

# SPE THE SPECIALIST

## 2011 MEGATECH – Tooling in America

Thursday, November 10, 2011 from 9:15am to 3:30pm

VADNAIS HEIGHTS COMMONS,

655 E. County Road F • Vadnais Heights, MN, 55127

9:15 – SPE Intro and Overview - Dick Bopp - SPE Chapter President

9:40 - Overseas Outsourcing & Domestic Tooling: Pros and Cons

Teresa Schell – Plastic Components, Inc

10:20 - Mold Finishes & Textures - Pete Kambouris – Wisconsin Engraving

11:00 - Science of Mold Venting & Cooling - Terry Schwenk – EWIKON Molding Technologies

11:40 - Rheological Control System Strategies - Kevin Rottinghaus – Beaumont Technologies

12:30 – Lunch – *Italian Buffet*

1:10 - Simplified Mold Design Using Collapsing Core Technology

Al Hickok – Progressive Components

1:50 – Aluminum Tooling vs. P-20 Tooling - Dan Mishek – VistaTek

2:30 – Roll-Fed Processing & Tooling (Thermoforming)

Mark Strachan – Global Thermoforming Technologies

3:10 - Finding Good Mold Makers & Mold Engineers - Laura Deede – AEROTEK

3:30 - Happy Hour – 1 Ticket Provided

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### Registration

Advance Reservation by November 3rd: **SPE Members:** \$100.00 **Non Members:** \$125.00

**All Registration after November 3rd:** \$150.00 **Student with ID:** \$20.00

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Snacks, Lunch and Conference are included in costing

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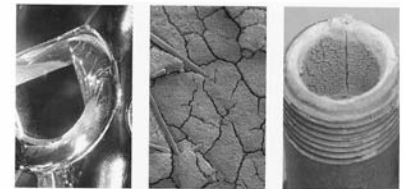
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# President's Remarks

Dick Bopp



## What's our Technical Diversity Profile?

Of course, there are many ways to “slice and dice” membership data. We can look at geographic distribution, age, experience level (years of continuous membership), gender, job description and more. Earlier, we looked at the geographic distribution of our membership and discovered that while we have members located in the far reaches of the Upper Midwest, the majority are located in the greater Twin Cities. Still, we have had some of our members come from as far away as Winnipeg and Iowa (technically outside our Section) to attend a Mini/MegaTEC or other special event. Moreover, two of our board members, Rolly Enderes and Tim Spahr, make the long trek from Western Wisconsin to participate in board meetings and special events. Still, it remains a challenge to find better ways to serve those members who live and work outside the Cities. Our website and newsletter are now set to provide some additional help in this area as you will read in this issue's “Spotlight on the Board.”

But, what is our technical diversity profile and how do we best select specific technical areas for our future MiniTEC's or MegaTEC's? Probably the best guidance can come directly from our members, but that input is not always available. An alternate approach is to consider the technical diversity of our membership via analysis of our members' affiliation with a technical division. As you are probably aware, each SPE member is allotted one “free” primary technical division affiliation, while additional technical divisions or special interest groups (SIG's) can be added to your membership for a nominal fee. In all there are some 26 divisions and 18 SIG's to choose from.

So, what can we say about our Section's technical diversity profile? A collection of the primary division affiliations for our members is listed in the attached Table. Injection Molding, Extrusion and Thermoforming are the top three divisions representing over 50% of our membership and indicating a strong plastics processing orientation. Perhaps not too surprisingly the next 5 divisional rankings have a distinct materials focus, e.g., Medical Plastics, Product Design & Development, Engineering Properties and Structures, Composites and Polymer Analysis, constituting an additional 27%. The last three divisions in the Top 10 are Marketing, Flexible Packaging and Mold Making & Design accounting for another 7.4%. All told, the Top 10 divisions represent close to 90% of our members. (Note: The Top 10 divisions are actually the Top 11 due to a tie in the # 10-slot.) In addition, there are enough other areas of specialization ranging from Marketing to Decorating & Appearance to Plastics Environment to help keep the whole mix interesting. Finally, 8 members have elected to remain unaffiliated. I'm not sure whether this is intentional or not. There is no requirement to select a primary division.

