Edward W. Davis, Ph.D.

274 Wilmore Labs **Phone: (334) 844-5471**
Auburn, AL 36849 **email: ewd0001@aubun.edu**

EDUCATION:

Ph.D. University of Akron, Department of Chemical Engineering (1997)
Advisor: Michael Cheung
Dissertation: Polymerized Bicontinuous Microemulsions as Controlled Release Devices

M.S.E. Tulane University, Department of Chemical Engineering (1993)
Advisor: Victor Law
Thesis: Beach Erosion Mediation Using Beach Cones and Modeling of Beach Topological Changes Due to Wind Generated Waves

B.S.E. Tulane University, Department of Biomedical Engineering (1990)

EXPERIENCE SUMMARY:

Aug. 2007 – Present **Auburn University**
Department of Mechanical Engineering Department
Materials Engineering Program
Assistant Professor (Effective Aug. 2015)
Department of Polymer and Fiber Engineering (Auburn, AL)
Senior Lecturer (Aug. 2014 – Aug 2015)
Lecturer (Aug. 2011 – Aug. 2014)
Assistant Research Professor (Aug. 2007 – Aug. 2011)

Aug. 2005 – Aug. 2007 **CSP Technologies**
Quality Improvement Engineer (Auburn, AL)

April 2000 – Aug. 2005 **EVAL Company of America**
Senior Principal Research Engineer / Analytical Lab Manager (Pasadena, TX)

April 1997 – April 2000 **Shell Chemicals**
Research and Development Center: Research Engineer (Louvain la Nueve, Belgium)
Polyester Business: Technical Service Engineer (Akron, OH)

Jan. 1994 – Aug. 1996 **University of Akron**
Graduate Researcher (Akron, OH)

Aug. 1990 – Dec. 1993 **Tulane University**
Graduate Researcher (New Orleans, LA)

RESEARCH INTERESTS:

1. Controlled Release Materials
2. Shape Memory Polymers
3. Biomechanical Testing
4. Biomedical Applications of Polymers and Nanocomposites

ACADEMIC EXPERIENCE:

Funding:

1. “Combating Resistant Staph. Infection with an Antibiotic-Producing Bacterium,” PIs: M. Liles, P. Panizzi, and E. W. Davis, Auburn University Intramural Grants Program, 5/2016-5/2017.
2. “In Vitro Fatigue of Flexor Digitorum Profundus an Superficialis,” PIs: R. Sesek, P. Panizzi, and E. W. Davis, Auburn University Intramural Grants Program, 5/2016-5/2018.
3. “NUE: The Freshman Experience and Nanotechnology Solutions to Engineering Grand Challenges”, PIs: E. W. Davis, P. K. Raju, and V. A. Davis, National Science Foundation, 9/2014 – 8/2017.
4. “Polymer Halloysite Formulation for Postnatal Methylmercury Delivery”, PIs: C. Newland and E. W. Davis, National Institutes of Health, 7/2014 – 6/2017.
5. “Synergistic Properties of Nanotube/Antibiotic Films,” PIs: E. W. Davis, V. A. Davis, and M. Liles, Auburn Intramural Grants Program, 5/2014 – 4/2016.
6. “Design Manufacture and Testing of Composite Car Wheels, Phase II,” Vision Wheel, PIs E. W. Davis and Yasser Gowayed, 03/2015 – 03/2016.
7. “Design and Fabrication of Device for the Continuous Application of Rotation and Monitoring of Angle of Rotation and Applied Torque,” PI: E. W. Davis, Orthopaedic and Neurosurgery Specialists Foundation, 12/2013 – 10/2014.
8. "REU Site for Micro/Nano-Structured Materials, Therapeutics and Devices,” PIs: M. E. Byrne, and S. Duke, National Science Foundation, Senior Investigators include Dr. E. W. Davis, 4/2011 – 2/2014.
9. “NERAM: Dispersion of Carbon Nanotubes for Incorporation into Composite Materials,” PI: Dr. B. Yuan, Subcontract from Lamar University Space Missile Defense Command Grant, Investigators include Dr. E. W. Davis, 4/2011 – 3/2012.
10. “Workshop in Asphalt Construction Materials and Technology,” PI: Donald Watson, Russian Corporation of Nanotechnologies, Senior Investigators include Dr. E. W. Davis, 3/2011 – 4/2011.
11. "Antimicrobial Coating Systems Based on Silver Nanorods," PI: Dr. E. W. Davis, Department of Commerce, $100,000, 1/2010 – 12/2010.
12. "Alternate Fuel Source Study – An Energy Efficient and Environmentally Friendly Approach”, PIs: Ralph Zee and Anton Schindler, Department of Energy, DE-FG36-05G085011 Phase 3, Investigators include Dr. E. W. Davis, 9/2008 –9/2010.
13. "Environmental Effects on the Release of Tetracycline HCl from Halloysite Polymer Composite Films," PI: Dr. E. W. Davis, Auburn Undergraduate Research Fellowship, 5/2009 – 8/2009.
14. "Antimicrobial Coating Systems Based on Silver Nanorods," PI: Dr. E. W. Davis, Department of Commerce, , 8/2008 – 7/2009.
15. "Environmental Effects on the Release of Tetracycline HCl from Halloysite Polymer Composite Films," PI: E. W. Davis, Auburn Undergraduate Research Fellowship, 5/2008 – 4/2009.
16. "Imogolite / PEO Nanocomposite Fibers and Membranes," Auburn University Mentoring Grant, PI: Dr. E. W. Davis, Mentor: Sabit Adanur, 5/2008 – 4/2009.

