

**176th Technical Meeting
of the Rubber Division,
American Chemical Society 2009**

**Pittsburgh, Pennsylvania, USA
13-15 October 2009**

Volume 1 of 4

ISBN: 978-1-61567-625-5

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2009) by the Rubber Division, ACS
All rights reserved.

Printed by Curran Associates, Inc. (2009)

For permission requests, please contact the Rubber Division, ACS
at the address below.

Rubber Division, ACS
PO Box 499
Akron, OH 44309-0499

Phone: (330) 972-7814
Fax: (330) 972-5574

rctassistant@rubberdivision.org

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2634
Email: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

Volume 1

FILLER REINFORCEMENT OF RUBBER - I

The Last 100 Years of Carbon Black Reinforcement in Rubber	1
<i>W. Wampler, L. Nikiel</i>	
The Last 100 Years of Fumed Silica in Rubber Reinforcement	19
<i>O. Taikun, R. Friehmelt, M. Scholz</i>	
High Performance Silica Tread with Next Generation Process Additives	46
<i>P. A. Danilowicz, B. M. Bezilla Jr.</i>	

NATURAL RUBBER AND NATURAL RUBBER-BASED PRODUCTS - I

Non-linear Viscoelasticity of (Unvulcanized) Natural Rubber, Derived Materials and Compounds	65
<i>J. L. Leblanc</i>	
Effect of Introducing Edgecuts into Strained Natural Rubber Samples	110
<i>C. Norton, G. Hamed</i>	
Hierarchic Multi-Scaled Structures in Natural Rubber	127
<i>S. Toki, B. S. Hsiao, S. Amnuaypornsi, J. Sakdapipanich</i>	
Application of Low Field 1H Double-Quantum NMR Experiments to the Study of Natural Rubber	141
<i>J. L. Valentín, J. Brasero, I. Mora-Barrantes, A. Marcos-Fernández, K. Saalwächter, L. González</i>	
Ecology the Driving Force for Extension of the Use of NR	159
<i>W. Parasiewicz</i>	

AUTOMOBILE ELASTOMERS AND ENGINEERED PRODUCTS – I

Review of Intellectual Property Law Applicable to the Rubber and Plastics Industry	163
<i>J. Ward, M. Dockins, W. Dusseau</i>	
On Fracture Modeling and Characterization of Elastomeric Materials and Composites for Design Applications	172
<i>M. R. Gurvich</i>	

MIXING AND PROCESSING –I

Lower Compounding Cost by Improved Mixing Efficiency	187
<i>F. J. Borzenski, W. Flaherty, R. Wagner</i>	
The Rubber Mirror: Reflections of the Rubber Division's First 100 Years	198
<i>H. J. Inman</i>	

NEW COMMERCIAL DEVELOPMENTS - I

Maintain Quality, Reduce Production Costs	230
<i>S. Pierno</i>	
Novel Fast Curing System for Butyl Rubber	277
<i>R. Joseph, S. Narayanan</i>	
A New EPDM to Meet Compounding and Processing Challenges	289
<i>D. Hofkens, G. van Zandvoort, S. Baird, M. van Boggelen, P. Knape, G. Choonoo, M. Koch, S. Bhattacharjee</i>	
Amorphous Metallocene EPDM for Superior Low Temperature Properties	312
<i>E. Jourdain, S. Jacob, G. Wouters, Y. Devorest, M. Joshi, M. Bednarik, M. F. Welker</i>	
Processing and Formulation Flexibilities of a New Metallocene EPDM Rubber	321
<i>W. Liang, T. Clayfield, S. Daniel, A. Paeglis, B. Walther, K. Walton, P. Voorheis</i>	

Addressing Rolling Resistance and Durability of Tires by using Sulfron 3001	337
<i>N. Huntink, R. Datta, P. Paping, M. van der Made, S. Parker</i>	
Ultra Low Viscosity Polymeric Additives	354
<i>D. Hofkens, P. Meijers, P. Meessen, G. van Zandvoort, G. Choonoo, M. Koch, S. Bhattacharjee</i>	

