SPEC SHEET

Newsletter of the Palisades - New Jersey Section

PALISADES NEW JERSEY

THE SOCIETY OF PLASTICS ENGINEERS

MAY 2018

2017 Section Awards

PINNACLE GOLD

COMMUNICATION EXCELLENCE

MEETING LOCATION:

Olde Mill Inn

225 Morristown Rd. (Rt. 202)

Basking Ridge, NJ 07920

Please RSVP by Wednesday, May 16

THURSDAY MAY 17, 2018

4:00 - 5:30 PM	Board Meeting
5:30 - 6:00 PM	Networking
6:00 PM	Dinner & Technical Presentation

Members and Guests	$45
Students/unemployed	$15
Scholarship recipients	no charge

RSVP by May 16 to Pete Hayles
peterhayles11@gmail.com 732-569-2368

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Palisades-New Jersey Section Meeting

May 17, 2018
AWARDS AND SCHOLARSHIP NIGHT

Join us as we give out special awards and honor our scholarship winners. We will be awarding $19,000 to 8 deserving students. Both the board meeting and dinner are in the Olde Mill Inn *(meeting room level downstairs).* Please RSVP to Pete Hayles by May 16, peterhayles11@gmail.com

Congratulations to the recipients of the 2018 Palisades–New Jersey Educational Scholarships:

Alva Whitney Graduate Scholarship ($4000):
Ms. Jamie Wooding, Georgia Institute of Technology, Materials Science and Engineering

Jack Ryan Undergraduate Scholarship ($4000):
Mr. Wesley Kendall, Rutgers University, Materials Science and Engineering

J. Stephen Duerr Undergraduate Scholarship ($2000):
Mr. Alex Wootae Lee, Rutgers University, Materials Science and Engineering

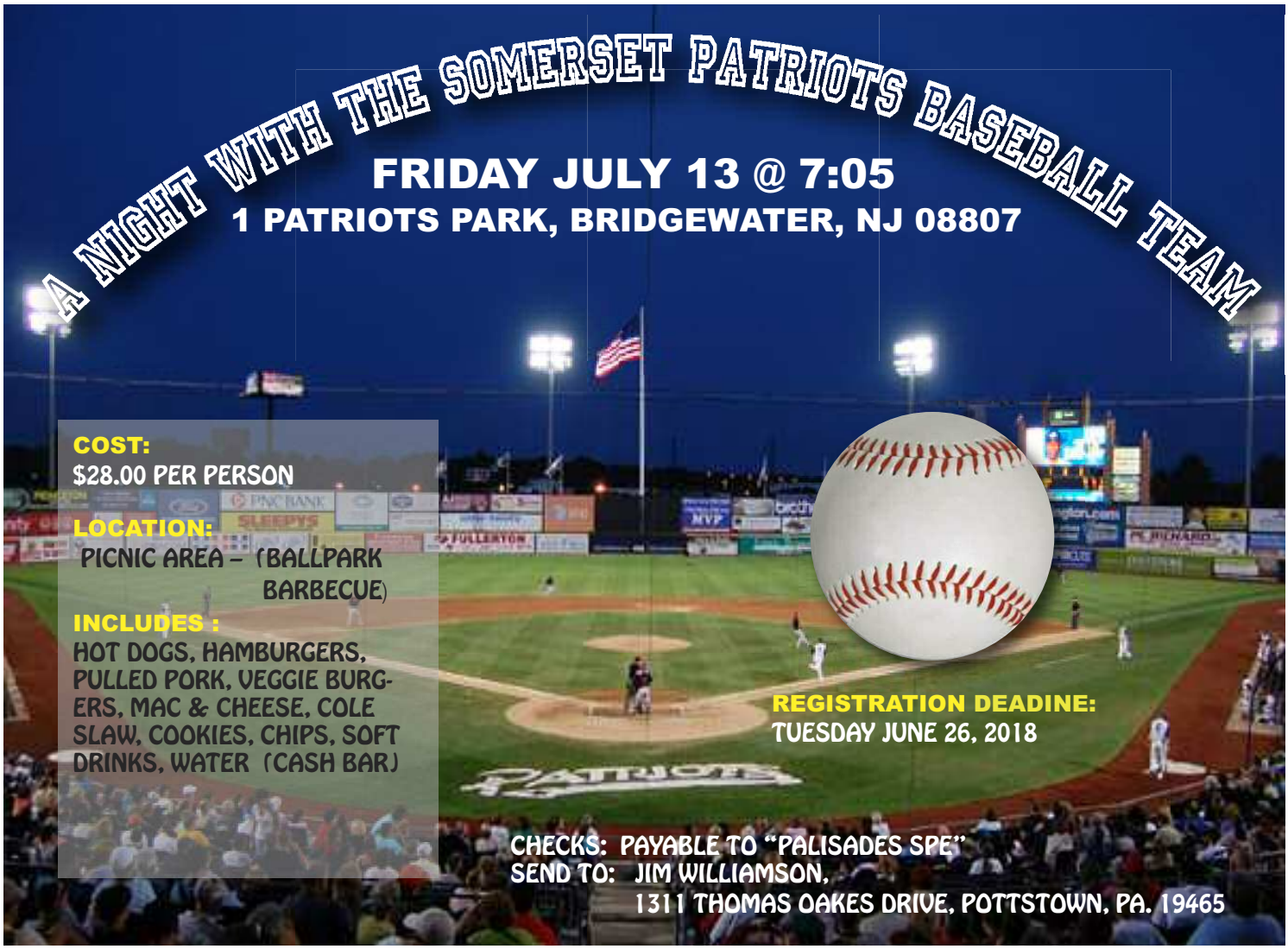
Richard Bradley Undergraduate Scholarship ($2000):
Ms. Alexandra Spitzer, Rutgers University, Materials Science and Engineering

