Attendees witnessed the next growth phase of the industry and its technologies.
By Michael Tolinski

The scope of ANTEC® 2010—like the backgrounds of SPE’s membership—encompassed plastics’ wide-ranging uses and global importance. “Our members’ work addresses important technical and social concerns, such as affordable clean energy, recyclability, climate change, human health, and the elimination of poverty,” said SPE President Ken J. Braney at May’s ANTEC in Orlando, Florida.

Photos courtesy of Orlando/Orange County Convention & Visitors Bureau, Inc.
Succeeding outgoing SPE President Paul A. Andersen, Mr. Braney was installed as 2010–2011 President at ANTEC, at which he spoke about SPE’s role in a “broader community of professional organizations around the world.” Strategic partnerships and alliances, social networking, and expansion into new geographic regions will help attract a new generation of SPE members worldwide, he said. As will current members: “I believe every member has a role in growing SPE, and must be offered opportunities to be involved.”

Both President Braney and President-elect Russell C. Broome embody these new directions for SPE and an increasingly global plastics industry. A native of the United Kingdom, Mr. Braney is the first non-resident of North America to be President of SPE. And President-elect Broome, global business development manager for PolyOne Corp. [Avon Lake (Cleveland), Ohio USA], will become one of the youngest SPE Presidents, reflecting SPE’s interest in drawing in younger professionals and students as members.

Mr. Broome’s personal history is fitting. “I originally joined SPE as a student member after being invited to a Section meeting by my father, and I immediately discovered many advantages in SPE membership. This experience solidified my decision to pursue a career in the plastics industry.” Two years after joining, he finished his degree in mechanical engineering and has continued to focus on plastics in the two decades since.

**Plenary Presentations**

Members and nonmembers alike could select from 630 technical presentations and peer-reviewed papers distributed within 98 diverse topical sessions, along with a trade show comprising 81 exhibitors. With delegates coming from nearly 40 different countries, the combined attendance of the conference and SPE seminar program reached 1545, a small increase over last year.

The event’s three plenary speakers addressed everything from future global demand for plastics to the rheology of the newest composite materials. John Verity, vice president of the Polyolefins Global Business Unit of ExxonMobil Chemical Co. (Houston, Texas USA), spoke on the growing global needs for energy, chemicals, and plastics.

Although the recovery from the severe recession will be slower than after previous recessions, the long-term global demand growth for plastics looks positive and consistent for many years to come, said Mr. Verity. “The role of plastics is diverse and ever increasing—from reducing food spoilage to insulating our buildings.” Sustained plastics growth, at about 5% per year, will be driven by continued population growth in developing countries. This is particularly true in Asia, which could take over 50% of the global demand for commodity chemicals (including feedstock for plastics) in the next five to ten years. These plastics will remain mainly petrochemical-based, since history shows that new technologies such as bioplastics generally take “decades to reach a position of significance,” he added.

Mr. Verity also argued that sustainability is simply “good business,” and that even standard plastics used in food packaging can be considered sustainable. “Plastics provide the desired protection at a much lighter weight and cost,” especially when replacing glass and aluminum packaging. And they efficiently preserve food and reduce food wastage, which
can be as high as 50% in the developing world, he reported.

While everyday plastic applications continue to grow long-term, new polymer-based materials are being better understood. Plenary speaker Donald Baird of Virginia Tech (Blacksburg, Virginia, USA) presented details about his research team’s study of the rheology and processing of molecular composites, liquid crystalline fluids, and nanoparticles dispersed into polymers using supercritical CO$_2$. Dr. Baird showed how modeling the flow properties of the materials will lead to better predictions of their processing conditions for optimum properties.

For example, molecular composites incorporate reinforcing particles that can be nano or molecular in scale. When these layered particles are exfoliated (completely separated) in a polymer matrix, they function as “stiff rods” whose orientation can be controlled during processing to create higher mechanical properties. Dr. Baird, who won the SPE International Award in 2009, also spoke on the use of injected supercritical CO$_2$ to disperse and exfoliate nanofillers inside the extruder; this is said to increase the tensile modulus, strength, and elongation of the resulting nanocomposite.

