



Polymeric Materials in Under-ventilated and Vitiated Environments - An investigation into control variable sensitivity for the controlled atmosphere cone calorimeter

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Sunday, June 5, 2022

ARRIVAL AND REGISTRATION

2:30 PM REGISTRATION BEGINS

LECTURE SESSION I

Session Chair: Jamie Grunlan, Texas A&M University

3:15 PM OPENING REMARKS

3:30 PM **Alexander Morgan**, University of Dayton Research Institute
Studying Smoldering to Flaming Transition in Polyurethane Furniture Sub-Assemblies: Effects of Fabrics, Flame Retardants, and Material Type **1**

4:00 PM **Mauro Zammarano**, NIST
Fire Barrier Fabrics in Upholstered Furniture: An Obvious Solution to One of the Most Enduring Problems in Fire Safety **2**

4:30 PM BREAK

4:45 PM **Isaac T. Leventon**, NIST
The NIST Material Flammability Database: Experimental Measurements for Fire Model Calibration and Validation **3**

5:15 PM **Morgan C. Bruns**, St. Mary's University
Development of Automated Calibration Tools for Determining Fire Model Input Parameters **4**

5:45 PM **Natallia Safronava**, Federal Aviation Administration
Microscale Combustion Calorimetry and Material Change Similarity **5**

6:15 PM WELCOME RECEPTION

Monday, June 6, 2022

7:00 AM BREAKFAST | 7AM – 10 AM IN THE HOTEL'S ATRIUM

LECTURE SESSION II

Session Chair: Alexander Morgan, University of Dayton Research Institute

8:30 AM **Anteneh Worku**, Pinfa North America
The Road to Flame Retardant Commercialization **6**

9:00 AM **Sabyasachi Gaan**, EMPA, Switzerland
Hybrid Strategies for Improving the Fire Performance of Epoxy Resin Cured With Aliphatic Hardener **7**

9:30 AM **Svetlana Tretsiakova-McNally**, Ulster University, UK
Thermal Decomposition of Styrenic Polymers Modified with Covalently Bound P- and N-containing Groups: Analysis of the Gaseous-Phase Mechanism **8**

Monday, June 6, 2022, cont'd

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| 10:00 AM | BREAK | |
| 10:15 AM | Todd Emrick , University of Massachusetts – Amherst <i>Designing Oligo- and Polymeric Flame Retardants for High Char Yields</i> | 9 |
| 10:45 AM | Sabine Fuchs , Hamm-Lippstadt University of Applied Science, Germany <i>Halogen-Free Styrene Copolymers With Intrinsic Flame Retardant Properties</i> | 10 |
| 11:15 AM | Jacques A. De Beer , University of Maryland <i>Milligram-scale Flame Calorimetry: Development of a Pyrolyzer System used for Accurate Emulation of the Burning Behavior of Non-thermally Thin Samples</i> | 11 |
| 11:45 AM | END AM SESSION, LUNCH ON YOUR OWN | |
| LECTURE SESSION III | | |
| Session Chair: Mauro Zammarano, National Institute of Standards and Technology | | |
| 4:00 PM | Ramaswamy Nagarajan , University of Massachusetts Lowell <i>Surface functionalization Strategies for Fire Retardant Nylon, Cotton and, Nyco</i> | 12 |
| 4:30 PM | Bernhard Scharfel , BAM Federal Institute for Materials Research and Testing, Germany <i>Non-vegan Flame-Retardant (Adjuvants in) Biocomposites</i> | 13 |
| 5:00 PM | Helge-Otto Fabritius , Hamm-Lippstadt University of Applied Sciences, Germany <i>Mechanistic Investigations of Wasp Nest Papers: Towards Environmentally Compatible Flame-Retardant Concepts for Synthetic Materials</i> | 14 |
| 5:30 PM | END DAILY LECTURES | |
| 6:00 PM | POSTER SESSION END DAILY SESSIONS | |

Tuesday, June 7, 2022

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| 7:00 AM | BREAKFAST 7AM – 10 AM IN THE HOTEL'S ATRIUM | |
| LECTURE SESSION IV | | |
| Session Chair: Sabyasachi Gaan, EMPA, Switzerland | | |
| 8:30 AM | Serge Bourbigot , University of Lille, France <i>Recent Advances in Designing Fire Barriers</i> | 15 |
| 9:00 AM | Jaime Grunlan , Texas A&M University <i>Water-Based, Environmentally-Benign, Polyelectrolyte-Based Flame Retardant Treatments</i> | 16 |
| 9:30 AM | Severine Bellayer , University of Lille, France <i>Formulation of Thin and Thick FR Sol-Gel Coatings</i> | 17 |

