

# DEPARTMENT of Polymer And Fiber ENGINEERING

SAMUEL GINN COLLEGE OF ENGINEERING

## 2009 E-Day open house showcases PFE curriculum to high schoolers

More than 1,000 middle and high school students considering a career in engineering converged on Auburn's new Student Center for the College of Engineering's 2009 E-Day open house. Prospective Auburn students and their families learned about the college and its majors through interactive exhibits, visits to classrooms and laboratories and one-on-one chats with engineering students and faculty. They also gathered information about admissions, scholarships, financial aid and residence life opportunities.

Each year, one academic department is highlighted at E-Day. This year's featured program was polymer and fiber engineering. In addition to showcasing the War Eagle Motorsports hovercraft team and new research within the department, students demonstrated a non-newtonian fluid pool. This liquid polymer acts as a solid when struck forcefully and can be used in protective vests for the military. Scheduled each year for the last Friday in February, E-Day 2010 will be held on Feb. 26.



Students gather around microscopes at the PFE E-Day exhibit in the new Student Center



Students in the department demonstrate a non-newtonian fluid pool, a liquid polymer that can be used in protective gear for the military

## Engineering researchers build advanced lightweight engine blades

Through a grant from the Air Force Research Laboratory, faculty member Yasser Gawayed, along with a team of researchers in the department, is designing and constructing physical models for a high-temperature capable, lightweight blade for gas turbine engines. The blades are constructed from advanced ceramic matrix composites (CMCs), which can operate at 400-800 degrees Fahrenheit hotter and are 75-200 pounds lighter than traditional metal engine blades. Using the blades can reduce fuel usage and engine size, decrease emissions, extend range, reduce operational cost and increase payload.

“Through this research, we can improve the current design tool, which was developed at Auburn under previous Air Force and NASA programs, to understand the impact of the environment on the material behavior and life at such high temperatures,” said Gowayed. “The successful application of these new advanced materials depends greatly on the design tools necessary to predict as-manufactured properties and develop design procedures utilizing the full range of their capabilities.”

The department is working with the Goodrich Company, Rolls Royce North America Technologies and the Southern Research Institute to better understand the material’s mechanical and thermal responses, enhance their load-carrying capacity and resistance to the operating environment and to construct the CMC blades and mount them in turbines.

## **PFE co-sponsors short course on design for area manufacturers**

The department recently co-hosted a short course for area manufacturers with Auburn Engineering Continuing Education and the ZDM Group of Atlanta. The workshop was aimed at employees responsible for the design and optimization of new products and manufacturing processes and evaluation of new technologies, processes or materials. It covered the use of

statistically designed experiments for maximum competitive advantage in manufacturing.

Participants gained the skills to perform, analyze and interpret statistically designed experiments for process modeling and simulation, optimization, troubleshooting, and product and process development and improvement. They also learned to use powerful and efficiently designed experiments to optimize products and manufacturing processes for maximum functionality, manufacturability, productivity and quality; reduce problem solving lead times from months to days; and master the understanding of cause and effect relationships between process, materials and functionality.

Short course attendees received 2.4 continuing education credits and a 180-day user license for Design Expert version 7, a software tool used for design of experiments (DOEs) and analysis. DOE is a key methodology for any continuous improvement strategy such as Six Sigma, Design for Six Sigma or 8 D’s.

## **Auburn hovercraft team finishes strong**

The department’s hovercraft team, part of Auburn University’s War Eagle Motorsports, finished with two second place awards and a fourth place finish at a recent competition held in South Lyon, Mich.

After several technical difficulties during practice, including an accident which destroyed the craft’s hull, the team finished second in the Formula 2 division of competition, which limits total engine displacement to 500 cubic centimeters, and the Formula S division, which requires one engine of unlimited displacement. The team also placed fourth out of 15 entries in the overall endurance race, a 25-lap contest.

“The competition was amazing for the team,” said David Branscomb, team adviser. “Everyone was so impressed with our engineering efforts and bravery against surmounting odds. Despite adversity, our team performed very well.”