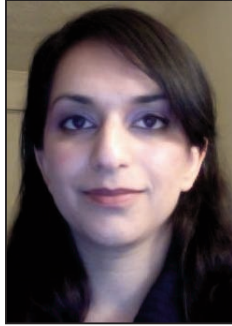
So far, I think that our technical program is pretty much in harmony with our technical diversity profile, having had one MiniTEC this year dealing with plastics failure analysis and another focused on micromolding. What's next? Dan Mishek, Technical Program Chair and President Elect, is now planning a very interesting MegaTEC for November where we will learn about the ins and outs of Mold Making for Manufacturing. Anyone who works with injection molding, thermoforming, blow molding or rotational molding should find this daylong event very worthwhile. In the meantime, if you have any special recommendations for future Mini/MegaTEC topics, please don't hesitate to let Dan or any member of the board know. We always look forward to hearing your ideas. Hope to see you in Vadnais Heights in November.

<b>PRIMARY DIVISION</b>	<b>NO.</b>	<b>%</b>	<b>RANKING</b>	<b>PRIMARY DIVISION</b>	<b>NO.</b>	<b>%</b>	<b>RANKING</b>
INJECTION MOLDING	104	27.5	1	MOLD MAKING & DESIGN	9	2.4	10
EXTRUSION	56	14.8	2	UNAFILLIATED	8	2.1	12
THERMOFORMING	44	11.6	3	BLOW MOLDING	8	2.1	12
MEDICAL PLASTICS	28	7.4	4	COLOR & APPEARANCE	7	1.9	14
PRODUCT DESIGN & DEVELOPMENT	23	6.1	5	VINYL	7	1.9	14
ENGINEERING PROPERTIES & STRUCTURE	22	5.8	6	PLASTICS ENVIRONMENTAL	6	1.6	15
COMPOSITES	17	4.5	7	ROTATIONAL MOLDING	4	1.1	16
POLYMER ANALYSIS	13	3.4	8	AUTOMOTIVE	2	0.5	17
MARKETING	10	2.6	9	DECORATING & ASSEMBLY	1	0.3	18
FLEXIBLE PACKAGING	9	2.4	10				
				<b>TOTAL:</b>	<b>378</b>	<b>81.2</b>	

# SPOTLIGHT ON THE BOARD

by Dick Bopp

## Dr. Mahin Shahlari



Dr. Mahin Shahlari

This month's "Spotlight on the Board" features our newest board member, Dr. Mahin Shahlari. Mahin comes to us with extensive advanced training in polymer science and engineering and is now working at NTIC in Circle Pines, MN developing new corrosion-inhibiting polymer composites. A prolific contributor to SPE publications including ANTEC and The Journal of Polymer Engineering and Science, Mahin is no stranger to technical writing. And, we are fortunate to have her serving as the editor of a regular technical column in The SPEcialist beginning with this issue where she presents a condensed version from a topical publication on plastics technology. I'm sure that she would appreciate your comments about her column and welcome your suggestions for future columns. Now in her own words is a short biography and description of her involvement with the SPE:

I graduated with a B.S. in polymer engineering from AmirKabir University of Technology (Tehran Polytechnic) in August of 2004 and then immigrated to the United States. In the US I had the opportunity to work under the supervision of Dr. Sunggyu Lee for my graduate studies. These studies were completed partly at the University of Missouri-Columbia and Missouri University of Science and Technology where I recently received my Ph.D. in Chemical Engineering. For my PhD I worked on several projects involving biodegradable polymer blends and polymer nanocomposites. The objective was to study the effect of organoclay type and the mixing process on the rheological, mechanical, thermal and morphological properties of these blends.

I have been an SPE member since 2007 and have attended all the SPE annual meetings (ANTEC), finding them a great place to learn, exchange ideas, network and present your work to get very helpful and illuminating feedback from the audience. In addition to three articles published at ANTEC, I have one article submitted to the Journal of Polymer Engineering and Science (an SPE journal).