Plenary speaker Balaji B. Singh, president of Chemical Market Resources Inc. (Houston, Texas USA), discussed the economics of alternative feedstocks for plastics. More of these chemicals will be produced from sources other than oil—including natural gas, coal, and biomass—when the economics of each become favorable over that of oil. Natural gas, for example, becomes advantageous when the gas-to-oil price ratio decreases to a certain point. Coal liquefaction and gasification processes, however, are high-cost, polluting, infrastructure-intensive, and somewhat unproven commercially; although Dr. Singh said China continues to explore coal gasification as a “hedge against foreign oil.”

The issue is even more complex for biobased feedstock. Several plants and biomass materials could be used to produce the building blocks of plastics, including wood, agricultural crops, switchgrass, and solid wastes, via biochemical or thermochemical processing. A biofuel such as ethanol from corn is tied to the price of oil for transportation fuel, Dr. Singh noted, and to food production economics as well. But other biomass raw materials could produce twelve key building-block chemicals he identified, which could then be used to produce polymers. Dr. Singh does see one alternative biomass source as “the ultimate winner” in the future (given enough time and effort for development): algae. As an efficient converter of solar energy, “algae is reverse energy,” he explained; it’s also region-independent, unlike most alternative energies or materials.

Nonetheless, despite their interesting potential, biobased plastics are still hindered in terms of market development. High costs, poor cost-to-performance ratios, retailer skepticism, and a lack of consumer awareness all work against market expansion, Dr. Singh explained. Instead, what’s needed are better “economies of scale, targeted market development via prioritization strategies, partnerships along the value chain, research and development, [and…] major commodity producer backing.”

**New Tech: Bio & Beyond**

Despite these hurdles to growth, there’s strengthening interest in biobased plastics at ANTEC events. And this interest seems to have matured, now that the “gee whiz” phase of the technology has passed and researchers attack specific problems in producing these materials and converting them into useful, high-volume products.

Bioplastics obviously fit the “Clean Environment” theme of ANTEC’s New Technology Forum. Presenters from various companies talked about applications for bioreins in agricultural equipment, packaging, textiles, and carpeting. (During the three-day Forum, researchers also presented on advancements in high-tech uses of polymers in filtration and photovoltaic media, and on alternative flame retardant technologies—see the March 2010 *Plastics Engineering*, page 13 ff.)

Topics discussed in the Forum ran the gamut from bio-monomer production to bioplastic end-use. A scheduled session from DuPont Tate & Lyle Bio Products, LLC, discussed producing a common component for producing various polymers—1,3 propanediol (PDO)—from fermented corn sugar. This session coincided with the joint venture’s May announcement about a 35% expansion in producing this “Bio-PDO” at its facility in Loudon, Tennessee, USA. Other scheduled Forum sessions covered applications of bioplastics by Ford Motor, John Deere, PolyOne, and Natureworks LLC.

Producers are also investigating how to improve the processing of their bioplastics. Metabolix, Inc. (Tellus/Mirel Bioplastics; Lowell, Massachusetts, USA), discussed using
Moldflow software to analyze the injection molding of its Mirel poly(hydroxy alkanoate) (PHA) material. The analysis reportedly shows that the material can be molded into common products in the same way as petroleum-based plastics, using conventional tooling. Metabolix and university co-researchers also presented technical papers on characterizing melt fracture when extruding poly(hydroxy butanoic acid) (PHB) copolymers; on the post-fabrication properties of PHB; and on the biodegradability of PHB agricultural mulch film—a potential alternative to polyethylene mulch films.

Another application paper discussed using nanoclay to make poly(lactic acid) (PLA) a better candidate for food packaging. Here, the oxygen-scavenging characteristics of iron in montmorillonite clay dispersed in PLA were examined by Nanobiomatters S.L. (Valencia, Spain, and Hamilton, Massachusetts, USA) and co-researchers in Spain. Oxygen-absorbing “active packaging” helps preserve food and extends shelf-life, and typically requires iron-containing sachets integrated with the packaging. Here, the oxygen-scavenging iron is dispersed into the protective film itself. Nanobiomatters founder Jose M. Lagaron said the iron-bearing nanoclay does add minimal color to transparent PLA film. But the nanocomposite “can be processed using double-screw high-shear compounding machinery for powder, or using any conventional plastic processing technology for the masterbatch form,” Mr. Lagaron added.

