

ELI Research d/b/a BCC Research

**17<sup>th</sup> Conference on Recent  
Advances in Flame Retardancy  
of Polymeric Materials  
2006**

**“Applications, Research and  
Industrial Development, Markets”**

**May 22-24, 2006  
Stamford, Connecticut, USA**

**Printed from e-media with permission by:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571  
[www.proceedings.com](http://www.proceedings.com)

**ISBN: 978-1-60560-411-4**

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

Copyright (2006) by ELI Research d/b/a BCC Research  
All rights reserved.

For permission requests, please contact ELI Research d/b/a BCC Research  
at the address below.

ELI Research d/b/a BCC Research  
70 New Canaan Avenue  
Norwalk, Connecticut 06850

ELI Research d/b/a BCC Research

17<sup>th</sup> Conference on Recent Advances in  
Flame Retardancy of Polymeric Materials  
2006

## TABLE OF CONTENTS

### **SESSION I: GENERAL PAPERS and REVIEWS**

Prediction of Thermodynamic Stabilities of Polymer/carbon Nanotube Composites.....	1
<i>S.I. Stoliarov, M.R. Nyden</i>	
Analytical Modeling of Fire Growth on Fire-resistive Wood-based Materials with Changing Conditions.....	10
<i>M.A. Dietenberger</i>	
Modeling of Combustion Process with Laser Pyrolysis Raman Microscope System .....	22
<i>B. Marosfoi, A. Szabo, A. Told, P. Anna, G. Marosi, D. Tabuan, G. Camino</i>	
"Some Roads Less Traveled" Some Less-exploited Flame Retardant Approaches .....	36
<i>E.D. Weil</i>	
Literature Review of Flame Retardancy of Styrenic Polymers - is a Halogen-free Solution Possible? .....	46
<i>S.V. Levchik</i>	
Chemical and Physico-chemical Structuration of Combustion Residues: a Strategy for the Improvement of Reaction to Fire .....	56
<i>J.M. Lopez-Cuesta, F. Laoutid, E. Leroy, P. Gaudon, L. Ferry</i>	
New Nano-dimensional Materials for Fire Retardancy.....	70
<i>C.A. Wilkie, M.C. Costache, J. Zhang</i>	

### **SESSION II: HALOGEN and NON-HALOGEN FLAME RETARDANTS**

Flame Retardants and the Environment.....	74
<i>P. Georlette, O. Manor, G.E. Squires</i>	
Influence of the Fireproofing Method on the Fire Retardant Performance of Intumescent Polypropylene Nonwoven.....	84
<i>S. Duquesne, C. Drevelle, S. Bourbigot, R. Delobel, F. Poutch</i>	
Strained Dioxaphospholanes As Reactive Flame Retardants for Styrenics .....	100
<i>B.A. Howell, J. Uzibor</i>	
Phosphonate Compounds As Flame Retardants for Epoxy Resins.....	112
<i>P. Finocchiaro, G.A. Consiglio, S. Failla</i>	
New Halogen-free Flame Retardant Styrenic Resin Formulation Through the Synergistic Char Formation .....	122
<i>B.N. Jang, I.C. Jung, J.H. Choi</i>	
Mechanisms of ARYL Phosphates As Flame Retardants in PC/ABS .....	129
<i>K.H. Pawlowski, B. Schartel</i>	

<b>Recent Advances on the Use of Metal Hydroxide and Borates As Fire Retardants in Halogen-free Polyolefins.....</b>	140
<i>K.K. Shen, E. Olson, P. Amigouet</i>	