FILLER REINFORCEMENT OF RUBBER - II

Disclosed Percolation Phenomena and Mechanism in Strengthening of Elastomeric Polymer by Nano-Fillers	379
<i>L. Zhang, H. Yang, W. Wu, H. Zou</i>	
Flocculation, Reinforcement, and Glass Transition Effects in Silica-Filled Styrene-Butadiene Rubber	422
<i>C. G. Robertson, C. J. Lin, R. B. Bogoslovov, M. Rackaitis, P. Sadhukhan, J. D. Quinn, C. M. Roland</i>	
Comparison of Graphite and Graphene Precursors in HNBR	451
<i>R. W. Faulkner, K. J. Mumby</i>	
Tailoring the Polymeric Nano-Particles for Rubber Reinforcement	460
<i>C. J. Lin, X. Wang</i>	
Nanofillers for Elastomers	477
<i>M. Galimbertia, P. Riccioa, S. Giudiceb, A. Citteriob, T. Riccòc, S. Pandinic, G. Ramorino</i>	

NATURAL RUBBER AND NATURAL RUBBER-BASED PRODUCTS – II

Bioisoprenetm as the Foundation for Renewable/Sustainable Alternatives to Natural Rubber and Petroleum-based Synthetic Rubber	505
<i>F. J. Feher</i>	
Alternative Sources of Natural Rubber: The European Perspective	519
<i>Y. Poirier, J. B. van Beilen, H. Mooibroek</i>	
Natural Rubber from Domestic Crops: Interspecific Comparisons	526
<i>C. McMahan, W. Xie, R. Wong, K. Cornish, D. Wood, L. H. C. Mattoso, J. A. Malmonge, D. Shintani, M. Whalen</i>	
Biological Feedstock Development as Part of the Domestication and Commercialization of <i>Taraxacum Kok-saghyz</i>, a Potential Domestic Source of Natural Rubber and Inulin: Progress and Outlook	549
<i>M. D. Kleinhenz, F. C. Michel Jr., A. Chanon, D. T. Ehrensing, A. R. Miller, J. Streeter, R. H. Seiple, C. J. Ohlemacher, C. M. McMahan, D. Shintani, S. C. Myers, F. W. Ravlin</i>	
<i>Taraxacum kok-saghyz</i> (TKS) – A Domestic Source of Natural Rubber: Rubber Quality of Early Development Samples	558
<i>C. J. Ohlemacher, R. H. Seiple, M. D. Kleinhenz, F. C. Michel, F. W. Ravlin, D. Ehrensing</i>	

AUTOMOBILE ELASTOMERS AND ENGINEERED PRODUCTS – II

Improved Flex Properties for Peroxide Cured AEM Compounds	570
<i>E. McBride</i>	
Elastomeric Materials based on Hydrogenated Nitrile Rubber for Seals in Carbon Dioxide (R 744) High Pressure Service Improving the Resistance against Explosive Decompression	590
<i>H. Magg, A. Welle, M. Soddemann</i>	
Practical State of Cure Measurements by NMR	605
<i>R. J. Pazur, F. J. Walker</i>	
A New Family of Low Viscosity HNBR Polymers	625
<i>M. Jones, A. Anderson</i>	
Light-Induced Gold Iridescence (Sunburn) of EPDM Weatherseals	649
<i>R. Ohm, D. Patton</i>	
Improving the Heat Resistance of THERBAN® / HNBR	664
<i>V. Nasreddine, M. Soddemann, K. Kulbaba, M. Saewe</i>	