From left, Andrew Mannion, adviser David Branscomb, Heather Rouse, adviser Jeff Thompson and Traci Thompson of the Auburn hovercraft team

Hovercraft team members include Ben McGuire from Mt. Hope, Ala.; Andrew Mannion from Grain Valley, Mo.; Heather Rouse from Opelika, Ala.; Traci Thompson from Smiths, Ala.; Cody Clark from Roanoke, Ala.; and technical advisers Jeff Thompson and David Branscomb.

Additional information about the hovercraft team can be found at <http://www.eng.auburn.edu/organizations/hovercraft>.

## ATEF creates \$1 million endowment

Since 1953, the Alabama Textile Education Foundation (ATEF) has supported Auburn polymer and fiber engineering students through scholarships, lab equipment and supplies. In 2008, the ATEF board voted to establish an endowment of more than \$1 million with the Auburn University Foundation.

Though the Auburn University Foundation reinvests earnings in excess of 4.5 percent in order to increase the endowment for the future, the foundation's investment policy will lower the ATEF scholarship budget for several years. During this transition, all available earnings and dues will be used for scholarships. As the endowment grows in the long term, ATEF endowment dues and earnings may also be used for lab equipment, supplies or other needs approved by the ATEF and Auburn.

While student enrollment is increasing each year due to a growing interest in the new curriculum, tuition continues to rise. If you are one of many alumni who received scholarship support from the ATEF as a student, please "pay it forward" by making a gift to the department and our students.

If you are interested in serving on the ATEF board or your company might consider a membership or a scholarship donation, please contact ATEF secretary Julia Freeman at 334-844-5457 or [freemja@auburn.edu](mailto:freemja@auburn.edu) for more information. The ATEF board continues to function as the industry advisory board to the Department of Polymer and Fiber Engineering at Auburn.

## PFE sponsors new seminar series

Each semester, the department sponsors a seminar series, which includes guest speakers from across Auburn's campus, peer institutions and industry and is open to the academic community, as well as the public. Recent industry speakers include Randy

Jackson, director of human resources and administration at Kia Motors Manufacturing Georgia, Inc.; Richard Hodges and James Stewart, both of GKN Aerospace Alabama; and J. Jack Zhou, engineering fellow of research and development with Ethicon, Inc., a Johnson & Johnson Company.

The PFE seminar series will continue this fall. The seminar schedule is available at [www.eng.auburn.edu/pfen](http://www.eng.auburn.edu/pfen).

## Faculty Research Updates

Polymer and fiber engineering now has one of two atomic force microscopes on campus to facilitate nanomaterials research. It is part of the department's newest lab equipment, which comprises a nearly \$1 million investment.

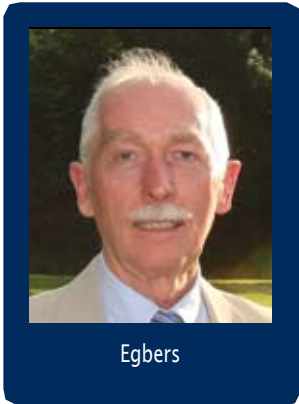
Faculty members are working to improve fuel cell membranes and filters to prevent poisoning of fuel cells. They are developing the next generation of fibers and films reinforced with additives to perform under high-performance applications, such as heat resistance, conductivity and strength.

Biomass research conducted with the USDA and Forest Products Lab is helping to develop strong natural materials and composites from waste created by the seafood and forestry industries. These materials could be used in pharmaceuticals, coatings and reinforcing hydrogels.

The department continues to develop research related to:

- protective covers for aircraft, vehicles and structures
- tailored surface reactivity of carbon nanotubes for polymeric composite applications
- antimicrobial fibers
- antimicrobial systems based on silver nanorods
- nanoparticle-reinforced hybrid fibers and films
- enzymatic polymerization
- analysis of the nature of the self-assembly phenomenon of nano-fibers for tissue engineering and drug delivery
- stress mapping around single wall nanotubes (SWNT) and multi-nanotubes (MWNT) in polymer-matrix nanocomposites

## Fund for excellence honors textile pioneer for contributions



An anonymous donor has established a fund for excellence in polymer and fiber engineering to honor textile pioneer **Gerhard Egbers'** achievements in engineering, industry and education.

