



FINAL PROGRAM

SIXTH INTERNATIONAL SYMPOSIUM ON POLYIMIDES AND OTHER HIGH TEMPERATURE/HIGH PERFORMANCE POLYMERS

SYNTHESIS, CHARACTERIZATION AND APPLICATIONS

To be held November 9-11, 2009, Florida Institute of Technology, Melbourne, FL, USA

This symposium will be the sixth in a series the first of which was held in Newark, NJ in 1999. In a relatively small but significant departure from the previous symposia, this symposium will be concerned not only with the well established polyimides but also the entire range of high temperature/high performance polymers. As a loose definition this would include all polymeric materials which exhibit thermal stability above 200 °C and in addition have outstanding thermal, mechanical, electrical, optical, surface and rheological properties. Examples would be the Poly(p-phenylene benzobisoxazole) materials and Carbon Nanotube composites. These materials exhibit exceptional thermal, mechanical and electrical properties. Other examples would include the entire range of rigid rod polymers as well as fluorinated hydrocarbon chains that can exhibit extraordinary surface properties.

Of all these materials the polyimides have found the widest range of application in such diverse areas as the aerospace industry and microelectronic components. The unique combination of physical and chemical properties makes these materials highly attractive for demanding applications where chemical inertness, high temperature stability, low

dielectric constant, mechanical toughness and processability are primary concerns. In addition, their ability to adhere to a range of inorganic materials including metals, ceramics, glasses and semiconductors have made these materials predominant in coating and composite applications. In this regard the issue of adhesion and interaction with other materials will be one of the major focal points of this symposium.

It is also our pleasure to announce that this symposium will be held in collaboration with Prof. Gordon Nelson of the Florida Institute of Technology and Dr. Martha Williams and Trent Smith of the NASA Kennedy Space Center. These individuals have been active in the area of high temperature polymers especially in regard to aerospace applications.

The invited speakers have been selected so as to represent widely differing disciplines and interests, and they hail from academic, governmental and industrial research laboratories. This meeting is planned to be a truly international event both in geographic coverage as well as in spirit. Below is a listing of papers to be presented at this symposium

SESSION I: SYNTHESIS; MONDAY, NOVEMBER 9, 2009:

8:00-8:05: INTRODUCTORY REMARKS

8:05-8:35: Camille A. Thorpe, Feng Yang and **Gordon Nelson**; College of Science, Florida Institute of Technology, Melbourne, FL 32901, USA; **Design, Synthesis and Characterization of Novel Ferrocene-Containing Polyimide Copolymers**

8:35-9:05: **Thuy D. Dang**, Zongwu Bai, Narayanan Venkat, Alexander B. Morgan, Joseph A. Shumaker and Marlene D. Houtz; AFRL/RXBN, 2941 Hobson Way, Wright-Patterson Air Force Base, Dayton, OH 45433, USA; **Novel Rigid-Rod Random Copolymers with Flexibilizing Structural Units for Enhanced Flame Resistance and Blast Protection**

9:05-9:35: **Roy Odle**; SABIC Innovative Plastics, 1 Lexan Lane, Mt. Vernon, IN 47620; **Synthesis and Structure-Property Relationships of Polyetherimide-Sulfones**

9:35-9:55: COFFEE BREAK

9:55-10:25: **Jason K. Ward**, Mita Das and William J. Koros; School of Chemical & Biomolecular Engineering, Georgia Institute of Technology, Atlanta, GA 30332, USA; **Synthesis of 6FDA based Membranes for Olefin Paraffin Separations**

10:25-10:55: **Wai Kin Chan**; Department of Chemistry, The University of Hong Kong Pokfulam Road, Hong Kong, CHINA; **Synthesis of Metal Containing Aromatic Polyamides and Polyesters and Their Properties**

10:55-11:25: Rohitkumar H. Vora; Advanced Polymers Research & Technologies 8080, Heritage Drive, Alburts, PA 18011 USA; **Designing of Next Generation of High Performance CeramImide[®] Type Nanocomposite Materials for Aerospace and Defense Applications**