**Successful “Failure” Track**

There were also several in-depth papers presented during the technical sessions of SPE’s Failure Analysis & Prevention Special Interest Group. The group serves as a good example for showing how much activity a single SIG or Division can pack into an ANTEC.

FAPSIG chair Paul Gramann said that perhaps the “biggest draws” of the FAP track were the tutorial sessions, which “were worth the price of admission, hotel and flight.” In tutorials like the one given by Vikram Bhargava of Motorola, Inc. (Holtsville, New York, USA), a good dialog was created between speaker and audience, Mr. Gramann reported. “People in the audience asked questions throughout the tutorials, which is different than normal ANTEC presentations.”

The SIG also announced its own “Best Paper” award during the conference. “The three finalists for ‘Best Paper’ were chosen from all the reviewers of the FAPSIG,” said Mr. Gramann. The FAPSIG Board recently decided to call the award the “Myer Ezrin Best Paper Award” in honor of long-time FAP member Dr. Ezrin, who delivered a one-hour keynote talk this year (see the March 2010 Plastics Engineering, pages 16 and 18).

One finalist was Jeffrey Jansen of Stork Technimet, Inc. (New Berlin, Wisconsin, USA), who presented a detailed analysis of failed hinges in a medical-housing assembly. His diverse analytical procedures showed this complex failure occurred from “slow crack initiation via fatigue and creep rupture mechanisms.” Another finalist was Anand Shah of Packer Engineering Inc. (Naperville, Illinois, USA), who used case studies to illustrate root-cause analysis and preventive/corrective actions for common failures in common plastic products, tracing failure origins all the way back to the material-selection phase (see pages 22-26 in this issue of...
Plastics Engineering.

The winning paper was by Dr. Zhenwen Zhou and a team of authors from the University of Illinois at Chicago and The Dow Chemical Co. in Freeport, Texas, USA. The researchers looked at how temperature affects mechanisms of slow crack growth in pipe-grade polyethylene. The findings may limit how accurately PE pipe lifetime data can be extrapolated.

“I believe his paper won since it hit on a difficult, but extremely important topic: prediction of crack propagation,” said Mr. Gramann. It focused on plastic pipe failure, as did a number of joint FAP/Plastic Pipe and Fittings SIG papers at this ANTEC. The reason is that plastic pipes are now very popular, and “Unfortunately, there are usually great monetary losses associated with pipe failures,” caused by bad installation, pipe quality, freezing, or chemical exposure.

Novel Technologies

Other technical sessions provided dozens of papers on highly novel plastics materials and processes; below are just a sampling:

• Ultrasound molding: The ASCAMM Technology Center (Barcelona, Spain) reported on the use of ultrasonic energy for melting and fusing thermoplastic pellets in a molding process for very small parts. The researchers noted that one big advantage of the process is the elimination of the conventional injection-plasticification system and its associated costs.

• Improved simulation: Rapid Prototyping Services (Plantation, Florida, USA) discussed how using “corrected residual in-mold stress” data in Moldflow analysis allows the software to predict warpage significantly better in molded parts made from unfilled crystalline polymers.

• Flavored plastics: Kari MacInnis of A. Schulman (Akron, Ohio, USA) reported on results showing how people on test panels responded to the compounder’s flavoring additives for plastics. The test panels indicated that adding a flavorant alone only provided intense aromas to a plastic article, while a “novel synergist” added with the flavorant dramatically intensified its taste as well.

• Practical elastomers: Presenters from Dexco Polymers LP (a Dow/ExxonMobil joint venture in Houston, Texas, USA) introduced a new family of styrene-isoprene-butadiene-styrene (SIBS) “quad- or tetra-block” polymers for personal-care and hygiene films. The SIBS films are said to have better cost/performance profiles than other commercially relevant styrenic block copolymers and blends.

• Nanococonductivity: Nanocyl S.A. (Sambreville, Belgium) studied multiwall carbon nanotubes in engineering polymers and blends. The team learned that electrical conductivity was possible at “remarkably” low loading levels of nanotubes (<1 wt%).

