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:

Current:

1. “NUE: The Freshman Experience and Nanotechnology Solutions to Engineering Grand Challenges”, PIs: E. W. Davis, P. K. Raju, V. A. Davis, National Science Foundation, $196,195, 9/1/2014 – 8/1/2016.
2. “Polymer Halloysite Formulation for Postnatal Methylmercury Delivery”, PIs: C. Newland and E. W. Davis, National Institutes of Health, $147,000, 7/1/2014 – 6/30/2016.
3. “Synergistic Properties of Nanotube/Antibiotic Films,” PIs: E. W. Davis, V. A. Davis, M. Liles, Auburn Intramural Grants Program, $60,000, 5/1/2014 – 4/30/2016

History:

1. “Design Manufacture and Testing of Composite Car Wheels, Phase II,” Vision Wheel, co-PIs E. W. Davis and Yasser Gowayed, $80,000, 03/05/2015 – 08/15/2015.
2. “Design and Fabrication of Device for the Continuous Application of Rotation and Monitoring of Angle of Rotation and Applied Torque,” Orthopaedic and Neurosurgery Specialists Foundation Greenwich, CT, PI: E. W. Davis $10,000 12/01/2013 – 10/01/2014.
3. "REU Site for Micro/Nano-Structured Materials, Therapeutics and Devices,” PIs: M. E. Byrne, co-PI S. Duke, National Science Foundation, $297,486, Senior Investigators include Dr. E. W. Davis, 4/01/11 – 2/28/14.
4. **“**NERAM: Dispersion of Carbon Nanotubes for Incorporation into Composite Materials,**”** PI: Dr. B. Yuan, Subcontract from Lamar University Space Missile Defense Command Grant, 4/1/2011 – 3/30/2012.
5. “Workshop in Asphalt Construction Materials and Technology,” PI: Donald Watson, Russian Corporation of Nanotechnologies, $57,670, 3/12/2011 – 4/3/2011.
6. "Antimicrobial Coating Systems Based on Silver Nanorods," PI: Dr. E. W. Davis Department of Commerce, $100,000, 1/2010 – 12/2010.
7. "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, $1,476,000, 9/2008 –9/2010.
8. "Environmental Effects on the Release of Tetracycline HCl from Halloysite Polymer Composite Films," PI: Dr. E. W. Davis, Auburn Undergraduate Research Fellowship, $3000, 5/2009 – 8/2009.
9. "Antimicrobial Coating Systems Based on Silver Nanorods," PI: Dr. E. W. Davis Department of Commerce, $120,000, 8/2008 – 7/2009.
10. "Environmental Effects on the Release of Tetracycline HCl from Halloysite Polymer Composite Films," PI: E. W. Davis, Auburn Undergraduate Research Fellowship, $6,000,5/2008 – 4/2009.
11. "Imogolite / PEO Nanocomposite Fibers and Membranes," Auburn University Mentoring Grant, PI: Dr. E. W. Davis, Mentor: Sabit Adanur, $4,000, 5/2008 – 4/2009.
12. "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, $297,486, 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. 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.
2. 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.
3. 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.
4. 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.
5. Nandikonda, S.; Davis, E. W., Parameters Affecting the Microwave-Assisted Polyol Synthesis of Silver Nanorods. ISRN Nanotechnology 2011, 2011, 104086 1-7.
6. 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.
7. 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.
8. 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.
9. 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.
10. 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.

Technical Reports:

1. 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:

1. 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, 11-15 March 2014.
2. 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, 18-20 June 2013.
3. 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, 17 – 20 July 2013.
4. 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, 7-11 April 2013.
5. 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, 5-6 April 2013.
6. 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, 1-5 April 2013.
7. 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, 26-28 February 2013.
8. 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, 13 September 2012.
9. Eustes, Alicia, 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, 26 July 2012.
10. Tronndorf, R. Auad, M. L., Davis, E. W., “NIR-Sensitive Shape Memory Polymers,” (poster) presented at Technische Universitat Dresden Research Symposium, Dresden Germany 2012.
11. 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.
12. 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.
13. 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.
14. 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.
15. 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.
16. 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.
17. Radhakrishnan, V., 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.
18. 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.
19. 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.
20. 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.
21. 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.
22. 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.
23. 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.
24. 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.
25. Davis E. W., “Nanocomposite Coating Systems Produced by Emulsion Polymerization,” presented at the Auburn University Materials Engineering Seminar, March 2008.
26. 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.
27. 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.
28. 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.
29. 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.
30. 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.

Graduate Students Advised:

1. Christopher Ward, Ph.D. Effects of Dispersion on Controlled Release from Halloysite Polymer Nanocomposites, Summer 2010 to Summer 2013.
2. Srichandana Nandikonda, M.S. Microwave Synthesis of Silver Nanowires, Fall 2008 through Summer 2010.
3. Brejender Sing, M.ChE. Property Enhancement of Organic – Inorganic Coatings Based on Latex / Sol Systems, Spring 2008 to Fall 2009.