17. "REU Site for Micro/Nano-Structured Materials, Therapeutics and Devices," National Science Foundation, PIs: S. Duke, co-PI M. E. Byrne, Senior Investigators include Dr. E. W. Davis, 4/2006 – 3/2009.

Book Chapters:

1. Ward, C. J.; DeWitt, M.; Davis, E. W., Halloysite Nanoclay for Controlled Release Applications. In Nanomaterials for Biomedicine, American Chemical Society: Washington D.C., 2012; Vol. 1119, pp 209-238.

Publications:

1. Lakin, J. M.; Han, Y.; and Davis, E. W., First-Year Students' Attitudes Towards the Grand Challenges and Nanotechnology. Journal of STEM Education: Innovations and Research 2016, 17 (3), 70-76.
2. Davis, E. W.; Raju, P. K.; and Davis, V. A., Nanotechnology Solutions to Engineering Grand Challenges. Proceedings of the 2016 Envisioning the Future of Undergraduate STEM Education: Research and Practice Symposium.
3. Davis, E. W.; Lakin, J. M.; Davis, V. A.; and Raju, P.K., Nanotechnology Solutions to Engineering Grand Challenges. Proceedings of the 2016 ASEE Annual Conference and Exposition, 2016.
4. Lakin, J. M.; Davis, E. W.; and Davis, V. A., Promoting Engineering Persistence among Women Through Alignment of Occupational Values and Perceptions of the Field, Proceedings of the 2016 ASEE Annual Conference and Exposition, 2016.
5. Davis, E. W.; Lakin, J. M.; Raju, P.K.; and Davis, V. A., NUE: The Freshman Experience and Nanotechnology Solutions to Engineering Grand Challenges, Proceedings of the 2016 ASEE Annual Conference and Exposition, 2016.
6. Ward, C. J.; Tronndorf, R.; Eustes, A. S.; Auad, M. L.; Davis, E. W., Seed-Mediated Growth of Gold Nanorods: Limits of Length to Diameter Ratio Control. Journal of Nanomaterials 2014, 2014, 765618 1-7.
7. Radhakrishnan, V. K.; Davis, V. A.; Davis, E. W., The Effect of Melt Extrusion Process Parameters on Rotary-Evaporated Poly(propylene) Nanocomposites. Macromolecular Materials and Engineering 2012, 297 (9), 864-874.
8. Fanter, N. J.; Davis, E. W.; Baker, C. L., Fixation of the Achilles Tendon Insertion Using Suture Button Technology. The American Journal of Sports Medicine 2012, 40 (9), 2085-2091.
9. Radhakrishnan, V. K.; Zagarola, S. W.; Davis, E. W.; Davis, V. A., Thermal properties of polypropylene nanocomposites: Effects of carbon nanomaterials and processing. Polymer Engineering & Science 2011, 51 (3), 460-473.
10. Nandikonda, S.; Davis, E. W., Parameters Affecting the Microwave-Assisted Polyol Synthesis of Silver Nanorods. ISRN Nanotechnology 2011, 2011, 104086 1-7.
11. Ward, C. J.; Song, S.; Davis, E. W., Controlled Release of Tetracycline-HCl from Halloysite-Polymer Composite Films. Journal of Nanoscience and Nanotechnology 2010, 10 (10), 6641-6649.
12. Radhakrishnan, V. K.; Davis, E. W.; Davis, V. A., Influence of initial mixing methods on melt-extruded single-walled carbon nanotube–polypropylene nanocomposites. Polymer Engineering & Science 2010, 50 (9), 1831-1842.
13. Davis, E. W.; Radhakrishnan, V. K.; Davis, V. A. Scalable route to well-dispersed polyolefin/carbon nanotube composites Plastics Research Online [Online], 2010. http://4spepro.org/view.php?source=002910-2010-04-12.