Earnings from the \$250,000 endowment will fund undergraduate and graduate scholarships for international exchange programs hosted by ITV Denkendorf, FH Reutlingen and the University of

Stuttgart in Germany, as well as Auburn's Department of Polymer and Fiber Engineering. Awardees may use the funds toward travel expenses, living costs, fees or other related expenses.

Egbers earned his bachelor's and doctoral degrees in mechanical engineering at Aachen University in Germany. He has conducted research and development at the University of Aachen and Massachusetts Institute of Technology. After serving as head of the yarn division for NINO AG, Nordhorn, Egbers served as director at the Institut für Textil- und Verfahrenstechnik ITV in Denkendorf, and professor and chair of textile technology at the University of Stuttgart until his retirement in 1998. From 2000-2005, Egbers served on the board of directors of Milliken & Company.

## Alumni News

### 2009 Outstanding Alumnus recognized

**Terry E. Lawler** of Cornelia, Ga., was honored as 2009 Outstanding Alumnus for the Department of Polymer and Fiber Engineering at the College of Engineering's spring award reception. Lawler graduated from Auburn University with a degree in textile chemistry in 1968. After five years as a pilot in the United States Air Force, he earned his doctorate in textile and polymer science at Clemson University in 1978.

Lawler's career includes a diverse background working in manufacturing and research in the textile and medical products industries. He has experience working in all areas of polymer

processing, from polymerization to finished products made from polyester, nylons, polypropylene and absorbable materials. His work has led to many articles and patents covering both textile and medical applications.

Lawler worked with Fiber Industries, Inc. as a senior research engineer from 1977 to 1982. From 1983 to 1985, Lawler served as head of the polymer engineering section and later as head of the polymer division at the Southern Research Institute in Birmingham. From 1998 until his retirement in 2004, Lawler served as a research fellow with Ethicon, Inc. in Somerville, N.J., where he led a team of scientists conducting work in absorbable polymers for sutures, tissue adhesives and adhesion prevention. He is now a consultant and research fellow emeritus with Ethicon.



Lawler, right, with Dean Larry Benefield at the college's spring awards reception

He has established five endowed scholarships for Auburn engineering students. Four offer preference to students from his high school in Piedmont, Ala., and one is designated for students studying polymer and fiber engineering. Lawler also serves a trustee on the ATEF board.

## Faculty-Staff News



Broughton

Faculty member **Roy M. Broughton Jr.** retired last year after 32 years of service to Auburn and is now professor emeritus in the department. Broughton was named Harry Philpott/WestPoint Pepperell Distinguished Professor of Textile Engineering in 1999. He has been a member of the Technical Association of the Pulp and Paper Industry (TAPPI) since 1969 and a member of the technical advisory board for

the Association of the Nonwoven Fabrics Industry for more than a decade. He is also an area editor for the Journal of Engineered Fibers and Fabrics. Broughton was part of a faculty team that received the Environmental Protection Agency's Presidential Green Chemistry Challenge Award in 2005. He is an adjunct professor at both the University of Alabama and the University of Tennessee.

Broughton also received awards from two organizations at the International Nonwovens Technical Conference (INTC), held in Houston last year. He was recognized with the Rhom and Haas Prize for leadership and service to the Nonwovens Division of TAPPI and the International Nonwovens and Disposables Association (INDA) Lifetime Service Award. He also earned a session best paper recognition for his INTC presentation, "Production and Evaluation of Meltblown Poly(phenylene sulfide)," which was co-authored with colleagues from the University of Tennessee.

Broughton earned his bachelor's, master's and doctoral degrees from North Carolina State University and spent six years as a senior research chemist in the polyester research division of Goodyear Tire and Rubber Co. in Akron, Ohio. His research areas have included protective fabrics, high performance fabric structures, fiber extrusion, nonwovens technology and antimicrobial treatments for fibers, fabrics and other surfaces.

