

PPS - 13

Extended Abstracts
and
Final Program

Thirteenth International Meeting
Meadowlands Hilton Hotel
Secaucus, N.J. USA

June 10 - 13, 1997

The Polymer Processing Society

Organized by
Polymer Processing Institute

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2. Reactive Extrusion
3. Mixing & Structure Development
4. Injection Molding
5. Composites & Highly Filled Systems
6. Alloys & Blends
7. Fibers and Films
8. Rheology & Rheometry
9. Modeling
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On behalf of the Conference Committee, we are extending a warm welcome to all the participants and attendees of the Thirteenth International Annual Meeting of the Polymer Processing Society, PPS-13. We are looking forward to the technical presentations, getting to meet again with old colleagues and meeting new ones. We also want to take this opportunity to thank our plenary lecturer, the keynote speakers, and the paper poster presenters who are at the heart of PPS-13.

We also want to express our gratitude to our PPI colleagues who brought this conference to fruition.



Joseph A. Biesenberger



Costas G. Gogos

Conference Co-Chairmen, PPS-13

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TECHNICAL PROGRAM

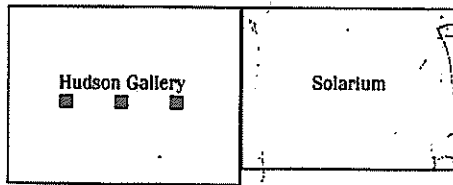
A list of symposia and symposia organizers is summarized below:

1. **Single & Twin Screw Extrusion**
Dr. K.S. Hyun - Midland, Michigan, USA
Prof. H-G Fritz - Stuttgart, Germany
Dr. T.H. Kwack - Taejon, Korea
2. **Reactive Extrusion**
Prof. W. Baker - Ontario, Canada
Dr. G-H Hu - Strasbourg, France
3. **Mixing & Structure Development**
Prof. T. Osswald - Madison, Wisconsin, USA
Dr. T. Sakai - Tokyo, Japan
4. **Injection Molding**
Prof. M.R. Kamal - Montreal, Quebec, Canada
Prof. H. Yokoi - Tokyo, Japan
5. **Composites & Highly Filled Systems**
Prof. D. Kalyon - Hoboken, New Jersey, USA
Prof. U. Yilmazer - Ankara, Turkey
Prof. S.C. Kim - Taejon, Korea
6. **Alloys & Blends**
Prof. B.D. Favis - Montreal, Quebec, Canada
Prof. L. Mascia - Loughborough, UK
Prof. X. Xu - Chengdu, China
7. **Fibers & Films**
Mr. T.I. Butler - Freeport, Texas, USA
Prof. T. Kikutani - Tokyo, Japan
8. **Rheology & Rheometry**
Prof. P.J. Carreau - Montreal, Quebec, Canada
Prof. A.D. Gotsis - Delft, Netherlands
Prof. S.J. Lee - Seoul, Korea
9. **Modeling**
Prof. J. Vlachopoulos - Ontario, Canada
Prof. J-F Agassant - Valbonne, France
Dr. T. Matsuoka - Aichi-gun, Japan
10. **Polyester Products & Processing**
Dr. D. Callander - Akron, Ohio, USA
Prof. T. Masuda - Kyoto, Japan
11. **On-Line Sensing**
Dr. C-K Shih - Wilmington, Delaware, USA
Dr. M. Stephan - Dresden, Germany
Prof. X. Geng - Beijing, China
12. **Industry-Institute-Academia Bridges**
Dr. S. Wythe - Pickens, South Carolina, USA
Prof. S. Bush - Manchester, UK
Dr. E. Kosior - Melbourne, Australia
13. **Symposium**
Honoring Zehev Tadmor's 60th Birthday
Prof. I. Manas-Zloczower - Cleveland, OH, USA
Prof. I. Talmon - Haifa, Israel