Sal Monte Undergraduate Scholarship ($2000):
Mr. Kees Schipper, Yale University, Biomedical Engineering

Francis McAndrew High School Scholarship ($2000):
Ms. Jessica Novak, Mountain Lakes HS

Palisades New Jersey Board of Directors Scholarships
Mr. Kyle Schipper – Lehigh University ($1500)
Ms. Constance Kapp – Wake Forest University ($1500)

*The Section also added, as planned, to the scholarship fund for the children of Andrew Yacykewych, in his honor and memory.



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And our Website

www.SPE-PNJ.org

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Society of Plastics Engineers
Palisades-New Jersey Section
Annual Golf Outing

PALISADES-NEW JERSEY

Tuesday, June 19, 2018
Oak Hill Golf Club

www.oakhillgolf.com 908-995-2285

15 Fernwood Road

Milford, NJ

$175 per Golfer Includes all of this:

- **Greens fees cart**
- **Range balls**
- **Skill prizes**
- **Door prizes**
- **Breakfast buffet**
- **Sit-down dinner**

9:00 am	Breakfast Buffet
10:00 am	Shotgun Start
3:30 pm	Served Dinner (Prime Rib, Salmon, French Chicken)

Not a Golfer?
Join us for Dinner -Only: $50

Hole Sponsorship Available: $100 per hole

Palisades - New Jersey Section

Contact person: Jim Williamson
Phone: 610-662-7779
Email: Jim.Williamson@doverchem.com

$175 per golfer ($185 after June 8th)
No "verbal" registrations
Registration is only confirmed upon receipt of check

REGISTRATION FORM

Contact person: Jim Williamson
Phone: 610-662-7779
Email: Jim.Williamson@doverchem.com

Hole Sponsorship Available: $100 per hole

$175 per golfer ($185 after June 8th)
Make checks payable to Society of Plastics Engineers and Mail to:
Jim Williamson
SPE Golf Outing
1311 Thomas Oakes Drive
Pottstown, PA 19464-7275

	Name	Email	Company/Affiliation
1)			
2)			
3)			
4)			

Councilor's Report

Council Meeting- May 6, 2018
Maggie Baumann Councilor

Preliminary notes *(full report will be available after minutes are published)*

Pat Farrey (the new CEO) has been in the position about a year. During this time, he has observed that communication among divisions and sections needs improvement. He has recommended the addition of additional headquarters personnel to serve the society volunteers. Some council members have asked how we can justify the investment while the Society is not in a breakeven position. His response is that investment needs to be made in some areas to improve the overall performance of the society – both in personnel and services. The website has also been redesigned and a new logo was implemented about a month ago. Executive committee and executive staff are considering a name change of the society to Society of Plastics Professionals. There is mixed reviews on this idea among Councilors.

ANTEC® 2018 had about 1600 attendees. Rooms were in short supply due to NPE but the sessions were generally well attended. The survey of SPE members regarding ANTEC® is completed and there are two models that are being considered for the next ANTEC®2019. ANTEC®2019 will be March 18-20 in Detroit. However, it will be about a month until the final model will be selected. This also is a concern among councilors because the turnaround is so short. All agree that a new, refreshed version of ANTEC® is overdue but how and when to implement is very much under debate.

Congratulations to SPE's newly elected leaders:

Brian Grady, new President 2018-2019.
Brian Landes (Dow), Executive VP
Jason Lyons (Arkema), Divisions VP
Scott Eastman (United Technology), VP of Sections
Ray Pearson (Lehigh), VP of Technology & Education.