**Xinyu Zhang** has joined the faculty as assistant professor. His papers have been listed among the top 10 highly cited chemistry papers and top 20 most-accessed articles about macromolecules. Zhang's research areas include nanostructured conducting polymers, chemical vapor sensors, carbon nanotubes and optically active polymeric materials. Zhang earned his bachelor's and master's degrees in materials science and engineering at Tianjin University in China. After earning his doctorate in chemistry at the University of Texas-Dallas, Zhang served as a research associate in chemical engineering at the University of Massachusetts-Lowell.



Zhang

**Sabit Adanur**, professor in the department, has been named outstanding faculty member for 2008-2009, an award chosen by PFE undergraduate students. Adanur's courses include introductory polymer and fiber engineering, engineered fibrous structures and polymer processing. His research interests include polymer and nanocomposites, extrusion, injection molding, compression molding, fibers, yarns, fabrics, weaving, knitting, braiding, computer-aided design and modeling, testing and analysis.



Adanur, right, receives his award from Dean Larry Benefield

Faculty member **Gisela Buschle-Diller** has been named a 2009 faculty fellow at Auburn's Biggio Center for the Enhancement of Teaching and Learning. The Biggio Center is an academic development center that works with graduate students, faculty members and other campus groups to support Auburn's attainment of educational excellence. Buschle-Diller is the first faculty member in the College of Engineering to receive this recognition.



Buschle-Diller

**Yehia El Mogahzy**, faculty member in the department, published a new book entitled *Engineering Textiles: Integrating the Design and Manufacture of Textile Products*. It serves as a guide to textile product design and development for engineers, textile technologists, fiber scientists and researchers developing traditional and new generation textile products. El Mogahzy discusses several approaches to the fiber-to-fabric engineering of various textile products. Chapters cover key topics such as structure, characteristics and the design of textiles. The book is available online.



El Mogahzy

Department chair **Peter Schwartz** recently edited the book *Structure and Mechanics of Textile Fiber Assemblies*, Woodhead Publishing Ltd., Cambridge, England, 2008.



Schwartz

**Ashley Winfree**, administrative support assistant in the department, was named Auburn University Employee of the Month in the Office/Administration Category for December 2008.



Winfree

## Student News

**Hasan B. Kocer**, doctoral student in the department, has been named the 2008-2009 outstanding international graduate student in the College of Engineering. A native of Turkey, Hasan is studying under faculty member Roy Broughton.



Kocer, left, and Broughton

Doctoral student **David Branscomb** has been named a NASA Space

Grant Fellow for the second year. The scope of his research is to design and produce lightweight, high-performance, fiber-reinforced polymeric composite structures using computer-aided design techniques, including topology optimization and finite element analysis along with computer-aided manufacturing. Branscomb's work will develop manufacturing processes for utilizing the department's newly acquired Torchon lace braiding machine, one of two known in the country, to produce composite structures that meet the demands of space travel. Activities supported by Branscomb's NASA fellowship include two weeks in Cleveland, Ohio, to attend a course on mechanical analysis of composites and a visit with NASA scientists at the Glen Research Center. He is studying under textile faculty member Roy Broughton and David Beale, faculty member in the Department of Mechanical Engineering.



Branscomb

### PFE students receive Auburn research fellowships

Two of three engineering students to receive Auburn University undergraduate research fellowships for 2008-2009 are studying polymer and fiber engineering. Senior **Samantha Bird** from Prattville, Ala., has been studying shape memory polymers with faculty member Maria Auad. Bird interned with NASA's composite research section in summer 2009, where she worked with **Christy Cunningham**, a 2005 textile engineering graduate who is now an aerospace engineer with NASA.

Junior **Chris Ward** from Montgomery studies the controlled release of tetracycline from Hallorsite/POE fibers with assistant research professor Ed Davis. Ward was also honored for Best Competitive Undergraduate Research Presentation at the 2009 Auburn University Undergraduate Research Forum. Both students presented their work at the National Undergraduate Research Conference in LaCrosse, Wisc., in April.