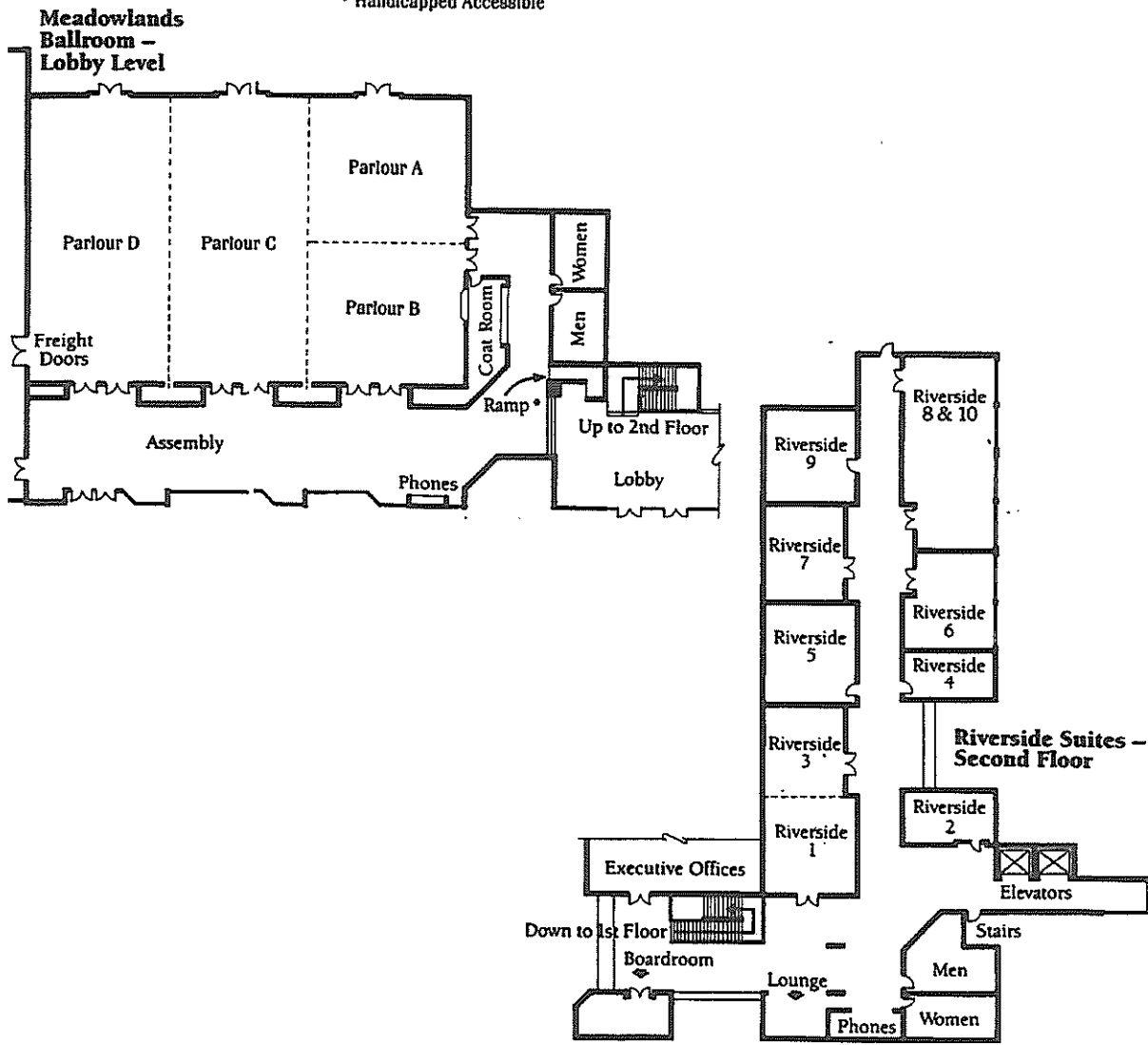
CONFERENCE AT A GLANCE

TUESDAY			
0800	Registration - Riverside 1		
1030	Opening Ceremony - Parlours A & B		
1100	Plenary Lecture, Zehev Tadmor - Parlours A & B		
1400	Riverside 5 Honoring Tadmor's 60th 13. A - E	Riverside 9/10 Parlour A Mixing and Structure Dev. 3. A - E	Parlour B Alloys and Blends 6. A - E
1605			Riverside 6 Polyesters 10. A - E
WINE & CHEESE RECEPTION (SOLARIUM)			
WEDNESDAY			
0830	Honoring Tadmor's 60th 13. F - I	Mixing and Structure Dev. 3. F - I	Alloys and Blends 6. F - I
1010	Industry/Inst/Academia Bridges 12. A-B	Mixing and Structure Dev. 3. J - M	Fibers and Films 7. A - D
1035		COFFEE BREAK	
1215	Industry/Inst/Academia Bridges 12. A-B	Mixing and Structure Dev. 3. J - M	Fibers and Films 7. E - GG
1400	Industry/Inst/Academia Bridges 12. Panel Disc.	Mixing and Structure Dev. 3. N - R	Fibers and Films 7. H - L
1605		LUNCH	
WINE & CHEESE RECEPTION (SOLARIUM)			
POSTER SESSION			
THURSDAY			
0830	Rheology and Rheometry 8. A - D	Single and Twin Screw Extrusion 3. S - V	Modeling 9. A - D
1010	Rheology and Rheometry 8. E - H	Injection Molding 4. A - D	Reactive Extrusion 2. AA, G, C
1035		COFFEE BREAK	
1215	On-Line Sensing 11. AA - D	Reactive Extrusion 2. D, E, I, B	Composite and Highly Filled 5. A - D
1400		LUNCH	
1800		Injection Molding 4. E - I	Composite and Highly Filled 5. EE - H
BANQUET CRUISE - "SPIRIT OF THE HUDSON"			
FRIDAY			
0830	On-Line Sensing 11. E - H	Injection Molding 4. J - M	Rheology and Rheometry 8. I - L
1010		COFFEE BREAK	
1035	On-Line Sensing 11. I - L	Injection Molding 4. N - O	Modeling 9. N - Q
		Rheology and Rheometry 8. M - P	Composite and Highly Filled 5. I - L
		Injection Molding 4. N - O	Modeling 9. R - U
		Rheology and Rheometry 8. M - P	Composite and Highly Filled 5. M - P

Map of Conference Rooms



* Handicapped Accessible



	Riverside 5	Riverside 8/10	Time
	13. Zehev Tadmor's 60 th	1. Single and Twin Screw Extrusion	
	Chair: I. Manas-Zloczower	Chair: K.S. Hyun	
Tuesday Afternoon June 10	13-A From Tadmor's Thesis to Reactive Extrusion in Three Decades J.A. Biesenberger (Polymer Processing Inst.) USA	1-AA* Analysis and Computations for Solid Conveying, Melting and Flow in Modular Co-Rotating Twin Screw Extruder, Comparison with Experiment S. Bawiskar, J.L. White (Univer. of Akron, Ohio) USA	14:00
	13-B The Roll-Casting of Block Copolymers: Polymer Processing on a Nano-Scale R.J. Albalak, E.L. Thomas (Massachusetts Inst. of Technology) USA	KEYNOTE CONTINUED	14:25
	13-C Modeling Mixing in Twin-Screw Extruders E.L. Canedo (Polymer Processing Inst.) USA	1-B Evolution of Melting of Solid Polymer Particulates in Co-TSE Kneading Blocks M. Essegheir, C.G. Gogos, D.W. Yu, D.B. Todd (Polymer Processing Inst.) USA	14:50
	13-D Aggressive Ultrasonics for Polymer Melt and Rubber Processing A. Tukachinsky (Norton Performance Plastics Corp.) USA	1-C The Nature of Intermesh Flow in ZSK Extruders J. Curry, A. Kiani (Werner & Pfleiderer) USA	15:15
	13-E Influence of Matrix Viscosity and Interfacial Properties on Particle Clusters' Dispersibility H. Yamada, D.L. Feke, I. Manas-Zloczower (Case Western Reserve Univ.) USA	1-D Flow & Mixing in an Intermeshing Co-Rotating Twin Screw Extruder S.A. Jaffer, V.L. Bravo, A.N. Hrymak, J.D. Wright, P.E. Wood (McMaster Univ.) CANADA	15:40

