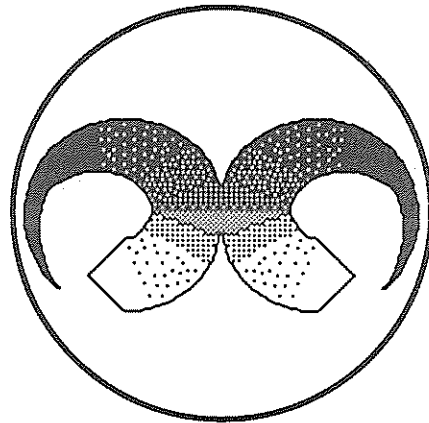


THE POLYMER PROCESSING SOCIETY

SUMMER MEETING

Amherst, Massachusetts
August 16-17, 1989

ABSTRACTS



General Theme:
**PROPERTIES THROUGH
PROCESSING**

Organized by
The Chemical Engineering Department
University of Massachusetts
Amherst, MA 01003
U.S.A.

Conference Committee -

Co-Chairman: H. Henning Winter
Michael F. Malone

Proceedings: Dave Hoagland

Technical Program -

Keynote Speakers: R.S. Stein, University of Massachusetts
R.G. Larson, AT&T Bell Laboratories

- Technical Sessions:
1. **Mixing**
R. Chella and J.M. Ottino
 2. **Processing of Filled Systems**
A. Graham and C.P. Henderson
 3. **Ultimate Properties**
A.E. Zachariades and M. Ito
 4. **Simulation**
A. Hrymak and D.J. Coyle
 5. **Liquid Crystals**
D.G. Baird and G. Kiss
 6. **Thermo-mechanical Properties**
R.J. Farris and S.R. Allen
 7. **Reactive Extrusion**
P.G. Anderson and J.A. Biesenberger
 8. **Die Design**
D.J. Coyle and A. Hrymak
 9. **Processing of Blends and Copolymers**
R.A. Mendelson and P. Soskey
 10. **Multilayer Flows & Coextrusion**
S.L. Parekh
 11. **Extruder Design**
L.R. Schmidt and W.M. Davis
 12. **Injection and Blow Molding**
J. Greener and K.K. Wang
 13. **Posters**
H. Henning Winter and Michael F. Malone