Undergraduate Students Advised:

1. Sean Bittner, Antibiotic Activity of Halloysite/antibiotic composites Determined by Quantitative Assay on 96 Well Format Plates, Fall 2014.
2. Troy Peck and Shane Furlong, Quality Improvement of Intake Bell Production, Senior Design Project Advisor, Spring 2013.
3. Alicia Eustes, Inductive Heating of Gold Nanorods to Stimulate a Shape Memory Effect in Polymers, Summer 2012.
4. Sina Pollmeier, Halloysite Fiber Production: Effect of Throughput on tensile properties, Summer 2012.
5. Tamara Metzger, Halloysite PP compounding: Effect of Processing Conditions, Summer 2012.
6. Morgan Bennett and Chloe Whittaker, Raw Material Conversion in Two Color Injection Process, Senior Design Project Advisor, Spring 2012.
7. Robert Tonndorf, UV/Vis Responsive Shape Memory Polymers, Fall 2011. Currently completing undergraduate program at Dresden University in Germany.
8. Megan DeWitt, Haloysite Nanotubes in Controlled Release Drug Delivery, Summer 2011.
9. Alina Braun, Halloysite PP Nanocomposite fibers, Spring 2011 through summer 2011. Currently attending graduate school.
10. Inga Reichert, Halloysite PP Nanocomposite Processing, Spring 2010 through Fall 2010. Currently at Mercedes-Benz.
11. Christopher Ward, Controlled Release from Halloysite, Spring 2008 to Spring 2010. Completed Ph.D. at Auburn University.
12. James Smith, Controlled Release from Halloysite, Summer 2010.
13. Daniel Slater, Silver Antimicrobials, Summer 2010.
14. Goldie Darr, Enhanced Latex Paint Systems through the Addition of SiO2 Nanospheres, Summer 2008 through Spring 2009. Completed Ph.D. at Virginia Tech.
15. Shang Song, Controlled Release of Tetracycline from Halloysite PVOH Nanocomposites, Summer 2008. Currently a graduate student at Berkley.

Teaching:

* Introduction to Materials Engineering (MATL2100): Taught Fall 2015.
* Polymer Processing Lab (PFEN5200): Taught Spring 2014 and 2015. Developed lab to provide students hands on experience with the general principles of polymer melt processing labs include twin screw compounding, injection molding of mechanical test parts and embossed coasters, melt spinning of mono- and multifilament with a single screw in line with a gear pump, and melt film casting. Prior to the development of the lab I trained graduate students in the operation of the department's polymer processing and characterization equipment on an adhoc basis.
* Statics (ENGR 2050): Taught regularly since Fall 2011. Students in this course frequently requested my section of the subsequent Mechanics of Materials (ENGR 2070) course. Integrated active learning and “flipped classroom” concepts into this course and ENGR 2070. This includes the use of iclickers and the development of ~40 videos on the subjects of Statics and Mechanics of Materials.
* Mechanics of Materials (ENGR 2070): Taught regularly since Spring 2012. Consistently received high reviews based on using pedagogy described under ENGR 2050.
* Biomedical Applications of Polymers (PFEN 5900/6900/6906): Taught Spring 2012 and Spring 2013 as development course (PFEN 4970). Covers applications of polymeric materials to medical sciences, implant requirements, effects on healing, service life, degradation of implanted materials, non-thrombogenic surfaces, tissue scaffolding, etc. Highly favorable feedback from students on course content and teaching style.
* Transport I (CHEN 2610): Taught Summer of 2009, 2010, 2013, and 2014. Received teaching evaluations well above the chemical engineering departmental average.
* Computer Aided Chemical Engineering (CHEN 3600): Taught Summer 2012, 2013, and 2014. Received highly favorable teaching evaluations.
* Introduction to Polymer and Fiber Engineering (ENGR 1110): Taught Fall 2012. Received highly favorable teaching evaluations. Introduced job change orders to design project.

Outreach and Service:

2014 Organized and ran Polymer and Fiber open house. Technical personnel from ~25 area companies attended to learn more about the departments research and outreach efforts.

Ongoing Developing relationships with industry, research has been performed for 5 companies – See Below.

Ongoing Member of the ASEE Virtual Community of Practice for mechanics.

2007 – 2010 BEST Robotics

2007 – 2010 Helped coordinate departmental booth for Engineering Day attended by over 1000 high schools students per year

2008 – 2010 Served on the Polymer & Fiber Engineering’s ABET working group to develop student objectives, outcomes and criteria.

2008 Prepared a brochure highlighting the department's analysis capabilities. This brochure has prompted several recipients to contact the department about the use of the equipment for projects ranging from single use testing to inclusion of the department's capabilities in research proposals.

2008 – Present Reviewer for NSF CMMI Division and SBIR/STTR programs

2008 – Present Reviewer for *Langmuir, Journal of Electrostatics, Journal or Controlled Release, Journal of Applied Polymer Science, Packaging Technology & Science, Biomacromolecules, and Composites Science and Technology.*

2008 – Present American Chemical Society, Session Chair 2010.

2007 – Present Member American Institute of Chemical Engineers, Session Chair for 2011 National Meeting.

2008 – Present Society for the Advancement of Material and Process Engineering.

Auburn University 8/2007 – Present

Assistant Professor Department of Mechanical Engineering Materials Engineering Program, Auburn, Al
Senior Lecturer / Lecturer /Assistant Research Professor 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:

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.

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.