Volume 2

MIXING AND PROCESSING – II

Extruder Feeder Design for Quick Cleaning	678
<i>W. Kramer</i>	
Maintain Quality, Reduce Production Costs	685
<i>S. Pierno</i>	
Effect of Aging on the Permeability Properties of Bromobutyl Based Tire Innerliner Compounds	732
<i>B. Rodgers, S. Jacob, B. B. Sharma, H. Manjunath, S. Pal</i>	
High-Temperature Elastomer Seal Material Testing and Selection for Downhole Environments	754
<i>L. Guo, P. McElfresh</i>	
AFM Studies on Silica Dispersion in EPDM Rubber	763
<i>N. Natchimuthu</i>	
Ultrasonic Aided Extrusion of Carbon Black Filled SBR Compounds	786
<i>J. Choi, A. I. Isayev</i>	

NEW COMMERCIAL DEVELOPMENTS – II

Magnetic Clamping Systems for the Rubber Molding Industry	826
<i>D. L. Fischer</i>	
Performance Characteristics of New Rubber-to-Substrate Bonding Technology	832
<i>C. D. Schneider, T. S. Kohli</i>	
Development of Aqueous Bonding Agents: An Encompassing Approach to Provide Innovation for Tomorrow	868
<i>R. A. Cassell</i>	
Soft Thermoplastic Polyurethanes	882
<i>D. Meltzer</i>	
New High and Low Temperature Esters for Acrylic Elastomers	888
<i>S. O'Rourke</i>	
Polymer Process Aid with Recycled Content	905
<i>H. Chandra, C. R. Pillai</i>	
A Green Revolutionary Microwave Process to Produce Alkoxysilanes	908
<i>L. J. Willey</i>	

FILLER REINFORCEMENT OF RUBBER – III

Multiwall Carbon Nanotube Reinforcement of HNBR and FKM	922
<i>R. W. Faulkner, K. J. Mumby, A. Fisher, T. Jozokos, S. Zhou</i>	
Maleic Anhydride Grafting of Natural Rubber by Gama- Radiation and Its Use in Preparing Natural Rubber /Clay Nanocomposites	962
<i>V. Vijayalekshmi, K. E. George, C. Pavithran</i>	
MWNT in Natural Rubber for Improved Mechanical Properties, Air Impermeability & Conductivity	N/A
<i>R. Joseph, N. George</i>	
Chemically Modified Precipitated Silica: Eliminates Production Drawbacks and Enhances Fuel Efficiency, Safety and Environmental Performance	980
<i>T. A. Okel</i>	
Special Low Surface Silica As Filler in Fluoroelastomers	1013
<i>G. Schmaucks</i>	

NATURAL RUBBER AND NATURAL RUBBER-BASED PRODUCTS – III

NR/BR-based Tire Sidewall Compounds Ozone-stabilized with Alkylphenol-polysulfide Modified EPDM	1026
<i>H. Zhang, R. N. Datta, A. G. Talma, J. W. M. Noordermeer</i>	

Microdispersion of Silica in Tire Tread Compounds Based on Epoxidized Natural Rubber	1065
<i>A. V. Chapman, S. Cook, R. T. Davies, J. Patel, J. L. Clark</i>	
Naphthenic Extender Oils in NR Tire Tread Compounds	1116
<i>A. Neau, M. Rangstedt</i>	
Redesigning OTR Compounds With Anti-Reversion Chemistry for Reduced Heat-Build Up and Improved Performance	1150
<i>F. Ignatz-Hoove, B. To, E. Terrill</i>	

ELASTOMERIC MATERIALS: CHALLENGES IN PHARMACEUTICAL/BIOMEDICAL APPLICATIONS

Rubber Products Optimization Via Laboratory Compound Characterization and Computer Design/Process Simulation for the Medical Field	1171
<i>B. Chouchaoui</i>	
Clean and Effective Curing Vital for Elastomer Applications in Pharmaceutical Packaging	1180
<i>W. K. Wong</i>	
Novel Styrenic-Block-Copolymers for Medical Tubing	1191
<i>M. G. Kalisvaart, K. J. Wright</i>	
Injection Molding of Thermoplastic Elastomers for Microfeature Replication	1221
<i>S.-H. Yoon, J. Rawson, Y. Kim, J. L. Mead, C. M. F. Barry</i>	
Design, Preparation and Performance of Novel Bioelastomers and Biobased Engineering Elastomers	1238
<i>L. Zhang, D. Yue, L. Lei, H. Zou, R. Shi</i>	

