 56, 797-800 (2007)
23. Santi Maensiri, Wiwat Nuansing[+], Siayasunee Ninmuang[+], Wirat Jarernboon, and Supapan Seraphin, "Structural characterization and morphology of electrospun TiO_2 nanofibers", Mat. Sc. Engr. B, 131, 147-155 (2006).
24. S. D. Felicelli, S. Seraphin, and D.R. Poirier, "A numerical model to simulate precipitate growth and ripening in oxygen-implanted silicon-on-insulator materials," Modelling Simul. Mater. Sci. Eng., 14, 1197-1210 (2006).
25. Matthew E. Katterman[+], Stephanie Birchard[+], Supapan Seraphin, and Mark R. Riley, "Cellular evaluation of the toxicity of combustion derived particulate matter: influence of particle grinding and washing on cellular response," Chemosphere, 66 (3), 567-573 (2006).
26. C. Liewhiran[+], S. Seraphin, S. Phanichphant, "Synthesis of nano-sized ZnO powders by thermal decomposition of zinc acetate using *Broussonetia papyrifera* (L.) Vent pulp as a dispersant," Current Appl. Phys. 6, 499-502 (2006).
27. Supapan Seraphin, "Brief Review: Basic Properties and Applications of Carbon Nanotubes," Microscopy Today, March 2006.
28. S. Choi., P. A. O'Day., N. A. Rivera., K. T. Mueller., M. A. Vairavamurthy., S. Seraphin and J. Chorover, "Strontium speciation during reaction of kaolinite with simulated tank-waste leachate: bulk and microfocused EXAFS analysis," Environ. Sci. Technol. 40, 2680-2614 (2006).
29. S. Choi, G. Crosson, K. T. Mueller, S. Seraphin and J. Chorover, "Clay mineral weathering and contaminant dynamics in a caustic aqueous system.II. Mineral transformation and microscale partitioning" Geochem. Cosmochem. Acta, 69, 4437-4451 (2005).
30. Supapan Seraphin, "Review carbon nanotubes as smart materials: basic properties and applications," Chiang Mai J. Sci., 32, 189-205 (2005).
31. Tula Jutarosaga[+], Srinivas Manne, Supapan Seraphin, "Si-SiO_2 Interface Formation in Low-Dose, Low-Energy Separation by Implanted Oxygen Materials, Appl. Surface Sc., 250, 168-181 (2005).
32. Tula Jutarosaga[+], Jun Sik Jeoung[+], Supapan Seraphin, "Infrared Spectroscopy of Si-O Bonding in Low-Dose Low-Energy Separation by Implanted Oxygen Materials, Thin Solid Film, 476, 303-311 (2005).

Refereed Conference Proceedings since 2004

1. Timothy Mayhew, Margo Ellis, and Supapan Seraphin, "The Nature and Evolution of Metalpoint Grounds in Traditional 4th to 16th Century Old Master Drawings," Proc. Mat. Res. Soc. Fall 2010
2. O.N. Akpa, S. Shaik, T. Thompson, T. F. Isaac-Smith, P. Anderson, S. Seraphin, K. Das, Sputter Deposition of CuInSe2 from Composite Targets on (100) Si, MRS Fall 2009
3. O.N. Akpa, S. Shaik, T. Thompson, T. F. Isaac-Smith, P. Anderson, S. Seraphin, K. Das, Chalcopyrite Heterojunctions for photovoltaic devices, TMS September 2009
4. Jirapat Ananpattarachai, Puangrat Kajitvichyanukul, and Supapan Seraphin, "Influence of Nitrogen Dopant on Morphology and Physico-chemical Properties of Interstitial N-doped TiO_2," Nano Today International Conference, Singapore, August 2009
5. Supapan Seraphin, "Review: Identify Unknown Substances," Proc. Micros. Soc. America, 2006
6. T. Jatarosaga, S. Seraphin, S. M. Smith, and Y. Wei, "Effect of RF-PECVD synthesis conditions on the carbon nanotube growth," Proc. Micro. Soc. America, 2006
7. T. Jutarosaga and S. Seraphin, "Anneal-Flattening of the Si-SiO2 Interface in Ultra-Thin SIMOX Structures", Proc. Micros. Soc. America, 2005
8. S. Choi, M.K. Amistadi, S. Seraphin, and J. Chorover, "Cesium and Strontium Uptake to Clay Minerals and Their Weathering Products in a Caustic Waste", the 227th American Chem. Soc. National Meeting, Anaheim, CA, 2004
9. S. Choi, M.K. Amistadi, S. Seraphin and J. Chorover, "Contaminant Sorption Behavior of Clay Minerals", Arizona Imaging and Microanalysis Society, March 4, 2004, Arizona State University
10. Margo Ellis, Tim Corley and Supapan Seraphin, "Biogenesis of Metal Precipitates", Arizona Imaging and Microanalysis Society, March 4, 2004, Arizona State University
11. Margo Ellis, Tim Corley and Supapan Seraphin, SEM Investigation of Biogenesis of Metal Precipitates, Sigma Xi Conference for Undergraduate Research, Quebec, Canada, November 2004 Received a best poster award