*Double Letter denotes Keynote Address

Parlour A	Parlour B	Riverside 6
3. Mixing & Structure Dev. Chair: P.D. Andersen	6. Alloys & Blends Chair: B.D. Favis	10. Polyester Products and Processing Chair: D. Callander
3-A Recent Advances in Understanding Phase Inversion During Compounding of Immiscible Polymer Blends C.E.Scott (Massachusetts Inst. of Technology) USA	6-A Rheological and Morphological Properties of PS/PMMA Blends with Co Continuous Structure C.Weis, C.Friedrich, K.Borkenstein, D.Maier (Univer. Freiburg) GERMANY	10-A Relationship between the Surface and Bulk Morphology for an Immiscible PP/PET Blend after Melt Processing. G.Verfaillie, R.Legras (UCL-laboratoire des Hauts Polymeres) BELGIUM
3-B Cellular Automata Simulation of Droplet Breakup and Coalescence in Polymer Blending A.Suwa, C.E.Scott (Massachusetts Inst. of Technology) USA	6-B Nonisothermal Crystallization Behavior of SPS/APS Blends J.Y.Park, H-S Lee, O.O.Park (KAIST) KOREA	10-B Rheological Characterization of Glass Fiber Filled Poly(butylene terephthalate) Resin C.S.Park, K.J.Lee, D-H Kim, H.J.Park (Seoul National Univer.) KOREA
3-C Morphology Development in Immiscible Polymer Blends: Initial Blend Morphology and Phase Dimensions R.C.Willemse, E.J.J.Ramaker, A.Posthuma de Boer (Delft University of Technology) NETHERLANDS	6-C Oxygen Permeability of Polyolefin/EVOH Blends S.C.Kim, S.Y.Lee (KAIST) KOREA	10-C Processing of PET and PC with small amounts of Foreign Polymers in Single and Twin-Screw Extruders A.K.Bledzki, C.Barth (Institut fur Werkstofftechnik) GERMANY
3-D Development of Morphology in Blends of Immiscible Polymers P.H.M.Elemans, J.M.van Wunnik, R.A.van Dam (DSM Research) NETHERLANDS	6-D Mechanical Properties of "Natural" Polymer Alloys: PC/ABS Systems R.Greco (National Research Council) ITALY	10-D Effect of Deformation Processes on PET Orientation and its Relaxation A.Ajji, R.Pearce, K.C.Cole, M.M.Dumoulin (National Research Council) CANADA
3-E Morphological Characterization with Markov Random Fields at the Example of PMMA/PS D.Maier, K.Borkenstein, J.Honerkamp, C.Weis, C.Friedrich (Univ. Freiburg) GERMANY	6-E LDPE/Vinyl Copolymers IPN: Influence of Copolymer Composition and Copolymer Crosslinker Content on Optical Properties R.Greco, M.Iavarone, E.Borsig, A.Fielderova (National Research Council) ITALY & SLOVAKIA	10-E Two Color Laser System to Follow Rapid Changes in the Birefringence during Heat Setting of PEN and PEN/PEI Blends J.M.Galay, M.Cakmak (The Univer. of Akron) USA

	Riverside 5	Riverside 8/10	Time
	13. Zehev Tadmor's 60 th	1. Single and Twin Screw Extrusion	
	Chair: I.Manas-Zloczower	Chair: H.G.Fritz	
Wednesday Morning June 11	13-F Uniaxial Extension of Polymer Multilayers L.Levitt, T. Saito, C.W.Macosko, (Univer. of Minnesota) USA	1-E Torque and heat flux in the metering zone of a co-rotating twin screw extruder C.S.Tenge, D. Mewes (Univ. of Hannover) GERMANY	08:30
	13-G Multiple Percolation in Polymer Blends M.Koslowski (POLYMAK) POLAND	1-F Twin Screw Extrusion and Die Flow of Filled Elastomer S.Railkar, A.Lawal, D.M.Kalyon (Stevens Inst. of Technology)USA	08:55
	13-H Flow Analysis Network modeling in Polymer Processing - From Journal Bearings to Twin Screw Extruders, An Overview B.David (Bayer Polymers)USA	1-G Statistical Analysis of Residence Time Distribution and Significance of Operating Parameters Y.Xie, J.Cheng, D.Tomayko, D.I.Bigio (Univ. of Maryland) G.Batch (3M) USA	09:20
	13-I Elementary Steps and "Structuring" of Polymers - Then and Now. C.G.Gogos (Polymer Processing Inst.) USA	1-H Devolatilizing Performance of a Square Channel Flighted Element in an Intermeshing Co-rotating Twin Screw Extruder N.H.Wang (Japan Steel Works) JAPAN	09:45
	COFFEE BREAK		10:10
	12. Industry-Institute-Academia	1. Single and Twin Screw Extrusion	
	Chair: S.F.Bush	Chair: H.G.Fritz	
		1-I Scale-up Theory for Twin-Screw Extruder, keeping the Resin Temperature Unchanged M.Nakatani (Mitsubishi Chemical) JAPAN	10:35
			11:00
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	12-A Developing New Polymer Products and Processes with Small Companies: The NEPPCO Enterprise S.F.Bush (UMIST Polymer Engineering Division) UK	1-J Viscoseal Rotating Shaft Seals for Polymer Processing Equipment D.E.Carter USA	11:25
	12-B Multi-Client Project on Visual Analyses of Injection Molding Phenomena H.Yokoi, Y.Murata, N.Masuda (Tokyo Univ.) JAPAN	1-K Experimental Studies and Modelling of a Buss Kneader M.Y.Lyu, J.L.White (Univer. of Akron) USA	11:50