11:25-12:25: LUNCH

**SESSION II: AEROSPACE APPLICATIONS;
MONDAY, NOVEMBER. 9, 2009**

12:25-12:55: Zeba Parkar and **James Economy**; Department of Materials Science and Engineering, University of Illinois at Urbana-Champaign, Urbana, IL 61801; **Design of Advanced Aromatic Copolyesters for Aerospace Applications**

12:55-1;25: Scott Jolley, **Tracy Gibson**, Lilliana Fitzpatrick, and Martha Williams; **Physical Properties of Low Melt Polyimides for Aerospace Applications**

1:25-1:55: **Scott Jolley**, Tracy Gibson, Lilliana Fitzpatrick, and Martha Williams; ASRC Aerospace Corporation, Kennedy Space Center, FL 32899; **Low Melt Polyimides for Repair and Coatings**

1:55-2:15: COFFEE BREAK

2:15-2:45: Luke Roberson, Shanju Zhang, Chris Immer, Janusz Kowalik and Satish Kumar; NASA, Kennedy Space Center, FL; **Carbon Nanotube Fiber Filaments for Lighting Applications**

2:45-3:15: Luke Roberson, Craig Fortier, LaNetra Tate, Sarah Snyder, and Martha Williams; NASA, Kennedy Space Center, FL; **Carbon Nanotubes Printing Techniques for Enhanced Conductivity**

3:15-3:45: Narayanan Venkat, Zongwu Bai, Thuy D. Dang, Victor K. McNier, Jennifer N. DeCerbo and Jeffery T. Stricker; University of Dayton Research Institute, 300 College Park Drive, Dayton OH 45469, USA; **Design of Polyimide and Other High Temperature Polymer Dielectrics for Aerospace Power Conditioning Capacitor Applications**

SESSION III: NOVEL AND COMPOSITE FORMULATIONS; TUESDAY, NOVEMBER. 10, 2009

8:30-9:00: Jun Sakai and Yasuharu Yamada; Kyoto Institute of Technology, KIT Liaison Center, Department of Biomolecular Engineering, Matsugasaki, Sakyo-ku, Kyoto 606-8585, JAPAN; **Nanoporous Low-k Hyperbranched Polyimide**

9:00-9:30: E. T. Kang, C. X. Zhu and K. G. Neoh; Dept. of Chemical & Biomolecular Engineering, National University of Singapore, Kent Ridge, Singapore 119260; **Electrical Bistability and Random Access Memory Effects in Functionalized Polyimides**

9:30-10:00: Anne Jonquieres, Ismail Ben Youssef, Halima Alem, Frederic Sarry and Omar Elmazria; Laboratoire de Chimie Physique Macromoleculaire, ENSIC, B.P. 20451, F-54001 Nancy, FRANCE; **New Polyurethaneimides Containing Lewis Bases for Gas Microsensor Applications**

10:00-10:20: COFFEE BREAK

10:20-10:50: Javier Parrondo and **B. Rambabu**; Solid State Ionics and Surface Science Laboratory, Department of Physics, Southern University and A&M College, Baton Rouge, LA 70813, USA; **Polybenzimidazole Membranes (PBI) for HT-PEMFCs: Synthesis, Fuel Cell Performance and Substantiate with That of Commercial High Temperature PEMS**

10:50-11:20: Imona Omole, W. J. Koros and **J. R. Johnson**; School of Chemical and Biomolecular Engineering, Georgia Institute of Technology, 311 Ferst Drive, Atlanta, GA 30332; **Crosslinked Polyimide Hollow Fiber Membranes for Aggressive Natural Gas Feed Streams**

11:20-11:50: Yasuharu Yamada and Tomoyuki Suzuki, Kyoto Institute of Technology, KIT Liaison Center, Department of Biomolecular Engineering, Matsugasaki, Sakyo-ku, Kyoto 606-8585, JAPAN; **Hyperbranched Polyimide-Silica Hybrids for Gas Separation Membranes**