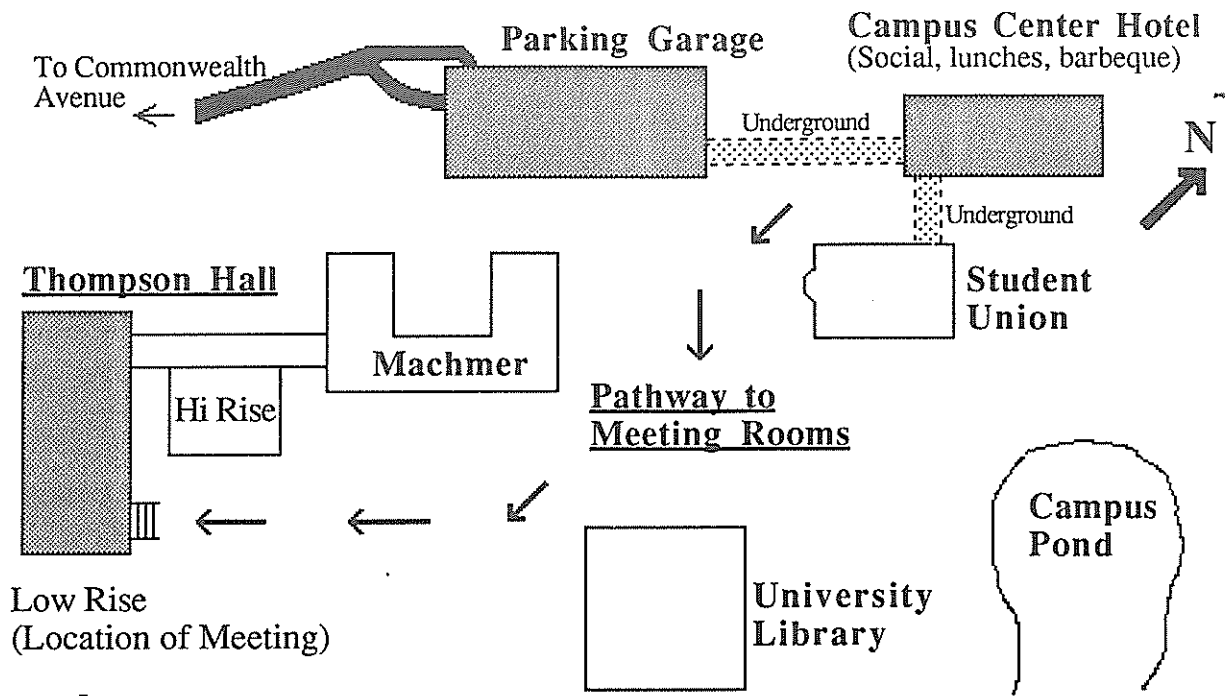
Acknowledgements -

The organizers of the Summer Meeting of the Polymer Processing Society wish to thank the following for their support:

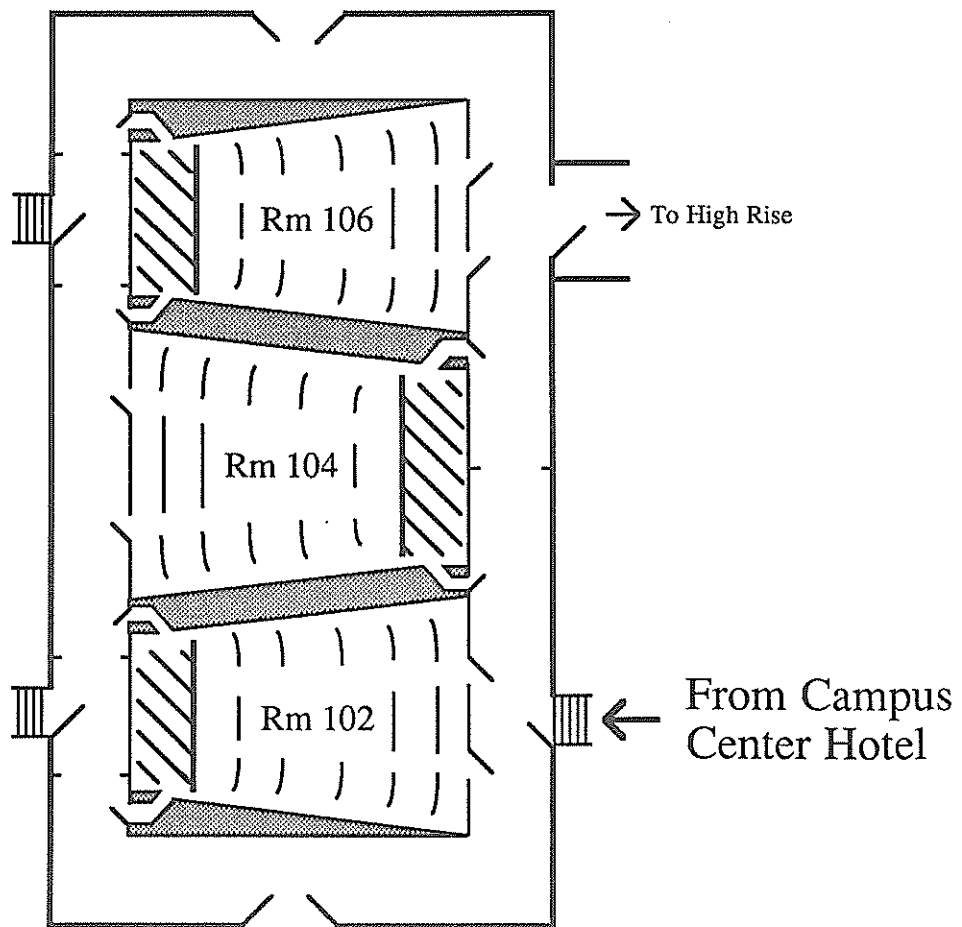
Applied Technology Center of the Univ. of Massachusetts
General Electric
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Monsanto Chemical Company

Local arrangements were made by the Univ. of Massachusetts Conference Services.