Parlour A	Parlour B	Riverside 6
3. Mixing & Structure Dev.	6. Alloys & Blends	7. Fibers & Films
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3-F Melting and Phase Inversion during Extrusion Compounding of Polymer Blends C.K.Shih (DuPont) USA	6-F Polymer Blending with The Addition of Supercritical Carbon Dioxide M.D.Elkovitch, L.J.Lee, D.L.Tomasko (The Ohio State Univer.) USA	7-A Orientation of Polymers in Die Drawing with Superimposed Transverse Shear Deformations L.Mascia, S.M.Mannell (Loughborough Univer.) UK
3-G A Morphological Study on Dissipative Melt Mixing of Binary Immiscible Compatibilized and Uncompatibilized Blends S.H.Kim, C.G.Gogos (Stevens Inst. of Technology) USA	6-G Modeling Reactive Blending: An Experimental Approach G-H Hu, I.Kadri (Univ. Strasbourg) FRANCE	7-B Properties and Structure of Solid State Formed Polypropylene N.Légros, A.Ajji, M.M.Dumoulin (National Research Council) CANADA
3-H Determining the Rate of Mixing of Polymer Blends in the TSMEE K.A.Klinger, M.D.Wolkowicz, A.A.Adewole (Montell) USA	6-H Use of Microencapsulated Dye Sensors for Determining Shear Stresses in Polymer Blends during Compounding D.C.Clark, W.E.Baker (Queen's Univer.) CANADA	7-C Rheological Characterization of In-Situ Fibrillation during Saponification of Polyvinylpivalate W.S.Lyoo, W.S.Ha, B.C.Kim (KAIST) KOREA
3-I Different Flow (RTD) of Separate Radionuclide Labelled Blend Components during Reactive Melt Mixing on a TSE ZSK 40 R.Pallas, H.Batz, O.Franzheim, M.Stephan, A.Zeuner (Technical University Dresden) GERMANY	6-I A Study of Polyolefin Blends: Application to Recycling I.Henaut, J.F.Agassant, J.M.Haudin, B. Vergnew (Ecole des Mines de Paris) FRANCE	7-D Image Analysis of Polypropylene Melt Fibre Stretching M.T.Martyn, P.D.Coates (Univ. of Bradford) UK
COFFEE BREAK		
3. Mixing & Structure Dev.	6. Alloys & Blends	7. Fibers & Films
Chair: C.E.Scott	Chair: M.Eseghir	Chair: T.Butler
3-J Flow Induced Reactive Self-Assembly C.A.Orr, C.W.Macosko, F.S.Bates (University of Minnesota) USA	6-J Crystallization Induced Composition Inhomogeneities in Binary Polymer Blends: Origin, Detection and Consequences B.J.Jungnickel (Deutsches Kunststoff-Institut) GERMANY	7-E Comparative Study of Structure Development in Melt Spinning of Polyolefin Fibers: Polyethylene, Polypropylene, Polybutylene and Polymethyl Pentene-1 C-H Choi, J.L.White (Univer. of Akron) USA
3-K Drop Breakup Mechanisms in a Two-Zone Cavity: The High Shear Region C.Marks, D.Bigio, R.Calabrese (University of Maryland) USA	6-K Infra-Red Estimation of Interactions between Base Resin and Saturated Crystalline Additives in the Formation of Low Pressure Thermoset Moulding Blends S.F.Bush, M.Esfandeh, J.M.Methven (UMIST) UK	7-F Ultra High-Speed Spinning of Sheath-Core Type Bicomponent Fibers of a Liquid Crystalline Copolyester: Poly(ethylene terephthalate-co-hydroxybenzoic acid) (PET/60PHB) and Poly(ethylene terephthalate) J.Radhakrishnan, H.Ito, T.Kikutani, N.Okui (Tokyo Inst. of Technology) JAPAN
3-L Analysis of CFC-Free Integral-Skin Foaming W.Michaeli, H.Ehbing (Institut fuer Kunststoffverarbeitung) GERMANY	6-L Co-continuous Morphologies in Polystyrene / Poly(ether-ester) Blends H.Veenstra, A.Posthuma de Boer (Delft Univer. of Technology) NETHERLANDS	7-GG Numerical and Experimental Study of the Film Blowing Process J.M.Andre, Y.Demay, J.M.Haudin, B.Monasse, P.Lafeur, J.F.Agassant (Ecole des Mines de Paris) FRANCE
3-M Analysis of Degree of Mixing in Filled Polymers by Wide-Angle X-Ray Diffraction R.Yazici, D.M.Kalyon (Stevens Inst. of Technology) USA	6-M The Role of Block Copolymers as Compatibilizers in Rubber Toughening of Plastics: Influence of Molecular Weight, Architecture and Chemical Composition J.A.Sousa, L.A.Ometto (Univ.Federal de Sao Carlos) BRAZIL	KEYNOTE CONTINUED

	Riverside 5	Riverside 8/10	Time
	12. Industry-Institute-Academia	1. Single and Twin Screw Extrusion	
	Chair: S.Wythe	Chair: D.E.Carter	
Wednesday Afternoon June 11	12-X Roundtable Discussion on Industry-Institute-Academia Bridges J.A.Biesenberger, S.F.Bush, E.Kosior, P.N.Plimmer, D.Sebastian, S.L.Wythe, H.Yokoi AUSTRALIA, JAPAN, UK, USA	1-LL Grooved Feed Extruders with Barrier Screws for Non-polyolefines J.Wortberg, R. Michels (Univer. of Essen) GERMANY	14:00
	ROUND	KEYNOTE CONTINUED	14:25
	TABLE	1-M An Experimental Investigation of Solids Conveying in Single Screw Plasticating Extruders M.A..Spalding, K.S.Hyun (Dow) USA	14:50
	DISCUSSION	1-N Top Down Melting Mechanisms in Single Screw Extrusion B.K.Lee, C.G.Gogos, D.H.Sebastian, M.A.Avgousti (Stevens Inst. of Technology) USA	15:15
	CONTINUED	1-O Correlations between the Pressure Profile and the Mass Throughput in the Melting section H.Potente, J.Jungemann (Univer. of Paderborn) GERMANY	15:40

Parlour A	Parlour B	Riverside 6
3. Mixing & Structure Dev.	6. Alloys & Blends	7. Fibers & Films
Chair: T. Osswald	Chair: M.O'Shea	Chair: T. Kikutani
3-N Development of a Computational Model to predict Blend Morphology in a Twin Screw Extruder D.Y.Moon, O.O.Park (Cheil Industries) KOREA	6-NN Interface Modification and Polymer Drop Deformation L.Levitt, C.W.Macosko (Univer. of Minnesota) USA	7-H Tensile Force Measurements in the PA6 High Speed Fiber Spinning and their Utility R.Beyreuther, H.Brunig, H.Hofmann (Inst. of Polymer Research Dresden) GERMANY
3-O The Continuous Mixing of a Low Viscosity Additive into a Viscous Mass Using a Cavity Transfer Mixer H.Benkreira (Univ. of Bradford) UK	KEYNOTE CONTINUED	7-I Rheological Design of Spiral Mandrel Dies D.Schlaefli (Nokia-Maillefer SA) SWITZERLAND
3-P Laminar Mixing in Kenics Static Mixer S.A.Jaffer, P.E.Wood (McMaster University) CANADA	6-O Compatibilization of PVDF/Nylon 6 Blends by Radiation Assisted Acid Functionalization and Metal Complexation L.Mascia, K.Hashim (Loughborough Univer.) UK	7-J Heat Transfer in Two-Layer Film Blowing J.Stasiak (METALCHEM) POLAND
3-Q A Study on the Structure Development of PS/TiO₂ during Pan-Milling Q.Wang, X.Xu (Chengdu Univ.) CHINA	6-P Morphology-Interface-Property Relationships in Compatibilized Polystyrene/Ethylene-Propylene Rubber Blends P.Cigana, B.D.Favis, C.Albert, T.Vu-Khanh (Ecole Polytechnique de Montreal) CANADA	7-K Experimental and Numerical Study of the Cast-film Process D.Silagay, Y.Demay, F.Chambon, J.F.Agassant (Ecole des Mines de Paris) FRANCE
3-R Effect of Pigmentation on the Microstructure and Properties of Rotationally Moulded Polyethylene M.C.Cramez, M.J.Oliveira, R.J.Crawford (University of Minho) PORTUGAL	6-Q New Approaches for Improving the Properties of Polyolefins X.Xu (Chengdu Univ.) CHINA	7-L A Modified Production Process for Partly Crosslinked Expanded PP Films and Sheets H.G.Fritz, U.Bolz (IKT, University Stuttgart) GERMANY

