



SOCIETY OF
PLASTICS ENGINEERS

Special points of interest:

- FAPSIG TALKS TO BE GIVEN AT ANTEC 18
- WINNER OF FAPSIG SCHOLARSHIP
- ANNOUNCEMENTS
- FAPSIG BOARD

Letter from the Chair — Brian Ralston

Letter from the Chair:

Welcome to the Failure Analysis and Prevention SIG (FAPSIG) Spring 2018 Newsletter! I am proud to report that FAPSIG remains one of the largest special interest groups of the Society of Plastics Engineers. Please remember to select your interest in FAPSIG when you renew your membership (on the newly updated SPE website (www.4spe.org)). ANTEC 2018 will be in Orlando, FL May 7-10, and is strategically co-located with NPE2018 to take advantage of the largest plastics trade show and conference in North America. There is still time to register for ANTEC 2018 if you have not already done so. FAPSIG will be offering technical and tutorial sessions, and will also hold its business meeting at

ANTEC. A special thank you to our Technical Program Chair, Todd Menna, and our tutorial speakers for volunteering their time. You are welcome to attend the business meeting and voice your suggestions, ideas, and opinions so that the FAPSIG board can continue to address the needs of our members. I look forward to seeing familiar faces and meeting new friends at ANTEC 2018 in Orlando, FL. Warm regards,
Brian Ralston
Cambridge Polymer Group
FAPSIG Chair





ANTEC 2018 (May 7-10, 2018)

Failure Analysis and Prevention Special Interest Group

Tutorials and Presentations

Tuesday, May 8th (Room S322)

Time	Presenter	Topic
1:30-2:30	Michael Sepe	Tan Delta - The Dimensionless Property that Tells You Almost Everything You Need to Know About a Polymeric Material
2:30-3:00	Farzana Ansari	Fractography: The Science & Art of Determining How Plastics Break
3:00-3:30	Rui Chen	Failure Analysis Using FT-IR and Raman Microspectroscopy
3:30-4:00	Tobias Pflock	How to Use Thermoanalytical Methods for Failure Analysis
4:00-4:30	Joerg Fischer	Investigation of the Effect of Stabilizer System, Medium and Temperature on the Fatigue Crack Growth Resistance of Polypropylene for a Proper Material Selection
4:30-5:00	Kelly Majewski	Fracture Properties of HDPE Exposed to Chlorinated Water
5:00-5:30	Patrick Bradler	Fatigue Resistance and Failure Characterization of Glass Fiber Reinforced PA Grades
5:30-6:00	Yusuke Hiejima	Non-Destructive Detection of Microscopic Structural Changes in Polyethylene During Photodegradation by Raman Spectroscopy
6:00-6:30	Jay Yuan	Any Bulging or Paneling Issues for Your Packages?

The FAPSIG Board meeting is scheduled for Wednesday, May 9th at 12:30 in room N210B

2018 FAPSIG Scholarship Winner

Brendan Ondra from the University of Massachusetts Amherst is the winner of the 2018 FAPSIG Scholarship. His advisor is Dr. Alan Lesser. The title and summary of his research are given below.

An Investigation into the Glass-Forming and Physical Aging Behavior of Aliphatic and Aromatic Thermosets of Various Cross-link Densities Conditioned with Hydrostatic Pressures

Glass-forming thermosets have found prominent use in fields such as aerospace, automotive, and electronics and have been incorporated into diverse applications such as structural adhesives, matrix materials for composites, and electronic packaging. Given the prolific and expanding use of glassy thermosets, it is of practical importance to understand and be able to predict how these materials age with time and what factors influence their aging behavior. Building upon thermal annealing strategies to accelerate physical aging, we are interested in investigating the ways in which pressure conditioning influences the physical aging behavior of glassy thermosets and the feasibility of this technique as an alternative strategy to perform accelerated aging studies. To accomplish this work, we designed and built a confining-fluid bi-fluidic pressurizable dilatometer. Using this new instrument, we can synthesize, condition, and interrogate epoxy samples under varying amounts of hydrostatic pressures in the range of 6.89 MPa – 206.84 MPa. A set of epoxies has been selected in such a way that we can additionally study the influence of network architecture (aliphatic versus aromatic networks), cross-link density (molecular weight between crosslinks), and backbone stiffness (chain flexibility) on the tendency of these materials to age. By synthesizing samples under varying amounts of hydrostatic pressure (atmospheric – 206.84 MPa), we are able to study the effects of the starting state of the glass on the subsequent aging behavior. Physical aging via pressure conditioning of synthesized samples involved several steps: (1) maintaining the baseline pressure, the sample is heated to above its T_g . (2) a short equilibration soak is performed at the low pressure (baseline pressure) and $T > T_g$. (3) the pressure is increased to the selected conditioning pressure and the sample is cooled to the selected conditioning temperature below the T_g . (4) the sample is held at the conditioning pressure and temperature for the selected conditioning duration. To inhibit any physical aging effects outside of our experimental protocols, all samples are stored in freezers below their beta transitions (T_β), as measured by Dynamic Mechanical Analysis (DMA) in tension mode, after synthesis and conditioning until they are further interrogated. Thermal and mechanical analysis are used to interrogate all samples. Differential Scanning Calorimetry (DSC) is used to measure the glass transitions and featural characteristics of the glass transition. Thermal Mechanical Analysis (TMA) is used to track structural recovery. Linear and non-linear mechanical analysis is performed through the use of compression tests. With the thermal, structural, and mechanical data, we aim to formulate predictive methods for property evolution for this class of engineering materials. The development of such tools has clear utility in failure prevention and material selection.



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Announcements

Jennifer Hoffman making news



AirXpanders Inc (San Jose, CA), developers of the AeroForm technology, promoted Dr. Jennifer Hoffman to Director, Research & Development Materials Science. Dr. Hoffman is the past-Chair of FAPSIG. She is currently the Education Chair and Treasurer of SPE Golden Gate Section and on the Golden Gate Polymer Forum board. Dr. Hoffman was also featured in the March 2018 Plastics Engineering publication's *SPE is Me Focus* series.

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ESi to hold Plastics Failure Analysis/Prevention Seminar

August 13-17, 2018 | Aurora, IL | Engineering Systems Inc. (ESi)

A UNIQUE SERIES OF SEMINARS THAT HIGHLIGHT THE PRINCIPLES OF FAILURE ANALYSIS AND FAILURE PREVENTION IN PLASTIC PRODUCTS.

These seminars will benefit FAPSIG members who are involved in plastic design, production, quality control, or quality assurance functions.

- Understand how to determine the cause of fracture of plastic products through analysis of the fractured part.
- Analyze failure of plastic products through testing and how to prevent failures through quality control/testing and through the application of proper stress analysis and design methods. Attendees are encouraged to bring questions and samples from actual experience for discussion and review.

SEMINARS

August 13 – 14: Plastics Fracture Analysis Workshop

August 15 – 16: Plastics Failure/Analysis Prevention & Testing Seminar

August 17: Failure Analysis of Plastic Products through Stress Analysis Method Seminar

For more information contact:

Emily Halbesma, ESI (630) 851-4566 (w) (630) 851-4870 (f)

Email: ejhalbesma@engsys.com



2018 Failure Analysis and Prevention ANTEC Sponsors



Because of their generosity we are able to forward our mission of plastics education. Directly, the sponsorships were used to fund the FAPSIG Student Award, for students involved in research related to failure analysis and prevention, and the annual FAPSIG Best Paper Award.

If you are interested in sponsoring FAPSIG, please contact Jeff Jansen at jeff@madison-group.com

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