ELASTOMERS FOR WIRE & CABLE

Improving Dispersion of Non-halogenated Flame Retardant Systems Using Functional Additives	1253
<i>B. L. Robb, J. R. Austin</i>	
Insulation Compounds Based on Blends of EPM and EPDM Polymers For Wire And Cable Applications	1267
<i>M. F. Welker</i>	
Halogen Free Flame Retardants for Wire and Cable Applications	1300
<i>M. Wei, D. Murphy, C. Barry, J. Mead</i>	
Use of Multifunctional Crosslinking Agents in the Electron Beam Cure of Elastomers	1340
<i>W. M. Boye</i>	
Improved Wire & Cable Performance Using Specialty Polymer Modifiers	1370
<i>B. A. Harrington, M. Welker, C. Y. Lin</i>	
Elastomeric Micropowder as a Compounding Alternative in Fluoroelastomer Wire and Cable Applications	1383
<i>J. A. Shell</i>	
A Mechanistic Study Into Cross-linking of Saturated Elastomers with Di-Azides	1395
<i>A. J. Zielinska, J. W. M. Noordermeer, A. G. Talma, R. Peters, M. van Duijn</i>	

Volume 3

TIRE TECHNOLOGY - I

Evaluation of Extractable Organic Zinc As a Quantitative Marker for Tire Tread Particles in Environmental Matrices	1420
<i>K. Unice, M. Kreider, B. McAtee, J. Panko</i>	
Analysis Methodology of Rubber Fraction in Fine Particles	1450
<i>M. Harada, T. Shibata, J. Panko, K. Unice</i>	
Understanding Wet Skid Resistance Testing with the British Pendulum Skid Tester: Analysis of Sliding Noise from Various Filled Compounds	1463
<i>C. Adams, A. Neil, G. Chaplin, P. Zakelj, X.-D. Pan</i>	
Multiple Glass Transition Terpolymers of Isoprene, Butadiene, and Styrene	1498
<i>A. F. Halasa, B. B. Gross, W. L. Hsu</i>	
Important Roles of Polymers and Fillers for Tire Performance Characteristics of Tread Compounds	1521
<i>S. Futamura, K.-C. Hua</i>	

FILLER REINFORCEMENT OF RUBBER – IV

Advanced Tyre Filler Materials to Reduce Fuel Consumption of Commercial Vehicles	1532
<i>M. D. Morris, T. Al</i>	
Diatomaceous Earth – Filler for Rubber Reinforcement	1553
<i>R. K. Singh</i>	
Compounding for Injection Molding with Talc	1576
<i>O. Noel, G. Meli</i>	
Reinforcing Effect of Modified Fumed Silica in Rubber Compounds	1594
<i>I. Mora-Barrantes, J. L. Valentín, P. Posadas, Á. Marcos, A. Rodríguez, L. Ibarra, L. González</i>	
Performance of Green, Tire Derived, Recovered Carbon Black	1604
<i>W. F. Cole, Jr.</i>	
Comparison of 3-Aminopropyltriethoxysilane and N, N-dimethyldodecylamine As a Modifier for Na⁺-montmorillonite (MMT) on Styrene-Butadiene Rubber (SBR)/Organoclay Nanocomposites Manufactured by a Latex Method	1617
<i>W. Kim, W.-S. Kim, I.-J. Kim, G.-S. Kim, J.-W. Bae, Y.-H. Byon</i>	