	Parlour B	Riverside 8/10	Time	
Thursday Morning June 12	9. Modeling Chair: J.F.Agassant	1. Single and Twin Screw Extrusion Chair: M.A.Spalding		
	9-A Use of a Kinetic Model of Processing Induced Structure Formation for Die Optimization T-C Tsai, K.A.High, M.S.High, D.A.Tree (Oklahoma State Univer.) USA	1-P Optimization of Single-screw Extruders with Statistical Methods H.Potente, M.Zellerohr (Univer. of Paderborn) GERMANY	08:30	
	9-B Improving the prediction accuracy of a two stage statistical process model by introducing process specific characteristics. H.Potente, T.Huchtemeier (University of Paderborn) GERMANY	1-Q Interaction of Polymer Rheology and Extruder Model on Extruder Polymer Temperature Rise Predictions G.A.Campbell, H.Y.Cheng, C.C.Wang (Clarkson Univer.) USA	08:55	
	9-C Dynamic Simulation of Particulate Motion in Injection Mold Filling. T. Matsuoka, S. Yamanmoto, Y. Inoue, T. Higashi (Toyota) JAPAN	1-R Investigation of Shear Heating for Barrel Rotation and Screw Rotation in Extrusion C.C.Wang, H.Y.Cheng, E.Leipold, G.A.Campbell (Clarkson Univer.) USA	09:20	
	9-D Numerical Analysis of Fiber-Die Wall Interaction and 3-D Fiber Orientation Distribution K.Kato, Y.Zhang, N.Otake (Tokyo Inst. of Technology) JAPAN	1-S Factors Affecting the Performance of Calibrators for the Extrusion of Plastics Profiles O.S.Cameiro, J.C.F.Teixeira, J.A.Covas, S.F.Teixeira, A.G.Cunha (Universidade Do Minho) PORTUGAL	09:45	
	COFFEE BREAK			10:10
	9. Modeling Chair: J.F.Agassant	5. Composites & Highly Filled Systems Chair: S.C.Kim		
	9-E Study of Chaotic Mixing for the "Chaos Screw" in the Single-Screw Extrusion Process via Numerical Mapping Methods. E.H.Kim, S.J.Kim (Andong National Univ.) KOREA	5-A Viscoelastic Behavior of Filled Polymers B.K. Aral, D.M.Kalyon (Stevens Inst. of Technology) USA	10:35	
	9-F Quantification of Mixing in Numerical Simulations P.G.M.Kruijt, G.W.M.Peters, H..H.Meijer (Eindhoven University of Technology) NETHERLANDS	5-B Shear-induced Particle Migration in Concentrated Suspensions of Noncolloidal Particles M.Allende, D.M.Kalyon (Stevens Inst. of Technology) USA	11:00	
	9-G Modeling of the Drying of Multicomponent Polymer Films S.Alsoy, J.L.Duda (Pennsylvania State Univer.) USA	5-C The Effect of Interfacial Reactions between Two Phases on Mechanical Properties in Heterocoagulated Particles H-J.Ha, Y-J.Park, J-H.An, J-H.Kim (Yonsei Univer.) KOREA	11:25	
9-H Crystallization Kinetics of Selected Polymer Melts Under Isothermal, Non-Isothermal and Isobaric Conditions M.Samara, M.R.Kamal (McGill Univer.) CANADA	5-D Effect of Fiber Orientation on the Rheological Properties of Short-Fiber Reinforced Plastics J.K.Kim, J.H.Song (Pohang Univ.) KOREA	11:50		

* Room Riverside 6

Parlour A	Riverside 6	Riverside 5
3. Mixing & Structure Dev.	2. Reactive Extrusion	8. Rheology & Rheometry
Chair: T.Osswald	Chair: W.E.Baker	Chair: P.Carreau
3-S Tools to Analyze Mixing from 3D Computations Using Spectral Elements H.E.H.Meijer, P.D.Anderson, P.G.M.Kruijt (Eindhoven Univer.) NETHERLANDS	2-AA Functionalization of Polyolefins and In-situ Compatibilization of Immiscible Polymer Blends by Reactive Extrusion G.H.Hu (Univ. Strasbourg) FRANCE	8-A Elongational Behavior of Polyolefin Melts and its Relation to Processing Properties S.Kurzbeck, H.Munstedt, L.Egersdorfer, F.Oster (Univ. of Erlangen-Nuremberg) GERMANY
3-T A Microstructural Approach to Modeling Liquid-Liquid Mixing E.D.Wetzel, C.L.Tucker III (Univ. of Illinois) USA	KEYNOTE CONTINUED	8-B The Effect of Higher Molecular Weight Polymer Chain on the Nonlinear Response in Elongational Viscosity K.Koyama, T. Takahashi, Y.Naka, J.Takimoto (Yamagata Univer.) JAPAN
3-U Towards the Modeling of Macro-Void Formation in Diffusion Induced Phase Separation F.N.van de Vosse, M.Verschueren, H.E.H.Meijer (Eindhoven Univer.) NETHERLANDS	2-G Radical addition polymerization of acrylates in a Buss-Kneader E.J.Troelstra, L.L.v.Dierendonck, L.P.B.M.Janssen, S.Maeder, A.Renken (Univer. of Groningen) NETHERLANDS	8-C Elongational Flow Opto-Rheometry and its Application to Supercooled Crystalline Polymer Liquids M.Okamoto, H.Kubo, T.Kotaka (Toyota Technical Inst.) JAPAN
3-V Processing-Structure-Property Relationships for Microcellular Foamed PVC/Wood-Fiber Composites C.B.Park, L.M.Matuana, J.J.Balatinecz (Univ. of Toronto) CANADA	2-C Modeling of Polymer Melt Grafting Reactions in Twin Screw Extruders S.Hojabr, W.E.Baker, P.J.McLellan (Queen's Univer.) CANADA	8-D Extensional Flow of Engineering Plastics with Glass Fibers A.H.Wagner, D.M.Kalyon, R.Yazici, T.J.Fiske (Stevens Inst. of Technology) USA
COFFEE BREAK		
4. Injection Molding +	2. Reactive Extrusion *	8. Rheology & Rheometry
Chair: M.R.Kamal	Chair: W.E.Baker	Chair: P.Carreau
4-A Injection Moulding: Integrating the Use of Process Rheometry, Specific Pressure Integrals, Taguchi Analysis and Modelling P.D.Coates, A.J.Dawson, A.Key, N.Khoshooee, Z.Leman (Univer. of Bradford) UK	2-D Chain Extension of Carboxyl Terminated Oligomers using a Dioxazoline Coupling Agent Y.Chalamet, M.Taha (Institut National des Sciences Appliquees de Lyon) FRANCE	8-E Evaluation by Torque-Rheometer of Suspensions of Semirigid and Flexible Natural Fibers in a PVC Matrix M.Ayora, R.Rios, J.Quijano, A.Marquez (Centro de Investigacion Cientifica de Yucatan) MEXICO
4-B Visualization and Simulation of Three-Dimensional Polymer Flow in the Injection Moulding Process W.Michaeli, J.Zachert (IKV) GERMANY	2-E Reactive Compatibilization in Rubber Toughening of Polymer Blends of PS/RPS/SEBS-G-MAH J.A.Sousa, F.C.Bordin (Univ.Federal de Sao Carlos) BRAZIL	8-F Rheological Properties of Polystyrene filled with Hairy PMMA-particles M.Bruch, M.Holderle, C.Friedrich (Univer. of Freiburg) GERMANY
4-C Process Control for Ultra Precision Injection Molding E.Griesser, A.Sahagen (Sensotron) USA	2-I Reactive Processing of Maleic Anhydride Copolymer/Polyol Blends G.Bayram, H.Warh, S.Patel, M.Xanthos (Polymer Processing Inst.) USA	8-G Crystallization of Polyolefines From Rheological Measurements K.Boutahar, C.Carrot, J.Guillet (Univer. Jean Monnet) FRANCE
4-D Measurement of Screw Torque Distribution along Axial Direction H.Yokoi, W.K.Kim (Univ. of Tokyo) JAPAN	2-B Kinetics of Low Molecular Weight and Polymer-Bound Amine/Anhydride Moieties in Non-Polar Solutions and in the Melt D.Ferrari, W.E.Baker, (Queen's University) CANADA	8-H Fitted Approximation Models for the Fourth-Order Moment Tensor in Shear Flows of Rodlike Polymers in the Nematic Phase J.S.Cintra, Jr. (Univer. Federal de Sao Carlos) BRAZIL