Since May of 2011 I have been working at Northern Technologies International Corporation (NTIC) in the research and development group where I work on corrosion inhibiting polymer composites for a variety of packaging applications. Our group also works with several compounding facilities, film producers, and analytical laboratories in Wisconsin and Minnesota.

I am very delighted to find the Upper Midwest chapter active and I am honored to join its board members. I believe SPE can have a significant role as a resource and networking platform for professionals involved in the plastic industry and I invite you to attend our upcoming MegaTech. Look forward to seeing you!!!

Please join me in warmly welcoming Mahin to our Section and thank her for her generous service.

# MINITEC - FAR FROM A MICRO SUCCESS

A nice group of attendees had giant exposure to two very strong presenters regarding micro technologies in June. Brent Hahn of Accumold presented on micro molding and Daniel Haight of MC Machinery presented on micro machining. These two presentations complimented each other nicely. It drew nice comparisons and benefits of each technology.

The presenters stayed afterwards and answered over 45 minutes of questions. This showed the interest that our chapter had regarding these micro technologies. A big thank you goes to these presenters that traveled from Iowa and Illinois to educate the attendees.

We are always looking for good topics for future MiniTecs. If you have an idea that you would find interesting or think you have a topic you could present, please contact us immediately. Your thoughts are appreciated!



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## **Hennepin Technical College Plastics Program Offers Blended Learning: More Opportunities for Quality Training**

**BROOKLYN PARK, MINN.** -- To expand the availability of quality training, the Plastics Manufacturing Technology program at Hennepin Technical College is offering blended learning. That means the best of face-to-face learning and e-learning are combined to meet the needs of employers eager to upgrade employees' knowledge and skills. It's a smart solution for employers looking for convenient, high quality, affordable training that utilizes the latest technology.

Some manufacturers want online training that's available 24/7. Others prefer having HTC Instructor Dan Ralph teach classes on site. Still others find a combination of the two training approaches works best. That's fine with HTC.

"Our goal is to make the best training accessible to manufacturers, no matter where their employees are," said HTC Dean Joe Mulford. "With online access 24/7, it's more efficient than ever to invest in training." He noted that manufacturers who invest in training find that advanced knowledge and skills make workers more motivated and more productive. Additionally, greater job satisfaction can lead to lower turnover.

**LEADING THE WAY** - Recognized as a leader in education for the Plastics industry, HTC has long offered students a 36-credit diploma as well as an 18 or 23-credit occupational certificate. On campus, the Plastics program credit classes are offered days or evenings.

"Our longtime partnership with Paulson Training Programs assures our students receive the most up-to-date training from the industry leader," said HTC's Dan Ralph, who has taught at the college for 25 years. Ralph now works with Scott Paulson, the second generation of the Paulson family to head the company ([www.paulsontraining.com](http://www.paulsontraining.com)), which is based in Chester, Conn.

**HOW IT WORKS** - After a company contacts Dan Ralph at HTC, he works with the organization's managers and supervisors to set goals for the employees who will be trained. Decisions are made about course content and skill development, and how the training will be delivered, either on site or online.

**KNOW THE SKILLS, SHOW THE SKILLS** - "The key is that the student will have to show they have developed the skills," explained Ralph, who can monitor online testing to be sure students have mastered the required skills. Whether it's someone in Minneapolis advancing their injection molding skills or an individual honing their skills in injection molding in Minot, North Dakota, these training solutions can help organizations become more efficient and effective.

HTC can meet the training needs of plastics manufacturers of all sizes, whether the goal is to concentrate training in a specific group or to expand the skills of an entire organization. HTC will work to create a comprehensive solution.

For information, contact Dan Ralph at (763) 488-2527 or [dan.ralph@hennepintech.edu](mailto:dan.ralph@hennepintech.edu).