NATURAL RUBBER AND NATURAL RUBBER-BASED PRODUCTS – IV

Polyisoprene as a Useful Substrate Dedicated to New Polymer Developments; from Natural Rubber to Bioactive Polymers	1654
<i>R. Jellali, A. Saetung, F. Gohier, I. Campistron, N. Kebir, A. Laguerre, J. F. Pilard</i>	
Rubber Vulcanization – A Well Known Technology with a Lot of Questions to Be Answered	1667
<i>N. Agulló, S. Borrós</i>	
Natural Rubber in Automotive Dynamic Applications	1689
<i>B. Le Rossignol, Y. Fromont, F. Gomez</i>	
Exfoliation of Nanolayer Assemblies for Improved Natural Rubber Properties: Methods and Theory	1700
<i>A. K. Bhowmick, M. Bhattacharya, S. Mitra</i>	
Properties of NR Composites Containing Nonconventional Fillers	1726
<i>A. Bischoff, K. Brandt, C. Oprisoni, L. Schneider, M. Zabel, R. H. Schuster</i>	
Flame Retardant Natural Rubber Formulations	1748
<i>M. Fernando, C. Hull, J. Clark</i>	

SCIENCE OF RUBBER STABILIZATION AND VULCANIZATION - I

Effect of Cure Efficiency on Properties of Gum and Black-filled Natural Rubber Vulcanizates	1769
<i>G. R. Hamed, K. Boonkerd</i>	
Butyl Rubber Curing Bladder Resin Vulcanization Systems: Compositions and Optimization	1791
<i>B. Rodgers, S. Jacob, C. Curry, B. B. Sharma</i>	
A New Approach to Activating Dithiocarbamates and Thiurams in EPDM	1824
<i>J. Nienaber</i>	
Aging of a Black-Filled Natural Rubber Vulcanizate at Fixed Strain: Part II. Tear Resistance	1837
<i>C. J. Ohlemacher, G. R. Hamed</i>	
Avoiding Potentially Hazardous Emissions in Rubber Compounding and Processing	1850
<i>S. Monthey, M. Saewe, S. Zemanek</i>	
Cure Activators to Improve both ECO-Balance and Economics of a Cure System	1868
<i>M. Saewe, S. Monthey</i>	
Vulcanization of Nanocomposite Tire Innerliner Compounds and Permeability	1883
<i>J. Soisson, B. Rodgers, W. Weng, R. Webb, S. Jacob</i>	

SYNTHETIC RUBBER AND SYNTHETIC RUBBER BASED PRODUCTS - I

The Role of Functional Polymers in Improving Tire Performance	1912
<i>T. E. Hogan, A. Randall, W. L. Hergenrother, C. J. Lin</i>	
Morphology and Rheology of Non-reactive and Reactive EPDM/PP Blends in Transient Shear Flow: Plasticized Vs. Non-plasticized Blends	1925
<i>S. Shahbikian, P. J. Carreau, M.-C. Heuzey, M. D. Ellul, P. P. Shirodkar, J. Cheng, H. P. Nadella</i>	

Styrene-Diene Thermoplastic Elastomers. Milestones and Recent Developments	1981
<i>R. P. Quirk</i>	
Silicone Elastomers	1997
<i>L. Tonge, M. DiPino, C. Gross</i>	
EPDM - Past, Present and Future	2023
<i>P. S. Ravishankar</i>	
Anionic Synthesis of Liquid Polydienes and Their Applications	2033
<i>T. Yoo, S. K. Henning</i>	

TIRE TECHNOLOGY – II

Compact NMR for Rubber Analysis	2070
<i>B. Blümich, F. Casanova, E. Danieli, J. Mauler, J. Perlo</i>	
In-service Evaluation of Nitrogen Inflation of Tires	2099
<i>R. C. Napier, W. H. Waddell</i>	
Polymers for Innerliner Applications – New Developments	2117
<i>W. H. Waddell, R. C. Napier, D. F. Rouckhout</i>	

Volume 4

TIRE TECHNOLOGY – II (cont.)