- Room Parlour A
- + Room Riverside 8/10

	Parlour B	Riverside 6	Time
	9. Modeling	5. Composites & Highly Filled Systems	
	Chair: T.Matsuoka	Chair: S.C.Kim	
Thursday Afternoon June 12	9-I Experimental and Numerical Study of the Encapsulation Phenomenom in the Coextrusion Process J.Teixeira-Pires, B.Vergnes, Y.Demay, D.Lebouvier, J.F.Agassant (Elf-Atochem) FRANCE	5-EE Composites Based on Thermoplastics Reinforced with Liquid Crystalline Polymers D.G.Baird (Virginia Polytechnic Inst.) USA	14:00
	9-J Non Isothermal Modeling and Simulation of Mold Filling Processes for Large-Area Parts R.Krause, H-G Fritz (IKT, Stuttgart) GERMANY	KEYNOTE CONTINUED	14:25
	9-K Simulation of PVC Melt Flow in Extrusion Dies as a Design Support R.Mehling, H-GFritz (Univer. Stuttgart) GERMANY	5-F The Effect of the Transcrystalline Interphase on the Flexural Properties of Fiber-Reinforced Polypropylene Composites. D.M.Dean, R.A.Register, L.Rebenfeld (Princeton Univer.) USA	14:50
	9-L Finite Element Analysis of Solid Phase Processing of Polymers using a Molecular Based Constitutive Equation J.Sweeney, P.Caton-Rose, T.L.D.Collins, P.D. Coates, I.M.Ward (Univ. of Bradford) UK	5-G Influence of a Compatibilizer on the Properties of In-Situ Composites Based on Nylon 11 Reinforced with a Hydroquinone-Based Liquid Crystalline Polyester R.K.Krishnaswamy, S.E.BinWacddud, D.G.Baird (Virginia Polytechnic Inst.) USA	15:15
	9-M Qualitative Analysis of Polymer's Deformation Behavior in the Stretch Blow Molding Process by Visco-Plastic 3D FEM Simulation S.Wang, A.Makinouchi, T.Nakagawa (The Tokyo University) JAPAN	5-H-Resin Infusion Molding and Curing of Vinyl Ester Resins L.Li, L.J.Lee (The Ohio State Univer.) USA	15:40

Riverside 8/10	Parlour A	Riverside 5
4. Injection Molding	2. Reactive Extrusion	11. On-Line Sensing
Chair: P.D.Coates	Chair: G-H Hu	Chair: M.Stephan
4-E An Experimentally Validated Finite Element Model for Gas-Assisted Injection Moulding G.A.A.V.Haagh, F.N.van de Vosse, G.W.M.Peters, H.E.H.Meijer (Eindhoven University of Technology) NETHERLANDS	2-HH On the Stability in Reactive Extrusion Processes L.P.B.M.Janssen (Univer. of Groningen) NETHERLANDS	11-AA The Development of On-Line Techniques for the Monitoring and Handling of the Evolution of Microstructure and the Applications T.Sakai (The Japan Steel Works) JAPAN
4-F Predicting Fiber Orientation in Three-Dimensional Mold Features B.E.VerWeyst, C.L.Tucker III (Univer. of Illinois) USA	KEYNOTE CONTINUED	KEYNOTE CONTINUED
4-G Thermal Stresses in Injection Molded Plastics Y.Farhoudi, M.Kamal (McGill University) CANADA	2-J Direct melt-polymerization process from lactic acid to biodegradable poly(lactic acid) T.Sakai, N.Hashimoto, K.Koyanagi, Y.Sumihiro, T.Fukushima (Japan Steel Works) JAPAN	11-B On-Line and Off-Line Gas Solubility Measurements in Foamable Thermoplastics N.Faridi, S.K.Dey, M.Xanthos, Q.Zhang (Polymer Processing Inst.) USA
4-H Two-Dimensional Modeling of Crystallization in Injection Molding A.S.Vintimiglia, N.Billon, M. Vincent (Ecole des Mines de Paris) FRANCE	2-K Reactive Compatibilization of Mingled Waste Materials R.Hettema, L.P.B.M.Janssen (Univer. of Groningen) NETHERLANDS	11-C Visual Analysis of the Resin Flow in the Semiconductor Packaging T.Yamaguchi, H.Yokoi (APIC YAMADA Corporation) JAPAN
4-I Minimum Volume Runner Design for Multicavity Molds C.C.Lee, J.F.Stevenson (Gen Corp Technology Center)USA	2-L New Thermoplastic Carbohydrate Derivatives Prepared by Reactive Processing H.Warh, R.Muelhaupt, J.Schaetzle (Univ. Freiburg) GERMANY	11-D The Visual and Dynamic Study on the Melting Process of Non-intermeshing Counter-rotating Twin Screw Extruders X-Z Geng, F.Lui, P.Zhang (Beijing Univer.) CHINA