**About Hennepin Technical College** Hennepin Technical College ([www.hennepintech.edu](http://www.hennepintech.edu)) is Minnesota's largest technical college, serving more than 10,000 students at campuses in Brooklyn Park and Eden Prairie. HTC offers more than 45 programs of study, leading to certificates, diplomas, an Associate of Applied Science (A.A.S.) or Associate of Science (A.S.) degree. The college offers many evening, weekend, and online courses. In addition, cutting-edge continuing education is available through HTC's Customized Training Services. To learn more, visit [www.hennepintech.edu](http://www.hennepintech.edu) or call (952) 995-1300.

HTC is a member of the Minnesota State Colleges and Universities system comprised of 32 universities and community and technical colleges serving the higher education needs of Minnesota. The system serves about 260,000 students per year in credit-based courses and an additional 164,000 students in non-credit courses.

In this section an article published in May of 2011 at journal of *Polymer Engineering and Science* is covered. The title of the article is

## “Novel foam injection molding technology using carbon dioxide-laden pellets”

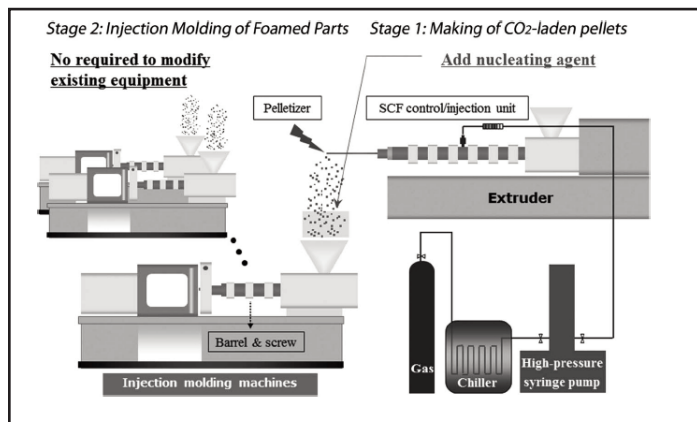
and the authors are: Jungjoo Lee and Lih-Sheng Turng, affiliated with Polymer Engineering Center, Department of Mechanical Engineering, University of Wisconsin-Madison, Madison, Wisconsin, and Eugene Dougherty and Patrick Gorton affiliated with Energizer Personal Care Products, Dover, Delaware 19904.

Plastic foams have been widely used in many industries such as automobile, construction, home appliances, sports goods, etc. due to their many advantages including a cost reduction for raw materials, energy savings, and improved productivity. Polymeric foams are, in general, formed by cell nucleation and growth of cells (bubbles) in the polymer matrix. For both cell nucleation and bubble growth, the type and amount of blowing agents and processing conditions dictate the density, cellular structure, mechanical, and chemical properties of polymer foams [1].

Injection molding of foamed components typically uses chemical blowing agents (CBAs) or physical blowing agents (PBAs) to produce a cellular or microcellular structure. A CBA can be easily and directly mixed with plastic pellets and fed into the molding machine through the hopper while a generally finer, microcellular structure can be realized using PBAs. The PBA route is accomplished by injecting more environmentally benign gases into the machine barrel to form a single-phase polymer–gas solution that subsequently foams during molding. This article proposes a new foam injection molding technology that enables the ease of processing of the CBA method with the foaming characteristics of a PBA, but in a cost-effective fashion. Using the proposed technique, lightweight injection molded parts with a cellular structure, good dimensional stability, and a good surface quality can be produced.

For the mass production of pre-saturated pellets, an efficient, continuous process is much more desirable than a batch process considering the cost and time. The process is shown in Figure 1.

The polymer resin used in this study was Marlex grade, low-density polyethylene (LDPE) supplied by Chevron Phillips Chemical Company. Montmorillonite modified nanoclays with a quaternary ammonium salt (Cloisite20A, Southern Clay Products) were used as the cell nucleating agents.



**Figure 1. The schematic of the complete experimental process.**

A foamed part produced with CO<sub>2</sub>-laden pellets could lead to lightweight cellular parts with a shiny, smooth, and swirl-free surface. When nanoclays are added to CO<sub>2</sub>-laden pellets, a higher weight reduction and better dimensional stability can be achieved. The weight reduction of a molded part could be as high as 15% with the addition of nanoclays.