Local Campus Map -



Meeting Rooms -



- PROGRAM SUMMARY -

Wednesday, August 16

8:15	Thompson 104	INVITED LECTURE :		R.S. Stein
9:30	Session 1 Thompson 102 MIXING	Session 2 Thompson 104 FILLED SYSTEMS	Session 3 Thompson 106 ULTIMATE PROPERTIES	9:50
10:10				
10:30				
10:50				
11:10				
11:30				
12:00	LUNCH (POSTERS)			
1:30	Session 1 Continued	Session 2 Continued	Session 3 Continued	1:50
2:10				
2:30				
2:50				
3:00				Break
3:30	Session 4 Thompson 102 SIMULATION	Session 5 Thompson 104 LIQUID CRYSTALS	Session 6 Thompson 106 THERMO-MECHANICAL PROPERTIES	3:50
4:10				
4:30				
4:50				
6:30				BARBEQUE

Thursday, August 17

8:15	Thompson 104	INVITED LECTURE:		R.G. Larson
9:30	Session 7 Thompson 102 REACTIVE EXTRUSION	Session 8 Thompson 104 DIE DESIGN	Session 9 Thompson 106 BLENDS	9:50
10:10				
10:30				
10:50				
11:10				
11:30				
11:50				
12:15	LUNCH (POSTERS)			
1:40	Session 10 Thompson 102 MULTILAYER FLOWS & COEXTRUSION	Session 11 Thompson 104 EXTRUDER DESIGN	Session 12 Thompson 106 INJECTION & BLOW MOLDING	2:00
2:20				
2:40				
3:00				
3:20				
3:40				
4:00				
4:30	MEETING ENDS			

8:15	Invited Lecture: Morphology control in processing through polymer blending Thompson 104 R. S. Stein		
	Thompson 102	Thompson 104	Thompson 106
	Session 1: MIXING Chairs: R. Chella J. M. Ottino	Session 2: PROCESSING OF FILLED SYSTEMS Chairs: A. Graham C. P. Henderson	Session 3: ULTIMATE PROPERTIES Chairs: A. E. Zachariades M. Ito
9:30	1A: Stick-slip transitions in rubber processing J. L. den Otter	2A: Flow of liquids through non-woven fibrous networks M. Chibani and R. Gauvin	3A: Theoretical limits of fiber strength D. Prevorsek
9:50	1B: Mixing of dissimilar polymers in 2-dimensional flows R. Chella	2B: Heat transfer effects in injection molding fiber orientation R. S. Bay and C. L. Tucker III	3B: Planar deformations of semicrystalline polymers via forging R. Saraf, J. P. Autran, and R. S. Porter
10:10	1C: Microdispersive interfacial mixing in fast polymerizations S. C. Machuga and C. W. Macosko	2C: A stratified two-phase model for the flow of sheet molding compound C. Sandstrom and C. L. Tucker III	3C: Maximum properties achieved by superdrawing of some flexible chain polymers T. Kanamoto and R.S. Porter
10:30	1D: Experimental studies of chaotic mixing of viscous fluids C.W. Leong, H.A. Kush, P.D. Swanson, M. Tjahjadi, and J. M. Ottino	2D: Continuous processing of solid rocket propellants D.M. Husband	3D: Effects of sample geometry and draw conditions on the mechanical properties of drawn poly-(ethylene terephalate) M. Ito
10:50	1E: Computer simulations and theoretical studies of chaotic mixing of viscous fluids J.L. Franjone, P.D. Swanson, C.W. Leong, and J.M. Ottino	2E: Particle size segregation induced by propellant processing E. Ganani, W.J. Tetlow, J.B. Neest, and A.L. Graham	3E: Relation between the tensile properties and the molecular draw ratio of polyethylene ultradrawn fibers A.E. Zachariades and T. Kanamoto
11:10	1F: 3-dimensional FEM mixing studies in fluted sections D. Sebastian and A. Kiani	2F: Micromechanical modelling of filled systems D.J. Kaiser, A. L. Graham, and A.S. Argon	3F: Tensile deformation and failure of Kevlar aramid fibers S.R. Allen
11:30	1G: Flow, starvation character, and mixing in an internal mixer J.K. Kim and J. L. White	2G: Ultimate glass fiber length, fiber entanglement, and other aspects of short glass fiber reinforced thermoplastics following extrusion compounding G. T. Keep	3G: Solid state deformation of thermoplastics by rolling and extrusion A. Austen and W. L. Hutchinson
12:00 - 1:30	- Lunch & Posters -		