	Parlour B	Riverside 6	Time
	9. Modeling	5. Composites & Highly Filled Systems	
	Chair: J.Vlachopoulos	Chair: U.Yilmazer	
Friday Morning June 13	9-N Implementing Time Integral Constitutive Equations in General CFD Packages P.Olley, R.Spares, P.D.Coates (Univer. of Bradford) UK	5-I Development of Thermoplastic Composites Reinforced with a Thermotropic Liquid Crystalline Polymer for Use in Rapid Prototyping Applications R.W.Gray IV, D.G.Baird (Virginia Polytechnic Inst.) USA	08:30
	9-O Modeling Solids Conveying in Polymer Extruders J.A.Yamamuro, D.Penumadu, G.A. Campbell (Clarkson Univer.) USA	5-J Biodegradable Composites Based Upon Renewable Resources W.Aichholzer, H.G.Fritz (IKT) GERMANY	08:55
	9-P Three-dimensional Flow Analysis in Twin Screw Extruders K.Funatsu, L.J.Liu, M.Yoshinaga (Kyushu Univer.) JAPAN	5-K Microwave Assisted Polymer Processing (MAPP) J.M.Methven (UMIST) UK	09:20
	9-Q Numerical Analysis of the Wall-Ironing Process of Coated Sheet Metal M.A.H.van der Aa, P.J.G.Schreurs, F.P.T.Baaijens (Eindhoven Univer. of Technology) NETHERLANDS	5-L Thermoplastic Composites Reinforced with Melt Processable Glass R.T.Young, D.G.Baird (Virginia Polytechnic Inst.) USA	09:45
	COFFEE BREAK		10:10
	9. Modeling	5. Composites & Highly Filled Systems	
	Chair: J.Vlachopoulos	Chair: U.Yilmazer	
	9-R Predictions of some Internal Microstructure Model with different Mobility Tensors A.Ramazani, A.Ait-Kadi, M. Gmela (Laval University and CERSIM) CANADA	5-M Innovative Biodegradable Highly Starch Filled TPU T.Seidenstucker, H.G.Fritz (Institut fur Kunststofftechnologie (IKT) GERMANY	10:35
	9-S 3-D Analysis of Fully Flighted Screws of Co-Rotating Twin Screw Extruder A.Lawal, S. Raikar, D.M.Kalyon (Stevens Inst. of Technology) USA	5-N Effect of Electrochemical Oxidation of the Surface of a Carbon Fiber on the Interfacial Shear Strength on a PEEK Composite C.Martinez, C.Guerrero, (DIMAT-FIME-UANL) MEXICO	11:00
	9-T A Method for the Evaluation of 3D Viscoelastic Flows J.F.M.Schoonen, F.H.M.Swartjes, G.W.M.Peters, F.P.T.Baaijens, H.E.H.Meijer (Eindhoven Univ. of Technology) NETHERLANDS	5-O Shear Effect on the Devolatilization of Filled Polymers, J.Cheng, D.I.Bigio, R.M.Brifer (University of Maryland) USA	11:25
	9-U Determination of Periodic Structures in 3D Non-Newtonian Mixing Flows P.D.Anderson, A.S.Galaktionov, F.N.van de Vosse, H.E.H.Meijer (Eindhoven Univer.) NETHERLANDS	5-P Formability of Zeolitic Pastes for the Extrusion of Intricate Honeycomb Structures C.Trefzger, H.G.Fritz (IKT) GERMANY	11:50

Riverside 8/10	Riverside 5	Parfour A
4. Injection Molding	11. On-Line Sensing	8. Rheology & Rheometry
Chair: H.Yokoi	Chair: C.K.Shih	Chair: A.D.Gotsis
4-J Development of Structural Hierarchy in Injection Molded PVDF and Blends of PVDF with PMMA: Application of Microbeam Waxes and Sals Techniques Y.D.Wang, M.Cakmak (Univer. of Akron) USA	11-E Visualisation of Polymer Melt Convergent Flows in Extrusion C.Nakason, M.Kamala, M.Martyn, P.D.Coates (Univ. of Bradford) UK	8-I Viscoelasticity and Processability of a Thermoplastic Elastomer R.E.Kucukpinar, D.M.Kalyon (Stevens Inst. of Technology) USA
4-K Fabrication of Low Density Crosslinked Foams based on substantially Linear Homogeneous Polyolefin Elastomers by Direct Injection Molding M.Barger, D.Pawlowski, S.Karande, K.Walton (Dow) USA	11-F On-Line Process Monitoring on Polymer Melts by Mid-and Near-IR Spectroscopy on Extruders D.Fischer, T.Bayer, L.Jakisch, M.Stephan, K.J.Eichhorn (Technical Univer. of Dresden) GERMANY	8-J Linear and Non Linear Rheological Behavior of Polystyrene Fractions R.Smail, C.Carrot, J.Guillet (Laboratoire de Rheologie)FRANCE
4-L Strategies towards Transparent Polypropylene for Injection Moulding J.Rosch (BASF AG) GERMANY	11-G Light Scattering Photometer with Optical Microscope for In-Line Study of Polymer Blends Extrusion E.Hobbie, K.B.Migler, S.Li, C.C.Han, E.J.Amis (National Inst. Of Standards & Technology) USA	8-K Rheological Behavior for Polymer Melts and concentrated Solution V. A New method for Determination of Molecular Weight Between Entanglements (Me) and of Primary Molecular weight (Mn) from Shear Flow Curve. M-S Song, C.Zhang (Beijing Univer. of Chemical Technology) CHINA
4-M The Weld Line Morphology of Injection Molded Polymer Blends Y.G.Son, K.H.Char (Cheil Industries) KOREA	11-H An Adjustable Gap In-Line Rheometer D.M.Kalyon, H.Gokturk, P.Yaras (Stevens Inst. of Technology) USA	8-L Pressure effect on entrance flow J.H.Christensen, M.Couch (Technical Univer. of Denmark) DENMARK
COFFEE BREAK		
4. Injection Molding	11. On-Line Sensing	8. Rheology & Rheometry
Chair: M.Cakmak	Chair: C.K.Shih	Chair: A.D.Gotsis
4-N Viscoelastic effects in the Injection Molding Process L.R.Schmidt (LR Schmidt Associates) USA	11-I Fluorescence Based Measurement of Temperature Profiles during Polymer Processing K.B.Migler, A.J.Bur (National Inst. of Standards and Technology) USA	8-M Initiation and Propagation of Interfacial Instabilities Generated by Slip in a Core Annular Flow L.Celariet, C.Carrot, J.P.Puaux (Univer. Jean Monnet) FRANCE
4-O Influence of Types of Injection Molding Machine and Atmosphere in Barrel and Hopper on The Quality of Molded Parts N.Nishiwaki, S.Hori, T.Arai, D.F.Ge, K.Yamazaki (Tokyo Univ. of Agriculture & Technology) JAPAN	11-J Online UV and IR Spectroscopie for Residence Time Distribution in Extruders T.Nietsch, P.Cassagnau, A.Michel (CNRS/LMOPS) FRANCE	8-N To the improvement and development of viscoelastic constitutive models G.W.M.Peters, J.F.M.Schoonen, H.E.H.Meijer (Eindhoven Univer. of Technology) NETHERLANDS
4-P Experimental Study on Injection-Charged Compression Molding of Thermoplastics S.Y.Yang, Y.C.Chen (National Taiwan Univer.) ROC	11-L The Importance of Accurate Measurement of Pressure and Temperature in Extrusion Injection Molding and Blow Molding J.S.Herrmann (DYNISCO) USA	8-O The Development of Secondary Flows in Straight Channels Induced by the Second Normal Stress Difference: Experiments and Simulations J.Dooley, K.Hughes, B.Debbaut, T.Avalosse (Dow) USA & BELGIUM
4-Q Transcription Behavior of Fine Surface Structure by Rapid Heating Stamper in Injection Molding T.Yasuhara, K.Kato, N.Fujisawa, N.Otake (Tokyo inst. of Technology) JAPAN		8-P A New Approach to Determine Time-Temperature-Transformation (TTT) Diagram Q.Wang, P.Zhu, T.He, P.Xia, T.Chen, B-THuang, (Hebei Univer. of Technology) CHINA