When pellets produced with a relatively high gas flow rate of 1.44 g/min for molding without nanoclays, a foamed part with a weight reduction of 8% to 10% was achieved. Molded parts with more than 10% weight reduction were not able to be produced since the gas-laden polymer melt could not fully fill the mold cavity, even with volume expansion by the nucleated cells. When nanoclays of 3 wt% were added to the CO<sub>2</sub>-laden polymer pellets, the plastic parts were reduced by about 15% in terms of weight and were molded without filling or shrinkage issues. It is believed that the addition of nanoclays lowers the energy barrier for cell nucleation (heterogeneous nucleation) by producing a broad interface between solid particles and the polymer melt such that cells are more able to nucleate...The storage period for CO<sub>2</sub>-laden pellets before injection moldings was set at 30 min for this set of weight reduction experiments.

A typical foam injection molded part has a rough and uneven surface and gas flow marks on its surface. On the other hand, a foamed part molded with CO<sub>2</sub>-laden pellets has a smooth and even surface profile similar to a solid part. Figure 2 shows images of injection molded parts. Surface defects of foamed parts molded with blowing agents are caused by bubbles forming at the advancing melt front, which are stretched by fountain flow behavior toward the mold surface and subsequently collapse and are dragged against the mold wall during the filling stage [3, 4, 5]. It is believed that when CO<sub>2</sub>-laden pellets remelted in the injection molding barrel are injected into the mold cavity, cell nucleation and subsequent

**CONTINUED ON PAGE 11**

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# Third Annual Awards Event of the Upper Midwest Section – SPE at the Guthrie Theater in the Historic Mill District near downtown Minneapolis.

## *Cat on a Hot Tin Roof*

By Tennessee Williams

On the heels of the explosive *A Streetcar Named Desire*, this Pulitzer Prize-winning classic receives its second-ever Guthrie staging this season. It's the 65th birthday of wealthy southern patriarch Big Daddy Pollitt, who is unknowingly dying of cancer, and his sons Gooper and Brick have arrived on the scene of the family's Mississippi plantation in hopes of inching closer to their \$10 million inheritance. Yet as Brick descends into alcoholism following the death of a college friend, his fragile relationship with his wife Maggie continues to crumble, and the lies and illusion become too much for the family to bear.

The play will be preceded by an Awards presentation and meal in a private dining room right at the Guthrie. The play starts at 7:30 on January 27, 2012 (Friday). The Awards presentation and meal will start at 5:00PM. More information will be coming soon about this event. Price is yet to be determined.

For questions, please contact LuVerne Erickson at 763-971-6143 or [verne.erickson@clariant.com](mailto:verne.erickson@clariant.com)

## OPEN Invitation to all Upper Midwest Section Schools/Colleges to JOIN the Society of Plastics Engineers (SPE)

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- FREE membership to your local SPE Section; FREE Division affiliation
- Section dinner meetings; technical programs and even Special Events.
- Professional contacts

**... and much more!!!**

## Upper Midwest Section (S22) Membership

*October 17, 2011*

**Section Total ..... 383**

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# Councilor's Corner

**Tom McNamara**



The biggest news out of SPE Headquarters is that our Executive Director, Susan Oderwald, is leaving SPE after 11 years of faithful service. Susan will be missed by all in the Society that know her. In view of this news, SPE is actively seeking Executive Director candidates and has retained Kellen Company to coordinate the recruitment efforts. The new Executive Director will be charged with growing our organization and, particularly, our presence around the world. The selection of the right person is critical because he or she will continue to help promote SPE as a relevant, global organization with ever-expanding, valued benefits. Kellen will work with the Executive Committee to interview top candidates and ultimately make a selection for SPE's next Executive Director. If you know of a candidate that you feel could fill this role, please refer interested individuals to [www.kellencompany.com/spe](http://www.kellencompany.com/spe) for more information. Side note: during the transitional period, Gail Bristol and Tom Conklin will be in charge of the Newtown office and will be the main contact points for major questions.