SCHOLARLY PRESENTATIONS

Invited Presentations since 2004

1. Workshop "Advanced course on SEM, TEM, and EDX," Instrumentation and Research Center, Kasetsart University, Bangkok, Thailand, March 13, 2012
2. "Current Research on Carbon Nanotubes" and "Principles and Applications of SEM and TEM" Mahidol University, Bangkok, Thailand, March 8, 2012
3. "Addressing Nanomaterials Characterization for Nano-Safety Research", Naresuan University, Pitsanulok, Thailand, March 6, 2012
4. "Discovery and Applications of Carbon Nanotubes," Rungsit University, Bangkok, Thailand, March 5, 2012
5. "Everything you want to know about Supapan Seraphin but are afraid to ask," King Mongkut's University of Technology Thonburi, February 27, 2012
6. "How to prepare a scientific manuscript," Kasetsart University, Thailand, June 29, 2009
7. "Scanning Electron Microscopy and Transmission Electron Microscopy Techniques for Nano- and Micro-Structural Analysis," Kasetsart University, Thailand, June 30 - July 3, 2009
8. Intensive Hands-on Workshop "Remote Operation Across the Pacific of Scanning Electron Microscopy and Optical Raman Spectroscopy Performed Simultaneously" Thailand National Materials and Metals Technology Center, Ministry of Science and Technology, June 11-13, 2008
9. "Scanning and Transmission Electron Microscopy in Nanotechnology," Siam Cement Group, Saraburi, Thailand, June 17, 2008
10. Intensive Hands-on Workshop "Transmission Electron Microscopy of Materials," Petroleum and Petrochemical College, Chulalongkorn University, Thailand, June 24-25, 2008
11. "Effects of Processing Conditions on Growth and Microstructures of Nanoparticles," Department of Materials Science and Engineering, Rutgers University, September 26, 2007
12. "Nano- and Microstructural Analysis of Materials," Faculty of Science, Kasetsart University, Thailand, December 19-20, 2007
13. "Review: Detection and Identify Unknown Substances," Annual Meeting, Microscopy Society of America, Chicago, August 2006
14. "Carbon Nanotubes – New Frontier in Nanotechnolgy," and "Nanotechnology for Environment Applications," Workshop at the International Conference for Waste Hazardous Management, Bangkok, Thailand, January 9, 2006
15. "Carbon Nanotubes – New Frontier in Nanotechnolgy," Special seminar, King Mongkut's University of Technology Thonburi, Bangkok, Thailand, January 6, 2006
16. "Fundamentals of Materials Characterization," The Gem and Jewelry Institute of Thailand, Bangkok, Thailand, January 5, 2006
17. "Structural Characterization of Materials," One-week intensive workshop, The Petroleum and Petrochemical College, Chulalongkorn University, Bangkok, Thailand, December 19-23, 2005
18. "Carbon Nanotubes in Consumer Products," Annual Meeting Thailand National Science and Technology Development Agency, Bangkok, Thailand, March 30, 2005
19. **"**Review Carbon Nanotubes As Smart Materials: Basic Properties and Applications", Plenary Presentation, International Meeting on Smart and Intelligent Materials 04, Chiang Mai, Thailand December 1, 2004