### **SESSION III: NANOCOMPOSITES in FLAME RETARDANCY**

<b>Effect of Additive Type and Surface Treatment on the Flammability of Polycarbonate/inorganic Nanocomposites Prepared Via Extrusion .....</b>	151
<i>G.L. Nelson, F. Yang, I. Bogdanova</i>	
<b>Nanocomposites and Flame Retardants: Migration, Oxidation, and Structure of Polymer Organic Layered Silicates (POLS) .....</b>	161
<i>M. Lewin, M. Zammarano, Y. Tang, E. Pearce</i>	
<b>Poss Polymer Nanocomposites. a Promising Fire Retardance Approach .....</b>	176
<i>G. Camino, A. Fina, D. Tabuani</i>	
<b>Flame Retardancy of PVC by Organoclays and Flame Retardancy of Eva by Carbon Nanofibres .....</b>	181
<i>G. Beyer</i>	
<b>Investigation on the Preparation and Flame Retardant Mechanism of Some Polymer/layered Compound Nanocomposites .....</b>	196
<i>Y. Hu, L. Song</i>	
<b>Polymeric Nanocomposites Based on Layered Double Hydroxides.....</b>	215
<i>M. Zammarano, J.W. Gilman, R.H. Harris Jr.</i>	
<b>Nanocomposite-containing Additive Combinations .....</b>	225
<i>J.M. Hossenlopp, E. Kandare</i>	
<b>Flammability of Polypropylene/clay Nanocomposites – Synergism with Some Flame Retardants .....</b>	232
<i>R. Kozlowski, M. Wladyka-Przybylak, H. Rydarowski</i>	
<b>Synergism Between Conventional Flame Retardants and Organoclays in Polymers and Polymer Blends .....</b>	241
<i>M. Rafailovich</i>	

### **SESSION IV: INDUSTRIAL APPLICATIONS and CONSUMER FOCUS**

<b>Improved Properties for Flame Retardant Polyamides Within the Electrical and Electronic Industries.....</b>	242
<i>W. Wanzke, S. Hoerold, B. Nass, O. Schacker, E. Schlosser</i>	
<b>Development of Fire Rated Ceramifiable Cable Insulation .....</b>	253
<i>D.C.O. Marney, N. Rigopoulos, L.J. Russell, G. Alexander</i>	
<b>Thermal Degradation and Fire Properties of Recycled Poly (Ethylene Terephthalate) (PETR)/recycled Polycarbonate (PCR) Blends .....</b>	262
<i>B. Swoboda, E. LEROY, F. Laoutid, J.M. Lopez-Cuesta</i>	
<b>Flame Retardant Finishing of Cotton Fleece Fabrics Using a Reactive Organophosphorus Oligomer.....</b>	277
<i>C.Q. Yan, X. Qiu</i>	
<b>The Use of Borates and Talc As Fire Retardants in Wood Plastic Composite.....</b>	289
<i>K.K. Shen, E. Olson</i>	

<b>Fire Performance of Oriented Strandboard.....</b>	297
<i>R.H. White, J.E. Winandy</i>	
<b>Flammability of Polymer/carbon Nanotube Nanocomposites .....</b>	310
<i>T. Kashiwagi, F. Du, K. Winey, J. Douglas</i>	

## **SESSION V: STANDARDS and TESTING**

<b>Experimental and Molecular Dynamic Studies of the Thermal Decomposition of Polyisobutylene.....</b>	320
<i>M.R. Nyden, S.I. Stolarov, S. Crowley, C.S.Y. Jee, Z.X. Guo</i>	
<b>Forensic Evaluations of Fabric Flammability .....</b>	335
<i>M.M. Hirschler, P.Y. Umino, J.B. Zicherman</i>	
<b>Early Ignition of Flame Retarded Plastics – Effects of FR Additives and Polymer Nanocomposites on Time to Ignition As Measured by Cone Calorimeter .....</b>	358
<i>A.B. Morgan, M. Bund</i>	
<b>Effect of Reinforcing Element on Burning Behavior of Fiber – Reinforced Epoxy Composites.....</b>	367
<i>B.K. Kandola, A. R. Horrocks, M.R. Rashid</i>	
<b>An Update on the Current Regulatory Status of Flame Retardants .....</b>	378
<i>R.B. Dawson, S.D. Landry, V. Steukers</i>	
<b>Performance of Construction Products in Reaction-to-fire Tests .....</b>	389
<i>M. Janssens, K. Carpenter, J. Huczek, M. Mehrafz, A. Sauceda</i>	

**Author Index**