An excerpt from Brian Grady's speech May 6…

I want to conclude this talk with a list of things that are my top priorities as President. In this list of priorities, I am only talking about things that I have significant influence on. So for example, I am NOT going to discuss really important items where my contribution will be minimal, for example the website redesign. For personal as well as SPE business reasons, ANTEC® is definitely a focus of mine. In fact, I see all conferencing as being an issue that I want to focus on. In particular, I believe SPE has a problem in identifying subject areas where we should be holding conferences. Membership is still the largest single category of revenue for the society and deserves attention. I have not said anything about students and young professionals; these groups are important for the future of SPE. SPE is a global organization; I am committed to continuing our efforts to expand the SPE brand throughout the world. Sections and Divisions are still the most direct link SPE has with members, and strong Sections and Divisions enhance SPE enormously. How do e-members and customers fit into the SPE framework is another question. The last thought I wanted to leave you with is that I will work every day to make SPE more transparent; I will do my best to answer the questions: what, why, and how.

--reported by Maggie Baumann, Councilor

Section News

March and April Section Meeting Minutes Highlights

Planned events for the coming year: Leistritz tour, Nov. 29. Potentially tours of Cimquest and Atlas.

Baseball game outing *(see details p 2)*. Minimum 30 people needed.

Board elections were not held in March; (to be discussed at the May board meeting).

Thank you to Rutgers personnel for getting the March meeting together and hosting April's meeting also.

Awards

The Palisades-New Jersey Section was awarded the Pinnacle Gold *(the highest award for Sections),* and given "Special Recognition" in Communications Excellence.

Ayra Tewatia (Rutgers) won third-place in the graduate poster competition at ANTEC® 2018 for his poster: "High Shear Melt-Processing of Polyetheretherketone Enhanced Polysulfone Immiscible Polymer Blends."
See poster on next page.

SPE INSPIRING PLASTICS PROFESSIONALS — ANTEC® ORLANDO — The Plastics Technology Conference — May 7-10, 2018 • Orange County Convention Center • Orlando, FL

RUTGERS Dept. of Materials Science & Engineering

HIGH SHEAR MELT-PROCESSING OF POLYETHERETHERKETONE ENHANCED POLYSULFONE IMMISCIBLE POLYMER BLENDS

Arya Tewatia, Justin Hendrix, (ADV) Dr. Thomas Nosker, (ADV) Dr. Jennifer Lynch
Department of Materials Science, Rutgers University, 607 Taylor Road, Piscataway, NJ

ABSTRACT:
PEEK-PSU immiscible polymer blends were produced using a novel one-step high shear injection molding process without compatibilizers. A dual phase, co-continuous structure was predicted from melt rheology results and predicted to occur at a concentration ratio of 55/45 PEEK/PSU. PEEK and PSU were dry-blended at various compositions and processed with morphology, impact resistance, and tensile properties characterized. Morphology analysis shows good mixing at all concentrations and confirms a fine dual phase, co-continuous structure occurs at 55/45 wt. % PEEK/PSU. Additionally, the highest impact energy absorption occurs at dual phase, co-continuous concentration. Tensile properties increase with increasing PEEK concentration in PSU. At the 80/20 PEEK/PSU concentration, mechanical properties are comparative to neat PEEK, while proving more economically advantageous. Additionally, the lower viscosity of PSU, reduces processing pressures resulting in easier part fabrication of IMPBs, and enabling more complex geometries.

BACKGROUND

Immiscible polymer blends (IMPBs) offer versatility in tailoring properties via synergistic combinations of blend components to optimize orthogonal properties more economically than chemical synthesis of a new polymer. However, poor load transfer at the phase interface, caused by low interfacial adhesion can result in below law of mixtures properties.[1] High shear processing enables efficient load transfer with a fine interlocking morphology, without the need for costly chemical compatibilizers.[2] The finest microstructure is found at the co-continuous point wherein both phases are continuous.

The dual phase, co-continuous region is predicted via the Jordhamo Equation [1], wherein the volume fraction (Φ) ratio of the polymers in the blend is equal to the viscosity (η) ratio of the polymers at a given shear rate and temperature.

$$\frac{\Phi_A}{\Phi_B} \cong \frac{\eta_A}{\eta_B} \quad [1]$$

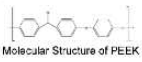
MATERIALS

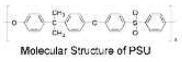
Polyetheretherketone (PEEK) and polysulfone (PSU) were used.