### Freshman receives 'hurricane' scholarship

**Hayden Kilcrease**, a Mobile native and freshman in polymer and fiber engineering, recently received the 2008-2009 Gulf Coast Hurricane Scholarship, funded by the Society of Plastics Engineers Foundation. The foundation funds programs and projects that support plastics and polymers education worldwide and offers scholarships to students who have demonstrated or expressed an interest in the industry.

As a student at Davidson High School, Kilcrease participated in a robotics team and studied an engineering pathways integrated curriculum. His interest in polymer and fiber engineering was the result of an "Accept the Challenge to Excel" semester-long program at the University of South Alabama, which exposed high school students to various engineering careers.

### A First for PFE



The first undergraduate students were admitted into the polymer and fiber engineering program in fall 2006. The first graduates in both the fiber and polymer options were awarded their degrees at Auburn's commencement ceremony held in May. The graduates of the program are (from left) **Jessica Dewberry** of Alexander City, Ala., **Arthur Hinton** of Ozark, Ala., **Brandon Carthon** of Albany, Ga., and **Gold Darr** of Clinton, Tenn. Not pictured is **Weston Wilson** of Auburn, Ala. The department currently offers students a master's of science degree in polymer and fiber engineering. Faculty members are working to develop studies for a doctoral degree in polymer and fiber engineering at Auburn.

### Junior receives honorable mention in Goldwater scholarship competition

**Chris Ward** was recognized recently with an honorable mention award in the 2009 Goldwater Scholarship Competition by the Barry M. Goldwater Scholarship and Excellence in Education Program. A native of Montgomery, Ward is a junior studying polymer and fiber engineering. The Goldwater Scholarship Program was established in 1986 by the U.S. Congress in honor of former senator and 1964 presidential candidate Barry Goldwater.



Ward

### Student award recipients recognized

Annual student awards are presented each spring. In April, students in the department were honored for the 2007-2008 and 2008-2009 years.

**Malcolm Hamilton**, currently a sophomore from Lincoln, Ala., was recognized with the 2007-2008 Phi Psi Freshman Scholarship Award, given to students following the completion of their freshman year.

**Brandon Carthon**, senior from Albany, Ga., was honored with the Christopher B. Terry Service Award.

**Katie Lushington**, senior from Tallassee, Ala., was honored with the Senior Leadership Award.

**Samantha Bird**, senior from Prattville, Ala., earned the Chattahoochee Valley Phi Psi Alumni Award.

**Weston Wilson**, senior from Cecil, Ala., was awarded the 2008-2009 W. Kenneth Lynch Merit Award, Outstanding Senior Award and 2007-2008 Student Engineer of the Year.

**Jessica Dewberry**, senior from Alexander City, Ala., was recognized with the Phi Psi Senior Honor Award and 2008-2009 Student Engineer of the Year award.

### Join Us!

The Department of Polymer and Fiber Engineering will hold its Homecoming Open House on Saturday, Nov. 7, at 10 a.m. in the Textile Engineering Building. Alumni and friends are invited to tour the updated labs, as well as visit with old friends. The Tigers will take on the Furman Paladins at Jordan-Hare Stadium.

## We want to hear from you!

If you are a graduate of Auburn's Department of Polymer and Fiber Engineering, we invite you to complete the department's online alumni survey.

Ask a coworker, supervisor or employee to complete the polymer and fiber engineering online industrial survey and help us stay on target with educational goals and objectives for future generations of students.

Visit the department's Web page at [www.eng.auburn.edu/pfen](http://www.eng.auburn.edu/pfen) for these and other opportunities to keep in touch.



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The PFE Newsletter is published by the Department of Polymer and Fiber Engineering. Mailing and e-mail address changes, news items and suggestions should be sent to Julia Freeman, 101 Textile Building, Auburn, AL 36849-5327 or [Freemja@auburn.edu](mailto:Freemja@auburn.edu).

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**AUBURN UNIVERSITY**  
**Samuel Ginn College of Engineering**

Department of Polymer and Fiber Engineering  
101 Textile Building  
Auburn, AL 36849-5327

[www.auburn.edu](http://www.auburn.edu)

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