14. Schmuhl, N.; Davis, E.; Cheung, H. M., Morphology of Thermally Polymerized Microporous Polymer Materials Prepared from Methyl Methacrylate and 2-Hydroxyethyl Methacrylate Microemulsions. Langmuir 1998, 14 (4), 757-761.
15. Davis, E. W.; Mukkamala, R.; Cheung, H. M., Effects of Precursor Composition on Pore Morphology for Thermally Polymerized Acrylic Acid/Methyl Methacrylate-Based Microemulsions. Langmuir 1998, 14 (4), 762-767.

Articles / book chapters in preparation / under review:

1. Ward, C. J., Eustes, A. S., Tronndorf, R. Auad, M. L., Davis E. W. "Novel Nanocomposite based Shape Memory Polymer Capable of Controlled Activation," in Preparation.
2. El-Gazaar, Y., Davis, E. W., Baker, C. L., "Biomechanical Evaluation of the Contribution of Rotator Cuff Suture Fixation to Locked Plating of 2- and 3-Part Fractures of the Proximal Humerus on Cuff Stabilization" in Preparation.

Technical Reports:

1. Davis, V. A., Raju, P. K., and Davis, E. W., Annual Report for NSF grant #1446060, "NUE: The Freshman Experience and Nanotechnology Solutions to Engineering Grand Challenges," Annual Report, August 23, 2015.
2. Newland, C. and Davis, E. W., Annual Report for NIH grant# 1R03ES024564-01, "A Polymer-Halloysite Formulation for Postnatal Methylmercury Delivery," Annual Report May 15, 2015.
3. Davis, V. A., Liles, M., and Davis, E. W., Annual Report for IGP grant, "Synergistic Properties of Nanotube/Antibiotic Films," Annual Report, March 2015.
4. Schindler, A. K.; Duke, S. R.; Burch, T. E.; Davis, E. W.; Zee, R. H.; Bransby, D. I.; Hopkins, C.; Thompson, R. L.; Duan, J.; Venkatasubramanian, V.; Giles, S. Alternative Fuel for Portland Cement Processing; in completion of Department of Energy grant "Alternate Fuel Source Study – An Energy Efficient and Environmentally Friendly Approach"; 2012.

Presentations: *student, presenter bold

1. **Davis, E. W.**; Raju, P. K.; and Davis, V. A., "Nanotechnology Solutions to Engineering Grand Challenges," presented at the 2016 Envisioning the Future of Undergraduate STEM Education: Research and Practice Symposium, Washington DC, April 27 – 29, 2016.
2. **Lakin, J. M.**, Davis, E. W., and Davis, V. A., "Promoting Engineering Persistence among Women Through Alignment of Occupational Values and Perceptions of the Field," presented at the 2016 ASEE 123rd Annual Conference and Exposition, New Orleans, June 26 – 29, 2016.
3. Davis, E. W., Lakin, J. M., Raju, P.K., and **Davis, V. A.**, "NUE: The Freshman Experience and Nanotechnology Solutions to Engineering Grand Challenges," presented at the 2016 ASEE 123rd Annual Conference and Exposition, New Orleans, June 26 – 29, 2016.
4. **Davis, E. W.**, Lakin, J. M., Davis, V. A., and Raju, P. K., "Nanotechnology Solutions to Engineering Grand Challenges," presented at the 2016 ASEE 123rd Annual Conference and Exposition, New Orleans, June 26 – 29, 2016.
5. **Davis, E.** W., "Nanotechnology and the Engineering Grand Challenges in a Freshman Engineering Course," (poster) presented at the Conversations in Celebration of Teaching Symposium, Auburn, AL, January 29, 2016.
6. Lakin, J., Raju, P. K., Davis, V. A., and **Davis, E. W.** "Nanotechnology Solutions to Engineering Grand Challenges," presented at the Materials Research Society Fall 2015 meeting, Boston, MA, Nov. 30 – Dec. 4, 2015.