- WEDNESDAY, EARLY AFTERNOON SESSIONS -

	Thompson 102	Thompson 104	Thompson 106
	<p align="center">Session 1 (Cont'd): MIXING</p> <p align="center">Chairs: R. Chella J. M. Ottino</p>	<p align="center">Session 2 (Cont'd): PROCESSING OF FILLED SYSTEMS</p> <p align="center">Chairs: A. Graham C. P. Henderson</p>	<p align="center">Session 3 (Cont'd): ULTIMATE PROPERTIES</p> <p align="center">Chairs: A. E. Zachariades M. Ito</p>
1:30	<p>1H: Flow field analysis of a Banbury mixer J.J. Cheng and I. Manas-Zloczower</p>	<p>2H: Characterization of the orientation of anisotropic mineral particulates in filled thermoplastics using wide angle x-ray diffraction S.H. Lim and J.L. White</p>	<p>3H: Processing and strength of polymer interfaces R. Wool, O.J. McGarel, B. Yuan, and K. L. Foster</p>
1:50	<p>1I: Mixing in a counter-rotating non-intermeshing twin screw extruder with different screw velocities D. Bigio and L. Greenan</p>	<p>2I: Density variations in injection molded lignocellulose-thermoplastic composites M. J. Simon and J. Rietveld</p>	<p>3I: Sources of toughness in polymers A. Argone</p>
2:10	<p>1J: A critical study of flow in modular co-rotating intermeshing and tangential counter-rotating twin screw extruders J.L. White, M.H. Kim, S. Montes, and J.K. Kim</p>	<p>2J: Effect of processing conditions on the mechanical properties of polyethylene filled wood fiber composites R.G. Raj and B.V. Kokta</p>	<p>3J: Liquid crystalline polymers: past, present, and future E. Samulski</p>
2:30	<p>1K: The effect of fluid flow decoupling on viscous mixing D. Bigio and O. Dickerson</p>	<p>2K: Effect of polar monomer on the properties of wood fiber reinforced polystyrene composites D. Maldas and B.V. Kokta</p>	<p>3K: Properties and application for extruded LCP films R.W. Lusignea</p>
2:50	<p>1L: Flow visualization and modelling of a high speed gelimat melter/mixer D. Lyons and W.E. Baker</p>	<p>2L: Effects of treatments of fillers on the rheological and mechanical properties of polyethylene composites T.M. Malik and P.J. Carreau</p>	<p>3L: X-ray diffraction studies of highly drawn polyethylene fabrics and fibers C.R. Desper, M. Sussman, and E. Kacsh</p>
3:00 - 3:30	- Break -		