Tuesday, June 7, 2022, cont'd

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| 10:00 AM | BREAK | |
| 10:15 AM | Ravi Mosurkal , US Army CCDC <i>Surface Functionalization Strategies for Fire Retardant Nylon, Cotton, and Nyco</i> | 18 |
| 10:45 AM | Jeffrey Pyun , University of Arizona <i>Polymers Derived From Elemental Sulfur with Enhanced Thermomechanical and Flame Retardant Properties</i> | 19 |
| 11:15 AM | Yury Brusentsev , Åbo Akademi University, Finland <i>Sulfenamides, Sulfinamides and Sulfonamides as Flame Retardants – Similarities and Differences in the Mechanism of Action</i> | 20 |
| 11:45 AM | END AM SESSION, LUNCH ON YOUR OWN | |
| LECTURE SESSION V | | |
| Session Chair: Serge Bourbigot, University of Lille, France | | |
| 4:00 PM | Baljinder Kandola , University of Bolton, United Kingdom <i>Effect of Crosslinkers on Charring Efficiency of Lignin-Polyamide Precursors for the Production of Carbon Fibers</i> | 21 |
| 4:30 PM | Conor McCoy , University of Maryland <i>Modeling of Flame Spread on Charring, Non-charring, and Flame Retardant Polymers In UL-94V</i> | 22 |
| 5:00 PM | Lorenza Maddalena , Politecnico di Torino-Alessandria campus, Italy <i>Water-Based Processes Exploiting High Aspect Ratio Nanoparticles for the Development of Flame Retardant Flexible Polyurethane Foams</i> | 23 |
| 5:30 PM | BREAK | |
| 5:45 PM | Vitus Hupp , Bundesanstalt für Materialforschung und -prüfung (BAM), Germany <i>Adhesive Tapes in Bonded Materials - Fire Risk or Protective Layer?</i> | 24 |
| 6:15 PM | Markus Wiesemann , Hamm-Lippstadt University of Applied Sciences, Germany <i>Halogen-Free Syntheses of Phosphoric Esters Based on Phosphorus Pentoxide</i> | 25 |
| 6:45 PM | END DAILY SESSIONS | |

Wednesday, June 8, 2022

7:00 AM BREAKFAST | 7AM – 10 AM IN THE HOTEL'S ATRIUM

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| LECTURE SESSION VI | | |
| Session Chair: Baljinder Kandola, University of Bolton, UK | | |
| 8:30 AM | Gaëlle Fontaine , University of Lille, France <i>Mechanistic Aspects of Flame Retarded Polybutylene Succinate</i> | 26 |

Wednesday, June 8, 2022, cont'd

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| 9:00 AM | Thomas J. Kolibaba , NIST <i>Polyelectrolyte Composites for Flame Retardant Additive Manufacturing</i> | 27 |
| 9:30 AM | Igor Jordanov , Ss. Cyril and Methodius University, Macedonia <i>Lignin-Based Multilayer Nanocoating for Flame Retardant Cotton Fabric</i> | 28 |
| 10:00 AM | BREAK | |
| 10:15 AM | Bob A. Howell , Central Michigan University <i>Iron Additives as Alternatives to Antimony Oxide in Flame-Retardant Formulations</i> | 29 |
| 10:45 AM | Hatsuo Ishida , Case Western Reserve University <i>Polybenzoxazines: Development of Very High Performance Noncombustible Polymers without the Need of Flame Retarding Additives</i> | 30 |
| 11:15 AM | CLOSING REMARKS | |