Contributed Presentations since 2004

1. ERC Site Visit, UC San Diego, April 18-20, 2010, University and Pre-college Education, Outreach, and Diversity
2. Poster "Gen-III ERC Center for Integrated Access Networks Education Programs", M. Kupinski, S. Seraphin, et al., presented at NSF Awardees Conference, February 2010, Reston, VA
3. Tasha Adams, Binh Duong, and Supapan Seraphin, "Effects of Catalyst Components on Carbon Nanotube Grown by Chemical Vapor Deposition," International Optical Society of America Network of Students, Oct. 1-3, 2010, Tucson, AZ
4. "University Spectroscopy and Imaging Facilities: The "small picture" is the "big picture" in characterization in Science and Technology", S. Seraphin, P.L. Anderson, S. Hernandez, 2010 AHSC Frontiers in Biomedical Research, A Poster Forum, October 20, 2010

5. Binh Duong, Yitian Peng, Supapan Seraphin, and Hao Xin, "Characterization of Carbon Nanotubes Using Raman Spectroscopy and SEM Simultaneously", Annual Meeting Arizona Imaging and Microanalysis Society, Arizona, March 12, 2009
6. Supapan Seraphin, "Growth and Microstructures of Carbon Nanotubes, Titanium Oxide and Zinc Oxide," MSE Department Colloquium, February 2, 2009
7. "Introduction of University Spectroscopy and Imaging Facilities," Tucson Joint ASME/ASM Meeting, at University of Arizona, September 30, 2009
8. Supapan Seraphin, "Mentoring REU/RET on a time budget," Center for Integrated Access Network, Engineering Research Center conference, Los Angeles, Nov. 11, 2009
9. Jirapat Ananpattarachai, Puangrat Kajitvichyanukul, and Supapan Seraphin, "Visible Light Absorption Ability and Photocatalytic Oxidation Activity of Various Types of Nanosize N-doped TiO_2," 12th International Conference on Integrated Diffuse Pollution Management, Khon Kaen University, Thailand; 25-29 August 2008
10. Supapan Seraphin, Gary Chandler, Marilee Sellers, David Bentley, Kristina Dorame, and Stephen Hernandez, "Remote Microscopy for Education and Outreach," Annual Meeting Microscopy & Microanalysis, Albuquerque, August 2008
11. Binh Duong, Yitian Peng, Margo Ellis, Supapan Seraphin, and Hao Xin , "Combined Raman Spectroscopy and SEM of CVD Grown Carbon Nanotubes," Annual Meeting Microscopy & Microanalysis, Albuquerque, August 2008 *Best Poster Award-Advance Instrumentation Category*
12. Binh Duong, Supapan Seraphin, Paveena Laokul, Chivalrat Masingboon, and Santi Maensiri, "Ni-Cu-Zn Ferrite Prepared by Aloe Vera Plant Extract or Egg White," Annual Meeting Microscopy & Microanalysis, Albuquerque, August 2008
13. M. Ellis, T. Jutarosaga, S.M. Smith, Y. Wei, and S. Seraphin, "Electron Microscopy and Raman Characterization of Multi-walled Carbon Nanotubes Grown by CVD," Annual Meeting Microscopy & Microanalysis, Albuquerque, August 2008
14. M. Ellis, T. Jutarosaga, S.M. Smith, Y. Wei, and S. Seraphin "A SEM-Structural Chemical Analyzer Study of Multi-Walled Carbon Nanotubes Grown by Chemical Vapor Deposition," Annual Meeting Arizona Imaging and Microanalysis Society, Flagstaff, Arizona, April 17, 2008 ***Best Poster Award***
15. K.E. Dorame, S. Hernandez, S. Seraphin, G. Chandler, D. Bentley "Remote Microscopy for Education and Outreach", Annual Meeting Arizona Imaging and Microanalysis Society, Flagstaff, Arizona, April 17, 2008
16. Binh Duong, Yitian Peng, Margo Ellis, Supapan Seraphin, and Hao Xin, "Simultaneous Raman Spectroscopy and SEM Analysis of Carbon", Annual Meeting Arizona Imaging and Microanalysis Society, Flagstaff, Arizona, April 17, 2008
17. M. Ellis, T. Jutarosaga, S.M. Smith, L. Yong, B. Coll, Y. Wei, and S. Seraphin, "Growth and Characterization of Crystalline Tin Oxide Nanostructures," Annual Meeting Microscopy & Microanalysis, Ft. Lauderdale, August 2007 *Microscopy Society of America Presidential Award*
18. T. Jatarosaga, S. Seraphin, S. M. Smith, and Y. Wei, "Effect of RF-PECVD synthesis conditions on the carbon nanotube growth," Annual Meeting Microscopy and Microanalysis, Chicago, August 2006
19. Tula Jatarosaga and Supapan Seraphin, "Flattening of the Si-SiO2 interface in ultra-thin SIMOX structures," Annual Meeting Micro. Soc. America, Hawaii, August 2005
20. Margo Ellis, Tim Corley, Supapan Seraphin, "SEM Investigation of Biogenesis of Metal Precipitates," SIGMA XI Conference. Montreal, Canada, November 2004
21. Margo Ellis, Tim Corley, Supapan Seraphin "Biogenesis of Metal Precipitates" Arizona Imaging & Microanalysis Society Annual Conference. Phoenix, Arizona. March 2004