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Upcoming Worldwide Conferences

In 2011, ANTEC will move to Boston, Massachusetts, USA. SPE is accepting submissions of abstracts or papers for the event up through the deadline of Nov. 19, 2010. Authors will have a choice between two “tracks” for submitting papers: the technical track will be composed of papers that are similar to traditional ANTEC papers about new technologies; commercial track papers must focus on commercial applications, such as case studies. (The conference runs May 1–5, 2011; see www.antec.ws for online submission instructions.)

In addition to the regular lineup of SPE Topical Conferences in North America this year, other upcoming (and new) conferences overseas are strengthening SPE’s presence worldwide. SPE will hold its first pan-Asian conference, ASIATEC®, February 15–16, 2011, in Tokyo, Japan. The conference will be conducted in English, and the submission deadline for abstracts is Oct. 1, 2010 (guidelines and other information can be found at http://web.mac.com/msainst/spe/ASIATEC2011.html).

Further down the road is SPE’s first EUROTEC™ technical conference, in November 2011, in Barcelona, Spain. Organizers are already recruiting speakers to present papers for this European counterpart of ANTEC. Paper abstracts can be submitted for multiple categories via www.spe-eurotec.eu (the deadline is June 1, 2011). This conference will also be conducted in English, with simultaneous translation available to meet the needs of the increasingly global plastics industry.
ANTEC 2010 provided an opportunity to recognize several key figures in the SPE community, from experienced academic researchers to students just starting their careers in plastics.

**Lifetime Achievement**

SPE’s prestigious lifetime achievement awards were presented to three honorees at a banquet during the event.

**Dr. L. James Lee** of The Ohio State University received the International Award for lifetime achievement in plastics engineering, science, or technology. Dr. Lee is known for his work in polymer and composite engineering, building strong programs at OSU to develop thermoset polymers and composite manufacturing processes. In 2004, he led 35 OSU faculty and collaborators from a number of universities to establish of the NSF Nanoscale Science and Engineering Center, reportedly the largest polymer nanomanufacturing research program in the U.S. And in 2005, he led the founding of the Center for Multifunctional Polymer Nanomaterials and Devices, with six university partners.

“Polymer nanomaterials and nano-technologies have great potential to improve existing products and create new products in our industry,” explained Dr. Lee. “My research group is currently developing nanoparticle-reinforced polymers, polymeric composites, polymeric foams, and polymeric membranes for various near-term industrial applications. Similar materials and technologies are also explored for environmental applications, including carbon dioxide sequestration and water purification. Another major direction is bio-nanotechnology by applying advanced functional nanoparticles and nanoscale devices for biosensing, drug/delivery and tissue engineering.” To commercialize the fruits of this research, safety, environmental, and manufacturing issues still must be investigated, he added. “This will require close collaboration among industry, academic researchers, and government laboratories.”

**Dr. Murali Rajagopalan**, director of materials research for the Acushnet Company/Titleist Golf, received the Research/Engineering Technology Award for lifetime achievement in plastics research or engineering. His early research focused on radiation-resistant PVC alloys and blends for HVAC applications and medical devices. Moving to Acushnet in 1993, he developed novel ionomers, reactive blends, and castable polyurethane for various golf-ball components. His work has reportedly helped Acushnet grow from $300 million in sales in 1993 to over $1.3 billion in 2007. Dr. Rajagopalan has over 170 U.S. patents and 50 patent applications pending, most of which concern improving golf-ball materials and design.

**Dr. Sadhan C. Jana** of the University of Akron received the Education Award for lifetime achievement in plastics or polymer education (this award is sponsored by SPE’s Detroit Section in memory of Fred Schwab, a founding member of SPE). Dr. Jana is chair of Akron’s Department of Polymer Engineering, where he has raised $22 million in research funding over the past eleven years. He also developed a strategic plan that in two years has led to the hiring of many new faculty members specializing in alternative energy and biobased materials.