I would like to point out that SPE has EUROTEC® coming up in November. EUROTEC® is an ANTEC-style conference to be held in Barcelona on November 14-15. It is the first conference of this type SPE is running, and we have a very solid program shaping up with close to 200 presentations, and a great slate of plenary speakers. Sponsored by SABIC, A. Schulman, PolyOne and Ticona, EUROTEC® has been three years in the making, and will be held in conjunction with Spain's Equiplast Trade Show. We actually have our next Council meeting at the EUROTECH but I will not be attending live as it is quite expensive to attend in Barcelona and I felt we could use those funds more effectively for local support and education activities. I will be attending via net meeting.

One benefit of SPE membership is the opportunity to connect with other professionals in our industry through LinkedIn. SPE has Largest Group for Plastics Professionals on LinkedIn Membership in the LinkedIn® group of the Society of Plastics Engineers now exceeds 10,000, making it the largest group for plastics professionals on the LinkedIn social media platform. The SPE LinkedIn Group has become an industry resource for plastics professionals who are seeking answers to technical questions, networking, and even employment opportunities. You may join through the SPE website at [www.4SPE.org](http://www.4SPE.org).

Also as a reminder, ANTEC® 2012 will be co-located with NPE and held in Orlando, Florida, at the Orange County Convention Center. **ANTEC®** will be held April 2-4; NPE will be held April 1-5. An early abstract is not required; the abstract and paper **deadline** is October 19, 2011.

On the local Section scene, I hope many of you enjoyed both our golf outing and the tour of Stratasy's / Redeye. Our Board of Directors and particularly our Technical Program Chair, Dan Mishek, are trying diligently to bring educational and networking opportunities to our Upper Midwest Section membership. Dan is in the final preparations for a very interesting Fall MegaTech on tooling for manufacturing covering prototype to production, overseas vs domestic, design to manufacturing, and finishing, venting and cooling. It will be a must attend for anyone that designs, uses, or purchases molds.

And last but not least, I want to give my usual pitch for your help in growing our Section. We have lost a few more active members since my last report. If you are one of the members that have fallen delinquent on paying your dues, please submit them now. SPE offers many benefits that cannot be obtained elsewhere. If you are a member in good standing, please recruit your colleagues. We as a Board are working hard to provide the educational and network benefits that you expect from a professional organization. We can only become better with your help!!

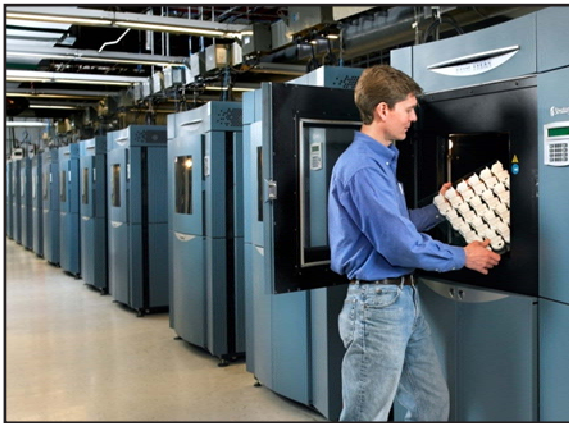


# SPE Tour at Redeye on Demand

Redeye hosted a great event for our Chapter on September 22<sup>nd</sup>. They greeted 30+ of us with refreshments and snacks then proceeded to share successes of their technology. The tour was broken up into stations to highlight and educate where their technology made add value to product development or low volume production.

The stations ranged from Large Parts, Materials, Vacuum Forming, Direct Digital Manufacturing (DDM) and Jigs & Fixtures. The attendees left impressed and honored to truly see a "Factory of the Future" today! A special thanks goes to the Redeye staff for staying late, sharing their knowledge and for making really cool additive manufactured samples for all the attendees.

It is difficult to find companies that want to host tours to educate our Chapter. Last year we toured The Toro Company and this year Redeye on Demand. If you have suggestions or can host a tour at your facility, please contact the board to schedule the event. Thank you!



< A row of FDM Machines that make additive manufactured parts 24 hours a day.

A platform of black > ABS parts that were built in .010" layers for a low volume production application.