GRANTS AND CONTRACTS WON (Effort on Grant, Role/Title, Source, Amount, Period)

Federal

1. 100% Fulbright Foreign Scholarship, 2011-2012
2. 40% Principal Investigator, Research in Optical Communication for K-12 Educators and Teachers (ROCKET), National Science Foundation, $407,068, July 2010-2012
3. 50% Co-PI, Integrated Optics for Undergraduates (IOU), National Science Foundation, $666,110, May 2010-1012
4. 100% Principal Investigator, International Research Experience for Undergraduates and Teachers: Advanced Materials Processing and Analysis, National Science Foundation, $70,000, May 2008-2009
5. 50% Principal Investigator, Co-PI: J. Pemberton (CHEM), J.H. Simmons (MSE), Acquisition of Field-Emission Scanning Electron Microscope and Renishaw Structural/Chemical Analyzer, National Science Foundation Major Research Instrumentation, $400,000, September 2006 - 2007
6. 75% PI, Co-PI: G.W. Chandler, REU/RET Site: Advanced Materials Processing and Analysis, National Science Foundation Division of Materials Research, $890,000, May 2002 – 2007
7. 20% Co-PI, PI: Debra Colodner (Flandrau Science Center), Revealing the Invisible Universe: From Nanoscope to Telescope, National Science Foundation Division of Materials Research, $457,895, January 2003 – December 2006
8. 10% Co-PI, PI: James Knight (Ag Ed), Track2 Graduate K12Teaching Fellows Collaborative for Advancement of Teaching Technology and Science in School (CATTS), National Science Foundation Division of Graduate Education, $1,999,926, January 2004 - 2009
9. 50% PI, Co-PI: D. Poirier (MSE), J. Heinrich (AME), Reduction of Defects in Ultrathin SIMOX, National Science Foundation Division of Materials Research, $ 527,741, June 2000 – 2003
10. 20% Co-PI, PI: S. Raghavan (MSE), J.H. Simmons (MSE), Near-Field Scanning Optical Microscopy (NSOM) System for Research and Research Training in the Optical Characterization, National Science Foundation Major Research Instrumentation, $300,000, May 2000 – 2002
11. 100% PI, Research Experience for Undergraduates/Teachers Site: Electron Microscopy and Microanalysis of Advanced Materials, National Science Foundation, Division of Materials Research, $ 372,500, May 1999 - 2002
12. 20% Co-PI, PI: Martha Civil (Math), Girls in the SYSTEM, National Science Foundation, Gender Equity in Science, Maths, Engineering Technology, $ 820,000, June 1999 – 2002
13. 15% Co-PI, PI: Michelle Hall-Wallace (Geosciences), K-12 Graduate Teaching Fellows: Collaborative for the Advancement of Teaching Technology and Science in School (CATTS), National Science Foundation, $1,370,632, September 1999 – 2002
14. 75% PI, Co-PI: B.D. Fabes (MSE), REU Site: Electron Microscopy and Microanalysis of Advanced Ceramics, National Science Foundation Division of Materials Research, $ 302,379, May 1994 - 1999
15. 75% PI, Co-PI: G. Chandler (MSE), Novel Approach to Microscopy Education, National Science Foundation, Instrumentation and Laboratory Improvement Program, $ 100,000, July 1992-1994
16. 75% PI, Co-PI: W.D. Kingery (MSE), Acquisition of Field-Emission Scanning Electron Microscope, National Science Foundation Division of Materials Research, $ 189,155, September 1993-1995
17. 100% PI, TEM Study of Growth Mechanism and Production of Carbon Nanotubes, National Science Foundation Division of Materials Research, $ 195,000, August 1993 - 1995