7. **Bittner, S. M.***, Robeson, L.*, Adams, E.*, and Davis, E. W., "Antibiotic Encapsulation and Release by Halloysite/Polymer Composites for Biomedical Applications" (poster) presented at the 2016 Emerging Researchers National (ERN) Conference in STEM, Washington, DC, February 25-27, 2016.
8. **Bittner, S. M.***, Adams, E.*, Robeson, L.*, and Davis E. W., "Controlled Release of Antibiotic Agents from PLGS/Halloysite Nanocomposites," (poster) presented at the 2016 Auburn University Research Week Undergraduate research symposium, Auburn, AL, April 13, 2016.
9. **Bittner, S. M.***, Adams, E.*, Robeson, L.*, and Davis, E. W., "Encapsulation and Controlled Release of Chemical Agents from Halloysite and Polymer Composite Materials," (poster) presented at Spring Meeting of the Alabama Alliance for Students with Disabilities in STEM, Auburn, AL, February 13, 2016.
10. **Bittner, S. M.***, Robeson, L.*I, Adams, E.*, and Davis, E. W., "Halloysite/PLGA Composite Films as a Novel Antibiotic Carrier: Potential and Limitations," (poster) presented at 2016 Southern Regional Conference of the American Institute of Chemical Engineers, Tuscaloosa, AL, March 31- April 2, 2016.
11. **Bittner, S. M.***, Adams, A.*, Robeson, L.*, and Davis, E. W., "Halloysite Nanotube/PLGS Composite Materials for Controlled Antibiotic Release," (poster) presented at the 2015 Annual Student Conference of the American Institute of Chemical Engineers, Salt Lake City, UT, November 6 – 9, 2015. (Third Place Award, Food, Pharmaceutical and Biotechnology Division.)
12. **Bittner, S. M.***, Robenson, L.*, and Davis, E. W. "Effects of Encapsulation by Halloysite/Polymer Composite Materials on Antibiotic Release," (poster) presented at the 2015 Annual Meeting of the Biomedical Engineering Society, Tampa, Fl, October 7 – 10, 2015.
13. **Bittner, S. M.*** and Davis, E. W., "Encapsulation and Controlled Release of Chemical Agent from Halloysite and Polymer Composite Materials," presented at Mid-summer research symposium of the Alabama Alliance for Students with Disabilities in STEM, Auburn. AL, July 8, 2015.
14. **El-Gazaar, Y.**, Davis, E. W., Baker, C. L., "Contribution of Rotator Cuff Suture Fixation to Locked Plating Proximal Humerus Fractures," presented at the Annual Meeting of the American Academy of Orthopaedic Surgeons, New Orleans, LA, March 11-15, 2014.
15. **Ward, C. J.***, Tronndorf, R.*, Eustes, A. S.*, Auad, M. L., Davis E. W., "Remote Photothermal Activation of Shape Memory Polymers: Polyurethane - Gold Nanocomposites," (poster) presented at the presented at the Alabama Composites Conference, Birmingham AL, June 18-20, 2013.
16. **El-Gazaar, Y.**, Davis, E. W., Baker, C. L., "Contribution of Rotator Cuff Suture Fixation to Locked Plating of 2- and 3-Part Fractures of the Proximal Humerus: A Biomechanical Cadaveric Study," presented at the Annual Southern Orthopaedic Association Meeting, Palm Beach, FL, July 17 – 20, 2013.
17. **Ward, C. J.***, Tronndorf, R.*, Eustes, A. S.*, Auad, M. L., Davis E. W., "Remote Photothermal Activation of Shape Memory Polymers: Polyurethane - Gold Nanocomposites," presented at the 245th ACS National Meeting, New Orleans, LA, April 7-11, 2013.
18. **Ward, C. J.***, Tronndorf, R.*, Eustes, A. S.*, Auad, M. L., Davis, E. W., "Remote Photothermal Activation of Polyurethane/Gold Shape Memory Nanocomposites," (poster) presented at the Tuskegee Showcase and National EPSCoR Meeting, Montgomery, AL, April 5-6, 2013.
19. **Ward, C. J.***, Tronndorf, R.*, Eustes, A. S.*, Auad, M. L., Davis, E. W., "Remote Photothermal Activation of Shape Memory Polymers: Polyurethane - Gold Nanocomposites," presented at Auburn University Research Week, Auburn University, AL, April 1-5, 2013.