Dr. Jana’s current research is on shape-memory nanocomposites, polymeric bipolar plates for fuel cells, and self-assembling nanocomposites, leading to significant practical applications, he explains. “The nanocomposites produced by self-assembly of hybrid organic-inorganic particles, such as polyhedral oligomeric silsesquioxane (POSS), will find large-scale applications in the carpet industry [and] in the manufacturing of self-reinforced composite articles, such as helmets and bulletproof vests, and possibly wind turbines.”
SPE Fellows & Honored Service Members

SPE also announced six new Honored Service Members and three new Fellows of the Society at the ANTEC banquet. Honored Service Members have demonstrated “long-term, outstanding service to SPE and its objectives,” and were sponsored by the Board of Directors of at least one SPE Section or Division. The six inductees for 2010 were:

- Sharon M. Ehr, Uniform Color Company
- James S. Griffing, The Boeing Company
- Hoa Q. Pham
- Dr. Natarajan S. Ramesh, Sealed Air Corporation
- Sharyl M. Reid, A. Schulman Inc.
- Timothy W. Womer, Xaloy Inc.

Fellows of the Society have “contributed to the field of plastics engineering, science or technology, or to the management of such activities.” Candidates are sponsored by an SPE Division or Special Interest Group, and are selected based on their professional accomplishments, written sponsorship, and long-term status as Senior Members of SPE. The three inductees for 2010 were:

- Dr. Robert A. Malloy, University of Massachusetts – Lowell
- Dr. Raymond A. Pearson, Lehigh University
- Dr. Hung-Jue Sue, Texas A&M University

Student Winners

Students were recognized for their excellence and contributions. Graduate student honorees included $500 award winner Sayantan Roy of the University of Akron. Other graduate winners were Daniel Dempsey, University of Massachusetts – Lowell ($400); Diya Bandyopadhyay, University of Akron ($300); Rebecca Radu, Ostfalia University of Applied Sciences ($200); and John Rodgers of Lehigh University ($100).

Undergraduate student winners included Matthew Bernasconi, University of Massachusetts – Lowell ($500), and Brittany Halfrey and Scott Kelly, also of UMass – Lowell ($200 each).

Networking @ ANTEC 2010

The new networking opportunities for ANTEC 2010 included not just the online varieties, but also real-life, real-time consultations with real experts in their fields.

In terms of online social networking, SPE already boasts over 5000 LinkedIn group members and about 1500 fans on Facebook. Active SPE Senior Member Barbara Arnold-Feret noted that a “meet-up” of SPE members—scheduled in advance via LinkedIn—occurred at the conference itself. Meanwhile, SPE’s ANTEC Twitter got off to a slower start, with just over 120 followers receiving “tweets” about conference information, and occasional observations from the event.

Elsewhere at the “real” conference, “Consultants’ Corner @ ANTEC®” made its debut. Attendees had a chance throughout the week to schedule appointments with eleven experts specializing in various areas of plastics.

“I think this was an excellent concept,” said consultant Paul Gramann of The Madison Group (Madison, Wisconsin, USA). “A lot of people talked about it and I mentioned it during the talks that I moderated.”

Consultant Scott Steele of Plastic Technologies, Inc. (Holland, Ohio, USA) argued that the concept certainly does make sense. “We had on tap at our time slot for blow molding three experts with over 120 years of combined experience and numerous U.S. and international patents. Normal consultations from these three people would cost attendees several thousands of dollars.” At Consultants’ Corner, they could access this advice simply by being a paid attendee at ANTEC. “That has always been the value of being a member of SPE and attending events—you get to meet people with real expertise and experience that can jump-start any project or problem people may have.”

The consultants had several ideas on how the event could work better if it is tried again in the future. Mr. Gramann and independent consultant Pete Grelle recommended more pre-promotion and advertising—and more promotion and signage at ANTEC itself. Scheduling of appointments for the consultants’ time slots should also be less “hit-or-miss” than it was at this first event. And the privacy of the meetings is critical and must be maintained, using a confined meeting area, advised consultant Timothy Womer of Xaloy, Inc. (New Castle, Pennsylvania, USA), a Past President of SPE.

“Granted, we had some glitches this time around,” said Mr. Grelle. “However, this is a great concept and worth doing again in 2011.”