18. 100% PI, High Resolution TEM and Nanoanalysis of Carbon Clusters National Science Foundation, Division of Materials Research, $ 17,623, March 1993 - 1995
19. 20% Co-PI, PI: D.R. Huffman (Physics), Creation and Destruction of Fullerene, Department of Energy Advanced Materials Division, my share $ 180,000 out of a total of $905,258, March 1993-1996
20. 100% PI, Faculty Directed Research Projects - Coalition to Increase Minority Degrees, National Science Foundation, $ 1,759, 1995

State

1. 100% PI, Match grant from Lowell Institute of Mineral Resources, supported by Science Foundation of Arizona, $42,000, March 2011-2013
2. 100% Development of online course MSE331R, WIRED program, Pima County, State of Arizona Funding, $20,000, 2010
3. 100% Da Vinci Fellowship Outstanding Faculty Award, College of Engineering, $10,000, 2007-2009

4. 50% PI, Acquisition of Field-Emission Scanning Electron Microscope and Renishaw Structural/Chemical Analyzer, University of Arizona, College of Engineering, College of Science matching fund, $160,000, September 2006-2007
5. 50% PI, Co-PI: G. Chandler (MSE), On-demand remote access to electron microscopes for bio and nanotechnology courses, ARRO Arizona Board of Regents, $87,391 plus $21,000 University matching, January 2007 – June 2008
6. 50% PI, Co-PI: R. Bailey, Learner-Centered Education: Integrating product dissection into the Engineering foundation course, Arizona Board of Regents, $25,000 plus $16,294 University matching, April 2006 – September 2007
7. 50% Co-PI, PI: Mark Riley, Electron microscopic imaging of environmental particulates: relationship between size, shape, composition and biological toxicity, $20,000, August 2002-July 2003
8. 100% PI, Monitoring Mercury Content in Household Alkaline Batteries, University of Arizona, Research Office, $5,000, 1999
9. 75% PI, Co-PI: G. Chandler (MSE), Upgrading X-Ray/ Digital Imaging System On Nature Scanning Electron Microscope, U. of Arizona, College of Engineering and Mines, $23,000, January 2000
10. 75% PI, Co-PI: G. Chandler (MSE) Acquisition of PC and Mac Computers For Microscopy Computer Network Lab, University of Arizona, College of Engineering and Mines, $ 16,000, August 2001
11. 75% PI, Co-PI: E. Harrison (University Teaching Center), Web-Enchanced Cooperative Instant Assessment in Large Class, Learning & New Learning Environment Program, University of Arizona, $58,300, August 1999 – 2000
12. 75% PI, Co-PI: G. Chandler (MSE), Novel Approach to Microscopy Education, Matching Fund University of Arizona, $155,338, July 1992-1994
13. 100% PI, Renovation of the Computer Lab, University of Arizona, $8,000, July 1993-1994
14. 75% PI, Co-PI: G. Chandler (MSE), Acquisition of Field-Emission Scanning Electron Microscope, Matching Fund University of Arizona, $126,000, September 1993-1995
15. 50% Co-PI, PI: G. Chandler (MSE), Pre-college Partnerships with the Computer Network Laboratory for Microscopy Education, Arizona Board of Regents, Eisenhower Math and Science Education Act, $49,705, February 1995-1996
16. 100% PI, Nucleation and Growth of Buried Oxide Layer in Oxygen Implanted Silicon, University of Arizona, Research Office, $4,980, 1991