11:50-1:30: LUNCH

**SESSION IV: SPECIAL APPLICATIONS;
TUESDAY, NOVEMBER. 10, 2009**

1:30-2:00: Rakesh Kumar; Specialty Coating Systems, 7645 Woodland Drive, Indianapolis, IN 46278; **Parylene HT: A High Temperature Vapor Phase Polymer for Electronics Applications**

2:00-2:30: Masataka Murahara; Tokyo Institute of Technology, Innovation Propellant Department, Research Professor, and Professor Emeritus of Tokai University, Tokyo, JAPAN; **Polymer Coating Surface Change into Ceramic Layer Photo-oxidized Silicone Oil Layer for High Temperature and High Electric Insulation Resistance**

2:30-3:00: Myeon-Cheon Choi, Junji Wakita, Sinji Ando, and Chang-Sik Ha; Department of Polymer Science and Engineering, Pusan National University, Busan 609-735, KOREA; **Highly Transparent and Refractive Polyimides with Controlled Molecular Structure by Chlorine Side Groups**

3:00-3:20: COFFEE BREAK

3:20-3:50: Brigitte Mutel, Philippe Supiot, Adil Essakhi, Axel Löfberg, Sébastien Paul, Véronique Le Courtois and Elisabeth Bordes-Richard; Génie des Procédés d'Interactions Fluides Réactifs - Matériaux (GÉPIFRÉM), EA 3571, USTL, Villeneuve d'Ascq, FRANCE; **Coating of Structured Reactors by Plasma Assisted Polymerization of TMDSO**

3:50-4:20: M. Akram, S. Bhowmik, R. Benedictus and J. A. Poulis; Aerospace Materials and Structures, Faculty of Aerospace Engineering, Delft University of Technology, Kluyverweg 1, 2629 HS Delft, THE NETHERLANDS; **Surface Modification of Polyimide by Atmospheric Pressure Plasma for Adhesive Bonding with Titanium and its Application to Aviation and Space**

4:20-4:50: Dong-Hee Park and Won-Kook Choi; Thin Film Materials Research Center, Korea Institute of Science and Technology, Cheongryang P.O Box 131, Seoul 130-650, KOREA; **Superhydrophilicity of Polyimide Surface Using Direct Reactive High Flux Low Energy Ion Beam Irradiation**

SESSION V: STRUCTURE -PROPERTY STUDIES; WEDNESDAY, NOVEMBER. 11, 2009

8:00-8:30: Musto Pellegrino, Mariangela Leo, Giuseppe Mensitieri and Marino Lavorgna; Institute of Chemistry and Technology of Polymers (ICTP), National Research Council of Italy, via Campi Flegrei 34, Pozzuoli (Na), ITALY; **Molecular Mechanism of Diffusion of H₂O and Methanol in PMDA-ODA Polyimide: A Time-resolved FTIR Study**

8:30-9:00: R. Khazaka, S. Diahm, M. L. Locatelli and B. Despax; Université de Toulouse; UPS, INPT; LAPLACE (Laboratoire Plasma et Conversion d'Energie); 118 route de Narbonne, F-31062 Toulouse cedex 9, FRANCE; **Oxidative Thermal Aging Effect on the Electrical Properties of BPDA/PDA Polyimide Films With and Without Oxygen Barrier Layers**

9:00-9:30: Francette Thominette; LIM ENSAM, 151 Bd de l'Hopital , 75013 Paris, FRANCE; **Hygrothermal Aging of Nafion®**

9:30-10:00: Jude O. Iroh, Wenchao Zhang, and Esther Obonyo; Department of Chemical and Materials Engineering, University of Cincinnati, Cincinnati, OH 45221-0012; **Hybrid Montmorillonite Clay/Polyimide Nanocomposite Membranes**

10:10:20: COFFEE BREAK

10:20-10:50: Joung-Man Park, Zuo-Jia wang, Joel GnidaKouong, Ga-Young Gu, Woo-Il Lee, Jong-Kyoo Park and K. Lawrence DeVries; School of Materials Science and Engineering, Engineering Research Institute, Gyeongsang National University, Jinju 660-701, KOREA; **Interfacial Aspects and Self-Sensing of Carbon Fiber/CNT-Phenol Nanocomposites using Electro-Micromechanical Techniques and Wettability**