- PEEK, manufactured by Solvay Plastics, is a semi-crystalline thermoplastic polymer with great mechanical strength, stiffness, and high durability at high temperatures.
- PSU, manufactured by Solvay Plastics, is an amorphous thermoplastic polymer with relatively high strength and thermal, oxidative and hydrolytic stability.
- Viscosity (η) of each polymer was determined at T = 360 °C and γ=300 s^{-1}

Raw Materials	PEEK	PSU
Viscosity (Pa.s)	750	620

$\frac{\eta_A}{\eta_B} = 1.21$ and Φ_A = 55 vol. % PEEK at predicted co-continuous region


Molecular Structure of PEEK


Molecular Structure of PSU

METHOD

Dry mixed PEEK and PSU resin was injection molded on a Negri Bossi V55-200 injection molding machine with a novel high shear mixing screw at 360°C, producing ASTM tensile, impact, and flexural test specimens.

CHARACTERIZATION

Tensile Mechanical Properties
- ASTM D638
- MTS QTest/25 UTS
- Crosshead speed = 5 mm/min

Izod Impact Properties
- ASTM D256
- Instron Dynatup POE 2000 Impact Tester

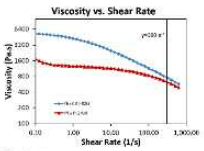
Morphology
- Zeiss Sigma field emission scanning electron microscope (FESEM)
- Cryofractured specimens
- 5 nm Gold Coating

Rheology
- TA Instruments AR-2000 rheometer w/ ETC Furnace
- Parallel plate frequency sweep from 100-0.01 Hz, and 1% strain @ 360 °C

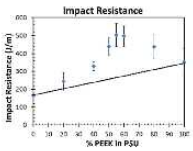

MTS Qtest/25 Universal Testing System


Intron POE 2000 Impact Tester

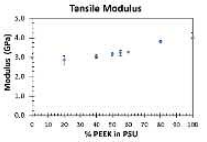
RHEOLOGY

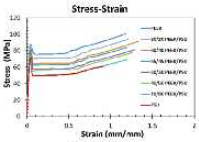


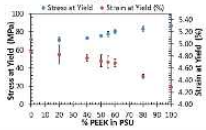
IMPACT

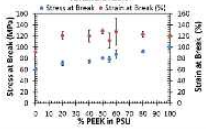


TENSILE

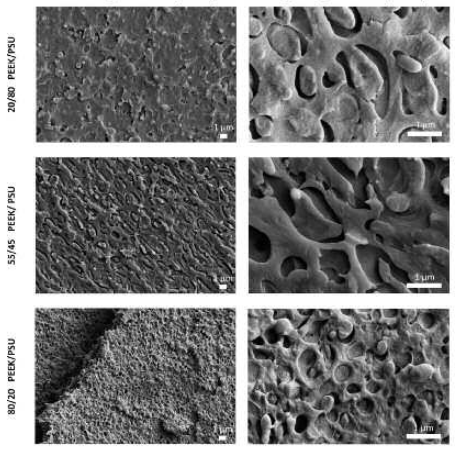








MORPHOLOGY



CONCLUSIONS

1. Co-continuous structure occurs at the predicted 55/45 PEEK/PSU compositio
2. Co-continuous region has the finest morphology
3. Highest impact properties are in the co-continuous region (503 J/m), a 42 increase compared to PEEK (353 J/m), and 204% compared to PSU (165 J/r
4. 80/20 wt. % PEEK/PSU shows comparable tensile modulus and super impact properties (437 J/m) as compared to neat PEEK (353 J/m).

FUTURE WORK

1. In-depth examination of co-continuous structure & properties produced varying shear rates, and processing temperatures.
2. Determine the effect of heat treatments on mechanical performance.

REFERENCES

1. Joshi, J. et al Selected physical characteristics of polystyrene/high density polyethyle composites prepared from virgin and recycled materials. J. Appl. Polym. Sci. 99, 2044–20 (2006).
2. Lynch, J. K. High shear melt-processing of fiberglass-reinforced poly(trimethyle terephthalate composites. J. Appl. Polym. Sci. 132 (2015).

2018 Society of Plastics Engineers Annual Technical Conference

SPE Poster Number: 2018-G33

UPCOMING MEETING DATES

May 17	Awards Meeting
June 19	Golf Outing
July 13	Somerset Patriots Baseball Game Outing
Sept. TBD	Section Meeting

Newsletter Publication

The next newsletter will be published in September.
Contact us if you want to sponsor the newsletter with an advertisement in the 2018-2019 year.

Have a great summer!

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Contact: Peter Hayles

peterhayles11@gmail.com

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