Industry

1. 100% PI, SEM/Raman/EDS analysis of carbon from a molybdenite ore floatation product and preg-robber carbon Carlin ores, $30,000, March 2011-2012
2. 100% PI, Acquisition of Renishaw Structural/Chemical Analyzer, Motorola contribution, $47,000, September 2006 - 2008
3. 100% PI, Consignment of a Variable-Pressure Scanning Electron Microscope, Hitachi Nissie Sangyo America Inc., $125,296, March 2007-2008
4. 100% PI, TEM Analysis of ZnS, Raytheon, $5,800, 2006-2007
5. 100% PI, TEM Analysis of Carbon Nanotubes, Motorola, $10,000, 2005-2006
6. 100% PI, TEM Analysis of SIMOX, Ibis Technology Corporation, $175,000, March 1996-2001
7. 50% Co-PI, PI: F. Shadman (CHEE), Physical Structure on the Out-gassing Properties of Anodized Aluminum, UA Center Micro-Contamination Control, $114,287, June 1995-1997
8. 100% PI, Service Contract for TEM, Hitachi Nissie Sangyo America Inc., $19,000, April 1997-1999
9. 100% PI, Support a Postdoc Position, Nanomaterials Research Corp., $18,000, June 1997-1998
10. 75% PI, Co-PI: G. Chandler (MSE), X-Ray Detector and Site License, Noran Instrument Inc., $460,000, 1992-1994
11. 100% PI, X-Ray System for FESEM, Burr-Brown Corporation, $54,000, November 1993-1994
12. 100% PI, Service Contract for Field-Emission SEM, Burr-Brown Corp., $36,000, Feb 1995 -1999
13. 50% Co-PI, PI: G. Chandler (MSE), Sun Microsystem in a New Laboratory Network for Microscopy Education, Sun Microsystems Computer Corp., $64,090, December 1993-1994
14. 100% PI, Electron Microscopy of Carbon Clusters, Materials & Electrochemical Research Inc. $95,000, June 1993-1998
15. 100% PI, TEM Analysis of Ultrathin SIMOX, Ibis Technology Corp., $24,983, October 1990-1991
16. 100% PI, Support for TEM/SEM Open Houses, Nissie Sangyo America, Inc., $7,000, 1992 and 1995

Foundations

1. 100% Course developer ENGR 211R, PI: J. Goldberg (SIE), Improving Engineering Undergraduate Education: Development of On-Line Courses, GE Foundation, $3,400, June 2000 – 2001
2. 100% PI, Research Fellowship Alfred P. Sloan Foundation, $30,000, September 1993-1995