Wednesday afternoon program
continues on the next page

- WEDNESDAY, LATE AFTERNOON SESSIONS -

	Thompson 102	Thompson 104	Thompson 106
	<p align="center">Session 4 SIMULATION</p> <p align="center">Chairs: A. Hrymak D. J. Coyle</p>	<p align="center">Session 5 LIQUID CRYSTALS</p> <p align="center">Chairs: D.G. Baird G. Kiss</p>	<p align="center">Session 6 THERMO-MECHANICAL PROPERTIES</p> <p align="center">Chairs: R.J. Farris S.R. Allen</p>
3:30 <i>no show</i>	<p>4A: Numerical prediction of flow-induced fiber orientation in diverging cavities M.C. Altan, S.I. Guceri, and R.B. Pipes</p>	<p>5A: Rheology of anisotropic rigid-rod polymer solutions K.H. Wei, W. Adams, T. Helminiak, and H.H. Chuah</p>	<p>6A: Effect of thermal treatments on the micro-structure of high density polyethylene G. Vigier, N. Alberola, J.Y. Cavaille, and J. Perez</p>
3:50	<p>4B: 2-D simulation of rigid PVC flow in different configurations A. Garcia-Rejon, A. Derdouri, and J.-P. Chalifoux</p>	<p>5B: Processing behavior of blends of liquid crystalline polymers D.G. Baird and R. Mehta</p>	<p>6B: Thermomechanical properties of polyethylene/polystyrene/co-polymer blends B. Brahim, A. Ait-Kadi, and A. Ajji</p>
4:10	<p>4C: Modeling of the reactive filling of complex cavities M.A. Garcia, C.W. Macosko, S. Subbiah, and S.I. Guceri</p>	<p>5C: Correlations of texture and rheology in PBLG liquid crystal polymers D.W. Mead, R.G. Larson, and G. Kiss</p>	<p>6C: Thermal and dynamic mechanical characterization of high-temperature crystalline thermoplastics R. Yee, T. Stephens, and G. Lindsay</p>
4:30	<p>4D: Use of boundary element method to simulate hydro-dynamic interactions around ellipsoids in 3-D flow fields C.Y. Chan, S. Advani, and A.N. Beris</p>	<p>5D: Bagley and Mooney corrections for thermotropic polymers J. Rietveld and P. Tangyuenyong</p>	
4:50	<p>4E: Numerical simulation of thermoforming H.G. deLorenzi, H.F. Nied, and C.A. Taylor</p>	<p>5E: Rheology of thermotropic liquid crystalline polymers near their melting transition H.H. Winter and Y.G. Lin</p>	
6:30	- Barbecue -		

- THURSDAY, MORNING SESSIONS -

8:15	Invited Lecture: Thompson 104	Instabilities in rotational shearing flows	R. G. Larson
	Thompson 102	Thompson 104	Thompson 106
	<p align="center">Session 7: REACTIVE EXTRUSION</p> <p align="center">Chairs: P.G. Anderson J.A. Biesenberger</p>	<p align="center">Session 8: DIE DESIGN</p> <p align="center">Chairs: D.J. Coyle A. Hrymak</p>	<p align="center">Session 9: PROCESSING OF BLENDS AND COPOLYMERS</p> <p align="center">Chairs: R.A. Mendelson P. Soskey</p>
9:30	7A: Extruder dynamics for reactive processing D. B. Todd	8A: Self-designing dies B. Caswell	9A: Effect of deformation history on properties and morphology of LCP/polymer blends R.A. Weiss, A. Kohli, N. Chung, and D. Dutta
9:50	7B: Extruder reactions: halogenation of butyl rubber R. Kowalski	8B: Three-dimensional study of co-extrusion flows A. Karagiannis, A.N. Hrymak, and J. Vlachopoulos	9B: Processing studies on blends of LCP's with engineering thermoplastics T. Sun, D. Done, and D.G. Baird
10:10	7C: Basic considerations in the selection of extrusion reaction equipment and systems C. Strait	8C: Profile extrusion analyzed and die shape designed by Galerkin's method with streamline adapted basis functions T. Yokoi and L.E. Scriven	9C: Effects of shear flow on blend miscibility by fluorescence quenching S. Mani, M.F. Malone, and H.H. Winter
10:30	7D: Continuous production of polyurethanes on a twin screw extruder reactor F. Brauer	8D: Die design using lumped parameters J. Perdkoulias, C. Tzoganakis, J. Vlachopoulos, and J. Vlcek <i>cancelled</i>	9D: Rheology and dynamic of phase separation in PS/PVME blends: model and experiments A. Ajji, L. Choplin, and R.E. Prud'homme
10:50	7E: Reactive extrusion chemistry on some Nylon 6 blends M.K. Akkapeddi, B. VanBuskirk, and J. Gervasi	8E: Non-isothermal effects in strand dies D.J. Coyle, C. Miaw, G.S. Balch, and E.K. Prunier	9E: Rheology and processing of oil resistant thermoplastic elastomers L.A. Goettler, K.E. Kear, and Y.L. Wang
11:10	7F: On the mechanism of con- trolled degradation of polypro- pylene by reactive extrusion M. Xanthos, C.G. Gogos, and S.H. Ryu		9F: The micromechanics of the shape evolution of polymeric fibers imbedded in a polymeric matrix A. Cohen, and C.J. Carriere
11:30	7G: Conversion of starch substrates to glycosides by reactive extrusion processing M.E. Carr		9G: Flow in latex inter- penetrating polymer networks M. Silverstein and M. Narkis
11:50	7H: Preliminary studies on micromixing of viscous polymer melts in helical- annular flow F. Busby, Jr., C.D. Denson, and R.M. Secor		<i>Processability of blends containing LCP's: Spiral Flow Molding G. Kiss</i>
12:15	- Lunch & Posters -		
1:40			