MONDAY, JUNE 6, 2022

POSTER PROGRAM

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| <u>Manon Fleurotte, Abdenour Amokrane, Olivier Authier, Gérald Debenest, Gaëlle Fontaine, and Serge Bourbigot</u> EDF R&D, University of Lille, CNRS, INRAE, FRANCE | 1 |
| <i>Sensitivity Analysis of the Pyrolysis Model of Non-Charring and Charring Materials Using Morris Screening Method</i> | |
| <u>Lei Chen, Byeongjin Baek, Scott Corneillie, Cheryl Patchett, Amol Prabhakar Avhad, Swamy SM, Han Goossens, and Sreekanth Pannala</u> SABIC Corporate Technology and Innovation, UNITED STATES | 2 |
| <i>Development of Computational Fluid Dynamics Models for Flame Retardant Thermoplastics in Electric Vehicle Applications</i> | |
| <u>James P. Covello, Erik J. Price, Rajib Paul, and Gary E. Wnek</u> Case Western Reserve University, UNITED STATES | 3 |
| <i>Tannic Acid-based Super-Intumescent Coatings for Prolonged Fire Protection of Cardboard and Wood</i> | |
| <u>Jacques A. De Beer, Joseph A. Alascio, Stanislav I. Stolarov, Emily L. Dietz, Michael J. Gollner</u> University of Maryland | 4 |
| <i>Analysis of Thermal Exposure and Ignition of Western Red Cedar Subject to Glowing Firebrand Piles</i> | |
| <u>Kata Enikő Decsov, Bettina Ötvös, György Marosi, and Katalin Bocz</u> Budapest University of Technology and Economics, HUNGARY | 5 |
| <i>Development of Silica Microfibres and Application as Flame Retardant Additives in Poly(lactic acid)</i> | |
| <u>Michael V. Heck, Isaac T. Leventon*, Matthew F. Bundy, Kevin B. McGrattan, and Rick D. Davis</u> NIST, UNITED STATES | 6 |
| <i>Experimental Measurements of Full-Scale Fire Growth for Fire Model Validation</i> | |
| <u>Carl-Christoph Höhne, Volker Gettwert, and Andreas Menrath</u> Fraunhofer Institute for Chemical Technology ICT, GERMANY | 7 |
| <i>Flame Retardancy Investigations on Composites for Lightweight Electric Vehicle Battery Housings</i> | |
| <u>David J. Irvin, Kousaalya Bakthavatchalam, Rahul Harkawat, and Jennifer A. Irvin</u> Firesafe Zone LLC, UNITED STATES | 8 |
| <i>Scale-Up and Testing of New Self-Extinguishing Polymer</i> | |
| <u>Md Tahmid Islam, Gordon L. Nelson, and M. Toufiq Reza</u> Florida Institute of Technology | 9 |
| <i>Combustion Kinetics of Hydrothermally Carbonized Lignocellulosic Biomass by Cone Calorimeter</i> | |
| <u>Sourabh Kulkarni, Julie St. Cyr, Zhiyu Xia, Arjan Giaya, Ryan Bouldin, Ravi Mosurkal, and Ramaswamy Nagarajan</u> University of Massachusetts Lowell, UNITED STATES | 10 |
| <i>Simple Surface Functionalization Method for Multifunctional Textiles with Flame and Vector Protection</i> | |

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| <u>Bethany Palen</u> , Matthew G. Rabaey, Danixa Rodriguez-Melendez, Ethan T. Iverson, and Jaime C. Grunlan Texas A&M University, UNITED STATES <i>Polymeric Coacervate Coating for Flame Retardant Paper</i> | 11 |
| <u>Karan Bansal</u> , Shanti Swarup, and <u>Mohiuddin Quadir</u> North Dakota State University, UNITED STATES <i>Phytic Acid-Rich Flame Retardant UV-Curable Coatings for Metal Substrates</i> | 12 |
| <u>Danixa Rodriguez-Melendez</u> , Matthias Langhansl, Alexander Helmbrecht, Bethany Palen, Cordt Zollfrank, and Jaime C. Grunlan Texas A&M University, UNITED STATES <i>Renewable Nanocoating for Flame-Retardant Cottonid Paper</i> | 13 |
| <u>Tarik Rust</u> , Bertram Schwind, Helge-Otto Fabritius, and Sabine Fuchs Hamm-Lippstadt University of Applied Sciences, GERMANY <i>Bioinspired Routes Towards Flame Protection of Wood-Plastic-Composites</i> | 14 |
| <u>Bertram Schwind</u> , Tarik Rust, Sabine Fuchs, and Helge-Otto Fabritius Hamm-Lippstadt University of Applied Sciences, GERMANY <i>Synthetic Papers Mimicking Structure, Composition and Flame-Retardancy Mechanisms of Wasp Papers</i> | 15 |
| <u>Dallin L. Smith</u> , Natalie A. Vest, Danixa Rodriguez-Melendez, Bethany Palen, and Jaime C. Grunlan Texas A&M University, UNITED STATES <i>Bio-Sourced Multilayer Nanocoating for Self-Extinguishing Nylon-Cotton Blend Fabric</i> | 16 |
| Robert John Bray, Jianping Zhang, and <u>Svetlana Tretsiakova-Mcnally</u> FireSERT, Ulster University, UNITED KINGDOM <i>Polymeric Materials in Under-Ventilated and Vitiated Environments - An Investigation Into Control Variable Sensitivity for the Controlled Atmosphere Cone Calorimeter</i> | 17 |
| <u>Natalie A. Vest</u> , Thomas J. Kolibaba, Andrea O. Afonso, Sashi A. Kulatilaka, Ethan T. Iverson, and Jaime C. Grunlan Texas A&M University, UNITED STATES <i>Acid-Doped Biopolymer Nanocoatings for Flame Retardant Polyurethane Foam</i> | 18 |
| <u>Olga Zilke</u> , Dennis Plohl, Klaus Opwis, and Jochen S. Gutmann Deutsches Textilforschungszentrum Nord-West, GERMANY <i>Halogen-Free Flame-Retardant Finishings for Textiles</i> | 19 |