International

1. 100% PI, Intensive Workshop "Remote Operation Across the Pacific of Scanning Electron Microscopy and Optical Raman Spectroscopy Performed Simultaneously" supported by the Office of Science and Technology, Royal Thai Embassy, Ministry of Science and Technology, $7,000, June 11-13, 2008
2. 75% PI, Co-PI: G.W. Chandler, International REU/RET Site: Advanced Materials Processing and Analysis, National Science Foundation Division of Materials Research, $150,000, May 2002 – 2007
3. 25% Invited Professor, New Conducting Polymers and Carbon Nanotube Composites for Flat-Panel Displays, Chiang Mai U., Thailand National Science and Technology Development Agency, $257,000, 2004
4. 100% University Teacher/Ambassador of Goodwill, Teaching Materials Science & Engineering, Rotary International Foundation, $12,500, May 15 – August 15, 2001
5. 100% Invited Professor, Ferromagnetic Properties of Carbon Coated Nanoparticles using Electron Holography, Swiss Federal University of Technology Lausanne (EPFL), Institute of Experimental Physics, $32,000, Fall 1997, Summers 1998 and 1999
6. 100% Invited Professor, Materials Science and Engineering Program, Department of Physics, Hong Kong University of Science and Technology, $25,000, September – December, 1996

OUTREACH

Local/State

- Principal Investigator "Research Experience for Teachers Program", supported by National Science Foundation, Division of Materials Research, May 1998 – 2007
- Co-Principal Investigator "Revealing the Invisible Universe: from Nanoscope to Telescope", supported by National Science Foundation Informal Science Education Program, led by UA Flandrau Science Center, January 2003 – December 2006
- Presenter, REURET Program at Dine College, in Tsile, northern Arizona Navajo Reservation, Feb 18, 2003
- Participant, "Building bridges: a conference of civic engagement, Flandrau Science Center and the City of Tucson's Rio Nuevo Project, Tucson, May 9-10, 2003
- Co-Principal Investigator "Girls in the SYSTEM: Sustaining Youth in Science, Technology, Engineering, and Maths", supported by National Science Foundation, Gender Equity in Science, Mathematics, Engineering & Technology Program, partnership with Tucson Sahauro Girls Scout Council, September 1999 – 2002
- Co-Principal Investigator "K-12 Graduate Teaching Fellows: Collaborative for the Advancement of Teaching Technology and Science in Schools (CATTS)", supported by National Science Foundation, Sept. 1999 – 2002 and Track II grant, 2003-2008
- Invited Speaker, "Opportunities for Careers in Materials Science and Engineering", Missouri Academy of Science, Mathematics and Computing, Northwest Missouri State U., Maryville, March 30, 2001
- Speaker, Brown Bag Seminar on Balancing Work and Life for Female Faculty, Association for Women Faculty, at the University of Arizona, February 2000
- Presenter, to science teachers and students from local schools on the Intro to MSE and the use of microscopic images to stimulate the sense of wonder, once or twice a semester 1992 - present
- Research Advisor, to high-school student in the TUSD Profession Internship Program, 2000
- Mentor, to six high-school girls, TUDS, Amphi, and Sunnyside High School who are interested in sciences and engineering, 1997 - 2001
- Invited panelist, Annual event of Women in Science and Engineering Expand Your Horizon, 2000
- Host, two Japanese students who studied at the Center for English as a Second Language, 1999

International

- Principal Investigator "International Research Experience for Teachers Program", supported by National Science Foundation, Division of Materials Research, May 2002 – 2007
- Ambassador of Goodwill, Rotary International Foundation University Teacher Grant, teaching MSE at King Mongkut's U of Technology Thonburi, Bangkok, Thailand, June - August, 2001
- Invited Speaker "Graduate Study in the U.S.A.: Opportunity and Challenges" Golda Meir Institute, Lima, Peru, March 15, 2001
- Short Course Instructor "Materials Science Curriculum" and "Principles and Applications of Electron Microscopy", Walailak University, July 25, 2000; Prince of Songkla U., Thailand, July 27, 2000
- Short Course Instructor "Practical Aspects and Applications of Electron Microscopy", National Metal and Materials Technology Center, Thailand, August 2, 2000
- Short Course Instructor "Hands-on TEM Intensive Training", The National University of Singapore, Singapore, May 19-23, 1997