Study of Steel Tire Cord – Rubber Adhesion Build-up and Degradation	2138
<i>G. Buytaert, H. Liang, G. Pax, P. Reis</i>	
ASTM Highway Equivalent Laboratory Wheel Testing Standards for Commercial Truck/Bus Tires: Final Research Report (Phases I & II)	2161
<i>P. Mosier, T. Ruip</i>	

FILLER REINFORCEMENT OF RUBBER – V

The use of Designed Experiments to Optimize the Filler Loading in an EPDM Compound	2244
<i>A. L. Scott</i>	

NATURAL RUBBER AND NATURAL RUBBER-BASED PRODUCTS – V

Improved Natural Rubber Processing and Physical Properties by Use of Selected Compounding Additives	2252
<i>C. Clarke, M. Hensel</i>	
The Effect of Additives on the Processing Behaviour of Natural Rubber Compounds – Rheology and Mould Sticking	2263
<i>M. Bennett</i>	
Use of Crosslinking Coagents for Natural Rubber Latex-dipped Products	2277
<i>J. Brasero, R. Verdejo, M. Á. L. Machado, J. L. Valentín</i>	
Investigation of the Composition and Growth of <i>in vitro</i> Natural Rubber using High Resolution Size Exclusion Chromatography	2280
<i>C. K. Chiang, W. Xie, C. McMahan, J. E. Puskas</i>	

SCIENCE OF RUBBER STABILIZATION AND VULCANIZATION – II

Can Tyre Crumb Be an Alternative to ZnO As Activator in Natural Rubber Vulcanisation?	2307
<i>M. Guzmán, N. Agulló, S. Borrós</i>	
Curing Cycle Optimization of a Thick Section Rubber Part	2327
<i>A. El Labban, P. Mousseau, J. L. Bailleul, R. Deterre</i>	
Advancure™ Hexamethylenediamine Curative in Guanidine-Free Cure Systems for Vamac®	2355
<i>B. To, P. Czomba, A. Uminska</i>	

Mechanism of Peroxide Crosslinking of EPDM Rubber	2371
<i>M. van Duin, R. Orza, R. Peters, V. Chechik</i>	
Fundamentals of Curing Elastomers with Peroxides and Coagents III: Blending Coagents to Optimize Processing, Vulcanization, and the Physical Properties of Rubber Compounds	2384
<i>S. K. Henning</i>	
An Original Anti-Reversion Nitrosamine-Free Curing Agent as an Alternative to TMTD	2423
<i>P. Lugez</i>	

SYNTHETIC RUBBER AND SYNTHETIC RUBBER BASED PRODUCTS – II

Polyisobutylene-based Rubbers: Past, Present, Future	2447
<i>J. E. Puskas, L. M. Dos Santos</i>	
New Generation of Low PAH Oil Extended ESBRS from Lanxess Elastômeros Do Brasil	2462
<i>A. Martins, M. Remigio, N. Santos, J. Douglas, M. Moutinho</i>	
Processing Behaviour of High-CIS Polybutadienes in Rubber Compounds – Highlighting Neodymium Polybutadienes	2485
<i>J. Douglas, H. Kloppenburg, D. Hardy, A. Lucassen, T. Groß, J. Kroll</i>	
Hydrogenated Liquid Acrylonitrile-Butadiene Rubber	2514
<i>D. Yue, L. Zhang</i>	
Simultaneous Control of Molecular Weight and 1,4-CIS Selectivity in the Polymerization of 1,3-Butadiene with N,N'-Bis(3,5-di-tert-butylsalicylidene)-1,2-diphenylethylenediaminato Cobalt (i) in Combination with Diethylaluminum Chloride	2527
<i>K. Endo, K. Nakatani</i>	