- THURSDAY, AFTERNOON SESSIONS -

	Thompson 102	Thompson 104	Thompson 106
	Session 10 MULTILAYER FLOWS & COEXTRUSION Chair: S.L. Parekh	Session 11 EXTRUDER DESIGN Chairs: L.R. Schmidt W.M. Davis	Session 12 INJECTION AND BLOW MOLDING Chairs: J. Greener K.K. Wang
1:40	10A: Controlling layer thickness in co-extrusion W.B. Virginski	11A: Some practical considerations in extrusion processes C. Miaw	12A: Experimental studies of the warpage of polyethylene in rotational molding C.H. Chen, Y. Ohta, and J.L. White
2:00	10B: The effects of extrusion profile on the barrier performance of ethylene vinyl alcohol copolymers E.B. Schaper	11B: Extend the life and lower the cost of hardsurfaced extruder components in corrosive environments F.B. Serafini	12B: Further results concerning post-filling simulation in injection molding C.A. Hieber and K.K. Wang
2:20	10C: Incorporating the energy balances in the analysis of the feed section of a single screw extruder M.A. Spalding, S.R. Jenkins, J.A. Naumovitz, and K.S. Hyun	11C: Thrust bearings - an important factor in extruder performance T.P. Harrington	12C: Thermoplastic injection molded single mode fiber-optic connectors with sub-micron concentricity P. Briggs and G. Kiss
2:40	10D: Numerical modelling of nonisothermal multilayer polymer flows M.E. Nordberg III and H.H. Winter	11D: Science and the art of screw design C.I. Chung	12D: Prediction of polymer crystallization in a disk during the filling and cooling stages of injection molding C. Dufosse, L. Lalart, A. Tournaire, J.M. Haudin, and B. Monasse
3:00	10E: The influence of fluid viscosity ratios on interface profiles in multilayer coextrusion W.H. Talbott and J.A. Henz	11E: Simulation and experimental studies of mixing in corotating twin-screw extruders D.M. Kalyon, A. Gotsis, U. Yilmazer, and Z. Ji	
3:20	10F: Multilayer thermoplastics advance composites by coextrusion L.J. Bonis	11F: Design considerations for twin screw extruders performing continuous polymer reactions M.H. Mack	
3:40		11G: Elastomer finishing extruders R.C. Yeh	
4:00		11H: Flow and mixing in pin barrel and list cokneader screw processing machines R. Brzoskowski, T. Kumazawa, and J.L. White	

- POSTER SESSION -
(To be held during lunch break each day)

- P1 **"Application of entry flow analysis to the estimation of the elongational viscosity of LLDPE/LDPE blends"**
B. Tremblay
- P2 **"Relationship between molecular orientation and mechanical properties of thermotropic polyester blends"**
K. Sato and S. Suzuki
- P3 **"Examination of entrance effects in capillary rheometer characterization of LCP melt"**
P.D. Frayer and P.J. Huspeni
- P4 **"Prediction of weldline strength in filled thermoplastics"**
M. Rahmani and B. Fisa
- P5 **"Quantitative evaluation of internal mold release agents for polyurea RIM by the measurement of the release forces"**
W.R. Willkomm, R.M. Jennings, and C.W. Macosko
- P6 **"Observation of carbon black agglomerate dispersion in simple shear flow"**
S.P Rwei, S.W. Horwatt, D.L. Feke, and I. Manas-Zloczower
- P7 **"Penetration of liquids into carbon black agglomerates"**
S.W. Horwatt, S.P Rwei, D.L. Feke, and I. Manas-Zloczower
- P8 **"Maleation of Polypropylene during Extrusion"**
Y. Trolez, C.W. Macosko, and A. Bouilloux
- P9 **(Title to be announced)**
P. Soskey