INTRAMURAL SERVICE

Departmental Committee

- Director, Electron Microscope Facilities for Materials Research, 1990 – 2007
- Director, Computer Network Laboratory for Microscopy Education, 1992 – present
- Sophomore Advisor, Department of Materials Science and Engineering, 2003, 2005-present
- Freshman Advisor, Department of Materials Science and Engineering, 2001
- Member, Department Scholarship Committee, 2002
- Member, Search Committee for the Head of the Materials Science and Engineering Department, 1999

College Committee

- Member, College Faculty Status Committee, 2005-2007
- Member, Committee Oversee Engineering 102, 2002
- Member, College Advisory Committee, 2001
- Member, Search Committee for the College Director of Development, 2000
- Initiator, Women in Engineering Program, 1999

University Committees

- Director, University Spectroscopy and Imaging Facilities, 2007 - present
- Member, Workgroup I, ADVANCE Project, 2007 – present
- Member, Academic Program Review Department of Agriculture Biosystems Engineering, spring 2009
- Search Committee for Associate Vice President for Research/Dean of Graduate College/Director of Graduate Interdisciplinary programs, 2006
- Review Committee to select Distinguished Professor Awards, 2006
- Search Committee for Vice President for Research, Graduate Studies, and Economic Development, 2005
- Review Committee for the UA Faculty Small Grant Program
- University Millennium Report Oversight Committee, 2003-2004
- Member, Advisory Board, National Faculty Center, the University Teaching Center, 2003
- Co-Chair, Women in Science and Engineering Program, 1999 - 2002
- Member, Advisory Board, Women in Science and Engineering Program, 1999 - present
- Member, Advisory Board, Honor College, 1999 – 2004
- Member, Advisory Board, Science and Math Education Center, 2000 – 2001

Others

- Faculty Advisor, UA Society of Women Engineers, 2002-2003
- Facilitator, two sessions of the Graduate Teaching Assistants Orientation on *Teaching Tools for Learner-Centered Instruction*, August 20, 2003
- Tutor, FE/EIT review, April 4, 2002
- Evaluator, Foreign Language Proficiency Exam on Thai language to two students, 2002 and 2003
- Faculty Advisor, Meditation Club, University of Arizona, 1998 – 1999
- Science Fair Judge, elementary schools and middle schools in Tucson, twice in 2000 and once in 2001

EXTRAMURAL SERVICE

Editorial Activities

- Member, Editorial Board, Microscopy Research and Technique, 1994 - 2002
- Member, Solar Energy and Solar Cells, 1992 - 2000
- Member, Editorial Board, Journal Chiang Mai Research, 2003 – present

To The Profession

- Director, one of twelve elected council members, Microscopy Society of America, 2006 - 2008
- Proposal reviewer for the National Science Foundation programs: DMR, MRI, MRSEC, REU, PIRE, GRFP, IGERT, PFI, GDSE, and ATE
- President, Arizona Imaging Microanalysis Society, 1999-2000
- Outreach Coordinator, Arizona Imaging Microanalysis Society, 2000-2001
- Review Panelist, NSF Site visit MRSEC, February 2001 and International Materials Institute, 2006
- Proposal reviewer, the Eisenhower Math and Science Program, for Arizona Board of Regents, and a member of the Hong Kong Research Grants Council, about four proposals a year, 1994 - 2000
- Manuscript reviewer for *J. Mat. Res.*, *J. Appl. Phys.*, *J. Chem. Phys.*, *Mat. Sc. & Engr. A*, *Ultramicroscopy*, *Mat. Sc. & Tech.*, *Adv. Mat.*,and *Nanotechnolgy*, about five-eight manuscripts a year
- Member, Advisory Board, Image Processing for Teaching in Technical Colleges Program, University of Arizona, 1995- 1998
- Presenter, Microscope laboratory tour for high school and middle school students twice a year, 1993 - 2001