POSTER SESSION

1-Z1 Melting Mechanism in Polymer Processing Equipment
M-ho Kim, C.G.Gogos, Z.Tadmor (Polymer Processing Institute)
USA

1-Z2 Application of Pressure and Pressure-Vacuum Viscoseals in a 30 CM. Diameter Front End Drive Single Screw Melt Pump
D.E.Carter USA

2-Z1 Miscibility Studies and Chemical Modification of Functionalized Low Molecular Weight Polyethylene for Use of Toughening Agents in Epoxy Resins
M.E.Frigione, D.Acierno, L.Mascia (Salerno University) ITALY

2-Z3 The Production and Properties of a new Starch Plastic
R.A.de Graaf, L.P.B.M.Janssen (Univer. of Groningen)
NETHERLANDS

3-Z1 Experimental Study on a Plastic Foaming for Cable Coating Processes
K.Inamori, T.Kobayashi, J.L.Salvacoïn, M.Ohshima, M.Tanigaki
(Kyoto University) JAPAN

3-Z2 The Foam Orientation of the Extruded Materials
S.Nagata, K.Koyama (Oji Paper Co., Ltd.) JAPAN

3-Z3 Evolution of Morphology in a Corotating Twin Screw Extruder
A.V.Machado, J.A.Covas, G.Caldeira, M.van Duin (University of Minho) PORTUGAL

3-Z4 Dynamic Model for Polymer Blending
H.B.Zhang, C.X.Zhou (Shanghai Jiao Tong University) CHINA

3-Z5 The Effect of Mixing Time, Viscosity Ratio and Elasticity Ratio on the Morphology and Rheological Behavior of PP/Poly(Ethylene co alpha olefin) Blends

P.Yaras, S.Srinivasan (D&S Plastics) USA

4-Z1 A New Dynamic Visualization Method by Rotary Runner Exchange System
H.Yokoi, Y.Kaneto (Univ. of Tokyo) JAPAN

4-Z2 Flow and Mechanical Property Simulation of Fiber-Reinforced Thermoplastic Blends
K.A.Narh, M.Xanthos (New Jersey Institute of Technology) USA

4-Z3 Dimensional Accuracy of an Injection Molded Epoxy Resin for Optical Applications
H.Sato, Y.Shuto, Y.Tamura, S.Tohno (Nippon Telegr & Telep Corp.) JAPAN

5-Z1 Application of the Taguchi Experimental Method for the Optimisation of Epoxy Resin Matrix Composites Production by Structural Reaction Injection Molding (S-RIM)
A.Hanif, A.F.Johnson (University of Leeds) UK

5-Z2 In-Situ Composite of Compatibilized Polyetherimide and Liquid Crystalline Polymer Blends
S.M.Hong, S.S.Hwang, Y.Seo, K.U.Kim (KIST) KOREA

6-Z1 Effect of Additives on Mixing Torque of PP Blends
M-F Zhu, Y.Zhang (China Textile Univer.) CHINA

6-Z2 Structure Development During Cure in Tetrafunctional Epoxy/Polysulfone Blends
T-S Yoon, B.S.Kim, D.S.Lee (Sung Kyun Kwan Univer.) KOREA

6-Z3 Compatibility Enhancement Toughening of Poly(Butylene Terephthalate)/Poly(Phenylene Oxide) Blends using a Reactive Compatibilizer
D-S Kim, D.S.Lee, J-H Kim (Sung Kyun Kwan Univer.) KOREA

6-Z4 Random Copolymers as Polymeric Compatibilizers
M.S.Lee, C.W.Macosko, T.P.Lodge (Univers. of Minnesota) USA

6-Z5 Polymer Blends Based on Polyolefin Elastomer and Polypropylene

M.C.G.Rocha, A.L.N. da Silva, F.M.B. Coutinho (Inst. Politécnico / UERJ) BRAZIL

7-Z3 Dyeable Fine Polypropylene Yarns

M-F.Zhu , Y-M Chen (China Textile University) CHINA

7-Z4 Low Oxygen Permeability Mica Filled Polyethylene Blown Films

Y.Li, M.Xanthos, N.Faridi (Polymer Processing Institute) USA

8-Z1 Chemorheology of Curing Thermosets
Z-Z Jiang, L-X Jiang (Chengdu Univer.) CHINA

8-Z2 Rheological Behavior and Processing Characteristics of Talc-Thermoplastic Compounds
K.J.Kim, J.L.White (Univer. of Akron) USA

9-Z1 Modeling of Slip Flow in Partially Filled Screw Channel
J.Cheng, Y.Xie, D.I.Biglo, R.M.Bruber (Univer. of Maryland) USA