10:50-11:20: J. R. Johnson and W. J. Koros; School of Chemical & Biomolecular Engineering, Georgia Institute of Technology, Atlanta, GA; **Torlon® (polyamide-imide) Nanocomposites Containing Laponite® RD Nanoclays for Barrier Membrane Applications**

11:20-11:50: Jude. O. Iroh, Jandro Abot, Harikrishna Boddu, Huabin Wang, Marlene Hourz, Loon-Seng Tan and Gary Price; Department of Chemical and Materials Engineering, Department of Aerospace Engineering, University of Cincinnati, Cincinnati, OH 45221-0012; **Damping Behavior of Carbon Nanofiber/Polyimide Nanocomposites**

11:50-12:20: Alexander Fainleib, Olga Grigoryeva, Angelika Menner and Alexander Bismarck; Institute of Macromolecular Chemistry of the National Academy of Sciences of Ukraine, Kyiv, UKRAINE; **High Temperature/High Performance polyHIPeS Based on Polystyrene/Polycyanurate IPNs**

[CLICK HERE TO VIEW FULL ABSTRACTS ONLINE](#)

REGISTRATION INFORMATION

DATES:

NOVEMBER 9-11, 2009: SIXTH INTERNATIONAL SYMPOSIUM ON POLYIMIDES AND OTHER HIGH TEMPERATURE/HIGH PERFORMANCE POLYMERS

NOVEMBER 12, 2009: SHORT COURSE ON ADHESION MEASUREMENT METHODS ([CLICK HERE FOR COURSE SYLLABUS](#))

NOVEMBER 13, 2009: SHORT COURSE ON DURABILITY OF ADHESIVE JOINTS ([CLICK HERE FOR COURSE SYLLABUS](#))

LOCATION:

Florida Institute of Technology
Melbourne, FL 32901
www.fit.edu

HOTEL

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890 Palm Bay Rd NE
Palm Bay, FL 32905

Ph 321-725-2952
FAX 321-768-1759

\$69/night plus tax - Double Non-Smoking or King Non-Smoking

\$74/night plus tax - Double Non-Smoking Premium or King Non-Smoking Premium

http://www.jamesoninns.com/Hotel_Detail.asp?pHotelID=SJ1425

Crowne Plaza Melbourne Oceanfront Hotel

2605 N. A1A
Indialantic, FL 32903

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\$119/night plus tax - House Room
\$129/night plus tax - Partial View
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www.cpmelbourne.com

AIRPORT AND TRAVEL:

Airports: There are 2 airports close by. Melbourne International Airport (MLB) is 10 minutes from campus; <http://www.mlbair.com/>. Taxi's should be readily available outside the terminal. Orlando International Airport (MCO) is 1 hour from campus;

<http://www.orlandoairports.net/main.htm>

Orlando Airport Shuttles:

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REGISTRATION:

Speaker/student \$395 each; regular attendee \$595 each. A 10% discount applies if more than 1 person are participating from the same organization.

ON- CAMPUS HOUSING

On-Campus Housing rooms are available for conference participants. They will be either single rooms or 2/room. These are dorm rooms with a community bath. Cost is \$145/week or \$50/night plus \$12/bed for linen cleaning. Interested attendees are advised to contact Anthony Skevakis, Director of Housing, directly via email at askevakis@fit.edu (321-674-8033) to reserve rooms.

TO REGISTER FOR SYMPOSIA:

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REGISTRATION FORM

POLYIMIDES AND OTHER HIGH TEMPERATURE POLYMERS November 9-11, (speaker/student)	\$395
POLYIMIDES AND OTHER HIGH TEMPERATURE POLYMERS November 9-11, (regular attendee)	\$595
Sub Total	
Short Course on <u>Applied Adhesion Measurement Methods</u> : November 12, 2009	\$595
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