20. **Ward, C. J.***, Auad, M. L., Davis, E. W., “Remote Photothermal Activation of Polyurethane/Gold Shape Memory Nanocomposites,” presented at the Graduate Scholars Forum, Auburn University, AL, February 26-28, 2013.
21. **Ward, C. J.***, Eustes, A. S.*, Auad, M. L., Davis, E. W., “Growth and Photothermal Heating of Gold Nanorods to Induce Shape Memory Behavior by Near-Infrared Irradiation,” (poster) presented at the Graduate Engineering Research Showcase, Auburn University, AL, September 13, 2012.
22. **Eustes, A. S.***, Ward, J. W.*, Auad, M. L., Davis E. W., “Inductive Heating of Gold Nanorods to Stimulate a Shape-Memory Effect in Polymers,” (poster) presented at Fellow Presentations & Farewell Dinner - NSF Research Experience for Undergraduates Program In Micro/Nano-Structured Materials, Therapeutics, & Devices, Auburn University AL, July 26, 2012.
23. **Tronndorf, R.***, Auad, M. L., Davis, E. W., “NIR-Sensitive Shape Memory Polymers,” (poster) presented at Technische Universitat Dresden Research Symposium, Dresden Germany 2012.
24. **El-Gazaar, Y.***, Davis, E. W., Baker, C. L., “Contribution of Rotator Cuff Suture Fixation to Locked Plating of 2- and 3-Part Fractures of the Proximal Humerus: A Biomechanical Cadaveric Study,” (poster) presented at the Hughston Foundation, Columbus, GA May 2012.
25. **Fanter, F. J.***, Davis, E. W., Baker, C. L., “Fixation of the Achilles Tendon Insertion Utilizing Suture Button Technology,” (poster) presented at the Hughston Foundation, Columbus, GA May 2011.
26. Nandikonda, S.* and **Davis, E. W.**, “Rapid synthesis of silver nanowires - effects of stabilizing ions,” presented at the AIChE Annual Meeting, Salt Lake City, UT, November 2010.
27. Reichert, I.* and **Davis, E. W.**, “Effects of compounding conditions on halloysite PP nanocomposite properties,” presented at the AIChE Annual Meeting, Salt Lake City, UT, November 2010.
28. Ward, C. J.* and **Davis, E. W.**, “Controlled release from halloysite / polymer composite films,” presented at the AIChE Annual Meeting, Salt Lake City, UT, November 2010.
29. **Radhakrishnan, V. K.***, Davis, E. W., Davis, V. A., “Polypropylene / single walled carbon nanotube nanocomposites: functionalization, processing and properties,” presented at the AIChE Annual Meeting, Salt Lake City, UT, November 2010.
30. **Radhakrishnan, V. K.***, Davis, E. W., and Davis V. A., “Melt Extruded Polypropylene Nanocomposites: Does Preblending Help?,’ (poster) presented at the Alabama Composites Conference, Huntsville AL, August 2010.
31. **Ward, C. J.*** and Davis, E. W., “Release of tetracycline hydrochloride from polymer/halloysite nanocomposite films,” (poster) presented at the Alabama Composites Conference, Huntsville AL, August 2010.
32. **Davis, E. W.**, “Physical blends of silica sol and polymer latex: Effects on coating process and performance,” presented at the 240th ACS National Meeting, Boston MA, August 2010.
33. Nandikonda, S.* and **Davis, E. W.,** “Effects of salt selection on the rapid synthesis of silver nanowires,” presented at the 240th ACS National Meeting, Boston MA, August 2010.
34. Ward, C. J.* and **Davis, E. W.**, “Halloysite:Polymer composite films for controlled release applications,” presented at the 240th ACS National Meeting, Boston MA, August 2010.
35. Darr, G. R.* and **Davis, E. W.**, “Film forming properties of nanocomposites prepared from physical blends of polymer latex and silica sol.,” (poster) presented at the 83rd Colloid and Surface Science Symposium, New York, NY, June 2009.