TIRE TECHNOLOGY – III

Tire Failure Through ICP	2539
<i>T. R. Giapponi</i>	
Elevast™ Polymer Modifiers (PM) – Highly Efficient Modifiers for the Property Enhancement of Butyl Rubber	2544
<i>B. A. Harrington, B. Rodgers, C. Y. Lin, D. B. Dunaway</i>	
Plasma Polymerization of Monomers Onto Fillers, to Tailor Their Surface Properties in Tire Compounds	2561
<i>W. K. Dierkes, M. Tiwari, R. N. Datta, A. G. Talma, J. W. M. Noordermeer</i>	
Novel Functionalized SSBR for Silica & Carbon Black Containing Tires	2619
<i>S. K. H. Thiele, D. Bellgardt</i>	

CONTRIBUTED PAPERS - I

State-of-the-Art Gel Detection and Quality Reporting for EPDM Products	2636
<i>A. U. Paeglis, L. A. Meiske, R. A. Mangold, P. J. Kenny, B. W. Walther, T. E. Clayfield</i>	
The Effect of Mixed Filler Sizes on the Fiber Diameter of Electrospun Butyl Rubber Formulations	2655
<i>D. Murphy, W. Zukas, C. Barry, J. Mead</i>	
Memory of Filled Rubbers	2671
<i>X. Wang, C. G. Robertson</i>	
Gear Pumps for the Rubber Industry	2694
<i>W. M. Murphy</i>	

RUBBER RECYCLING

New Rubber Recycling Technology: Cost Effective Transformation of Rubber Crumb into Secondary Rubber	2700
<i>A. Vainer, A. Yam, L. Rappoport</i>	
Thermal Behavior of Vinyl Ester Resin Matrix Composites Filled With Mechanochemical Devulcanized Ground Rubber Tire Powder (GRT)	2701
<i>S. Yagneswaran, N. Tomar, D. W. Smith, Jr., J. R. Cellura</i>	
True Recycling of Rubber-Needed Now More Now Than Ever	2711
<i>D. Brown, M. Burgoyne, W. Maddever</i>	

DeLink Devulcanization Technology: A New Sustainability Option for the Rubber Industry	2728
<i>S. Nieto</i>	

SCIENCE OF RUBBER STABILIZATION AND VULCANIZATION – III

Selected Aspects on Aging of Elastomers	2737
<i>U. Giese, M. Santoso, R. H. Schuster, Y. N. Torrejon, C. Welzel</i>	
Reversion Behavior, Mechanical and Thermal Aging Properties of Natural Rubber Vulcanizates with Various Sulfur to Accelerator Ratios and Accelerator Types	2757
<i>C. Deeprasertkul, K. Boonkerd, K. Boonsomwong</i>	
Effect of Surface Modified Zinc Oxide as Cure Activator on the Properties of Rubber Compound Based on NR/SBR	2772
<i>S. Taghvaei-Ganjali, M. Malekzadeh, A. Abbasian, M. Khosravi</i>	

CONTRIBUTED PAPERS – II

Smarter Rubber Testing That Contributes to the Rubber Industry's Productivity Gains	2782
<i>J. S. Dick</i>	
Adhesion Science of Rubber-to-Metal Bonding Technology	2804
<i>D. Pugne, F. Krakowski</i>	
Extending the Usability of an Installed Calender - Developing the Requirements for a “New” Calender	2819
<i>L. R. Gooch</i>	
Modeling and Product Optimization for Automotive Weather-stripping	2837
<i>S. Daniel, B. Walther, P. Voorheis, T. Clayfield, A. Paeglis, W. Liang, D. Schiff</i>	
Sub-Micrometer Thermoplastic Vulcanizates Obtained by Reaction-induced Phase Separation of Miscible Poly(e-Caprolactone)/Dimethacrylate Systems	2853
<i>M. van Duin, R. l’Abee, H. Goossens, M. Verbruggen</i>	

STUDENT COLLOQUIUM: TIRE TECHNOLOGY

Reinforcing Effects of a Novel Networked Silica on SBR Compounds	2879
<i>K. T. Choi, C. K. Hong, G. Seo, D. L. Cho, S. Kaang</i>	

Author Index