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- Expanding Ingeo Applications in Durable Products
- Growth of Ingeo Lactides and Lactide Derivatives
- Driving Economics to Sustainable Commercialization
- Opportunities in Food Service and Food Packaging
- Legislative and Regulatory Issues

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- Editors & Journalists
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- Packaging Professionals
- Process Engineers
- Product Designers
- Product & Process Developers
- Researchers
- Retailers
- Sustainability Managers

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#### Pre-conference workshops:

- The Future for Bioplastics Feedstocks
- Adhesives and Key Essentials for Laminating Biopolymer Films into Flexible Packaging

#### Exhibitor & sponsorship opportunities available

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# Society of Plastics Engineers Membership Application

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## Applicant Information

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first last mi

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 Other

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Composites  Polyolefins  
 Film  Polystyrene  
 General Interest  TPEs  
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**Process (choose all that apply)**

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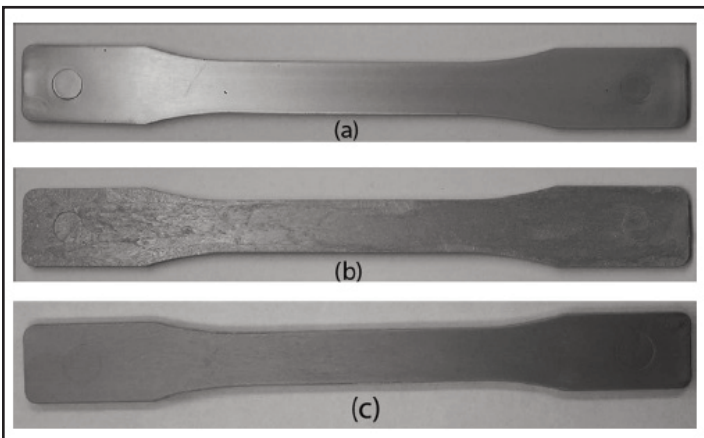
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## SCIENCE corner *continued from page 6*

growth of bubbles are retarded due to a low gas concentration in the polymer pellets until the melt front of the polymer-gas solution touches the mold wall as avoiding surface imperfections. After that, cells start to nucleate and grow in the hot polymer core until the material solidifies within the chilled mold.



**Figure 2. Injection molded tensile test bars produced by: (a) a typical injection molding (nonfoamed solid part), (b) a typical foam injection molding process using a gas supply system, and (c) a novel foam injection molding technology using CO<sub>2</sub>-laden polymer pellets.**

In conclusion, a foamed part produced with CO<sub>2</sub>-laden pellets could lead to lightweight cellular parts with a shiny, smooth, and swirl-free surface. When nanoclays are added to CO<sub>2</sub>-laden pellets, a higher weight reduction and better dimensional stability can be achieved. The weight reduction of a molded part could be as high as 15% with the addition of nanoclays.

(1) D. Eaves, Handbook of Polymer Foams, Rapra Technology Limited, United Kingdom (2004).

(2) J.J. Lee, L.S. Turng, E. Dougherty, and P. Gorton, Polymer, 52, 1436 (2011).

(3) D.E. Pierick, J.R. Anderson, S.W. Cha, L. Chen, J.F. Stevenson, and D.E. Laing, U.S. Patent 6,884,823 (2005).

(4) J.J. Lee, L.S. Turng, and A. Kramschuster, Polym. Plast. Technol. Eng., 49, 1339 (2010).

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763-225-6600  
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763-971-6133 FAX  
verne.erickson@clariant.com

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November 14-15, 2011 - EUROTEC 2011-  
Barcelona Spain

November 10, 2011 - Megatech

November 15, 2011 - Indian Convention on  
Masterbatches & Additives

November 17, 2011 - An Engineering Approach  
to the Correction of Rotational Flow  
Calculations for Single-Screw Extruders

November 21, 2011 - Polymer Problem Solving  
via Excellence in Polymer-Analytical  
Sciences 2011 Conference

November 21, 2011 - ClearPlast 2011 Conference

January 27, 2012 - Annual Awards



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