36. Radhakrishnan, V. K.*, Davis, E. W., and **Davis, V. A.,** "The effects of functionalization, preblending, and melt processing on SWNT-PP nanocomposite properties," (poster) presented at NSTI Nanotech, Houston, TX, May 2009.
37. **Ward, C. J.*** and Davis E. W., "Release of tetracycline hydrochloride form polymer/halloysite nanocomposite films," presented at the 23rd National Conference on Undergraduate Research, University of Wisconsin-La Crosse, La Crosse, WI, April 2009.
38. **Davis E. W.**, "Nanocomposite Coating Systems Produced by Emulsion Polymerization," presented at the Auburn University Materials Engineering Seminar, March 2008.
39. Kilinc-Balcil, F.*, Zuberi, A., Dunham, R., Ward, C. J.*, Davis, E. W., and **Broughton, R. M.**, "Fiber implants in catfish for controlled release of ovulation inducing hormone," presented at the Fiber Society Fall Conference, Industrial Materials Institute, Boucherville, Canada, September 2008.
40. **Davis E. W.**, Darr, G. R.*, and Sing, B.*, "Property enhancement of organic – inorganic coatings based on latex / sol systems," presented at the 82nd Colloid and Surface Science Symposium, Raleigh, NC, June 2008.
41. **Davis, E. W.**, Mukkamala, R.*, and Cheung, H. M., "Polymerized microemulsions as controlled release materials: effects of the release environment," (poster) presented at the 70th Colloid and Surface Science Symposium, Clarkson University, Potsdam, NY, June 1996.
42. **Davis, E. W.**, Mukkamala, R.*, and Cheung, H. M., "Polymerized microemulsions as controlled release materials: effects of precursor microemulsion composition," (poster) presented at the 70th Colloid and Surface Science Symposium, Clarkson University, Potsdam, NY, June 1996.
43. **Davis, E. W.**, Khandavalli, K.*, and Cheung, H. M., "Characterization of microemulsions via dynamic depolarized light scattering," presented at the 26th Annual Meeting of the Fine Particle Society, Chicago, IL, August 1995.

Appointments:

Auburn University **8/2007 – Present**
Assistant Professor. Department of Mechanical Engineering, Auburn, AL

Assistant Research Professor / Lecturer. Department of Polymer and Fiber Engineering, Auburn, AL

- Developed novel shape memory polymer nanocomposite capable of wavelength dependent light activation. Found that the degree of activation can be controlled by altering the intensity of the applied light.
- Investigated the effects of processing conditions on the shape selectivity of the seed mediated production of gold nanorods. Found that reaction temperature is a critical factor in controlling aspect ratio of produced rods.
- Designed a device for the testing of rotator cuff fixation repairs. Used in experiment to demonstrate efficacy of supplemental suture fixation through rotator cuff tendons in 2-part and 3-part fractures repaired via locking plate. Improved fixation increased stability at the fracture site.
- Provided expertise on polymer processing and polymer characterization during department transition from textile engineering to polymer engineering emphasis. Provided training and assistance to faculty, technicians and students on installing and running ~$600,000 of new processing and characterization equipment. This included expanding the polymer processing lab by setting up a 50 ton injection molder, an 18 mm twin screw compounder, a six inch cast film line, and a multi-filament fiber line.

- Demonstrated controlled release of tetracycline HCl from halloysite nanotubes in polyvinyl alcohol and polymethyl methacrylate.
- Determined effects of premixing, functionalization extrusion conditions on the thermal properties of polypropylene/single-walled carbon tube composites using a design of experiments (DOE) approach.
- Discovered that the effects of salt type on the geometry of silver nanowires produced by the microwave assisted polyol method are different than expected based on traditional polyol synthesis.
- Investigated the effects of silica sol and cross linker on the minimum film formation temperature and solvent resistance of polymerized microemulsions suitable for low volatile organic compound (VOC) paints.
- Directly supervised three graduate and six undergraduate researchers. In addition, I have been the faculty advisor for several senior design teams and mentored five visiting students from Germany. Mentored students in safety, synthesis, polymer processing and materials characterization protocols as well as written and oral communication of results. Three of the undergraduates are now in PhD programs, one was a Goldwater finalist.
- Assisted students, faculty, and staff from four departments with developing protocols and techniques to overcome specific polymer and nanomaterial research challenges.

University of Akron **1/1994 – 8/1996**

- Demonstrated the viability of using polymerized bicontinuous microemulsions as controlled release systems.
- Modeled the pore distribution in polymerized system and demonstrated that changing the phase ratio of the precursor system can radically affect the pore size and the release mechanism.
- Demonstrated that change in the pH of the environment affects the degree of pore opening and can be used to control release from acrylate based polymerized bicontinuous microemulsion systems.

INDUSTRIAL EXPERIENCE:

Industrial Educational Activities:

- Trained others on laboratory equipment including a Kortec co-injection molding machine, a Sidel blow molding machine, a carbon dioxide transmission tester, a drop tester, and a thermal gravimetric analyzer.
- Developed training seminars on ethylene vinyl alcohol (EVOH). Topics included processing and handling of material focusing on multilayer bottle and blown film.
- Developed training course for educating operators on polyethylene terephthalate (PET). Topics included manufacturing, chemistry, processing, and properties with emphasis on injection molding and reheat blow molding processes. Course was primarily targeted toward to line operators at manufacturing plants, but also adapted for engineers and management.

Appointments:

CSP Technologies **8/2005 – 8/2007**
Quality Improvement Engineer. Auburn, AL

- Lead quality improvement programs encompassing all areas of manufacturing. Identified needs and formulated action plans to improve material compounding and two color injection molding manufacturing processes. Trained others in the use of statistical methods for analyzing data and planning experiments.

EVAL Company of America (Division of Kuraray) **4/2000 - 8/2005**
Senior Principal Research Engineer / **Analytical Lab Manager.** Pasadena, TX

- Procured and managed a $450,000 research budget for demonstrating recyclability of EVOH-PET multilayer bottles. Met project objectives while spending less than half of the budget. Received Post Consumer Plastics Recyclers (APR) Champions of Change award and two internal Special Recognition Awards for this work.
- Planned, executed and analyzed statistically designed experiment on the effects of injection and blow molding processing conditions on the delamination resistance of multilayer bottles and on PP/EVOH regrind compatibilization.
- Selected and procured $1.5 MM of equipment to improve center capabilities and competiveness. Designed laboratory space for $8.5 MM technical center (opened April 2004).
- Developed new production process for largest commercial product. Process resulted in net savings of $4,000,000/year.
- Supervised three laboratory technicians and developed their skills in PET and EVOH chemistry and processing, bottle testing, and time management.
- Provided technical leadership of the US PET/EVOH bottle development program. Developed active barrier, passive high barrier, and reduced de-lamination EVOH resins for PET applications.
- Evaluated competing technologies and participated in licensing discussions for oxygen scavenging technologies.
- Provided customers with technical information and training in EVOH, PET, injection molding and blow molding. Primary technical contact for EVALCA's largest bottle customer.

Shell Chemicals **4/1997 – 3/2000**
Technical Support Representative, Shell Polyester Technical Center, Akron, OH.

- Provided technical assistance to customers using Shell Polyester products for packaging. Worked closely with sales to solve problems and improve customer satisfaction. Made recommendations to customers on resin choice and processing conditions.
- Worked with plant to identify and remove sources of product contamination and improve product quality. Evaluated new products for technical viability.

Researcher. Basic and Exploratory Research, Shell Research & Tech. Center, LLN, Belgium.

- Evaluated how nanotechnology could be used to improve properties of Shell Polymers. This required understanding the chemistry, processing, property characterization, and commercial needs of polymer businesses (polystyrenes, epoxy resins, polyesters and polyketones).
- Produced five types of polymer/nanoclay composites and evaluated properties.
- Published three internal technical awareness bulletins in eighteen months compared to a norm of one bulletin per year. Published three internal research reports in nine months compared to an expectation of one report every eighteen months.
- Developed low VOC (volatile organic compound) coatings containing nanoparticles. The improved properties of these coatings increased product sales.
- Wrote literature reviews, performed polymer synthesis, processing and characterization and presented results.
- Advanced safety improvement efforts by benchmarking local laboratory practices against those of other Shell research labs. Supported environmental stewardship initiatives by evaluating the use of high shear polymer processing technologies for the in situ compatibilization of mixed polymer waste. This effort was in conjunction with a consortium consisting of five external organizations and professionals from six countries.
- Supported division objectives for exchange and growth of knowledge by participating in the Polymer Structure and Performance Skill Group and attending meetings with the Basic and Exploratory Research Group at the Shell Research and Technology Center in Amsterdam.