Joint Meeting of the
2nd International Conference on Green and Sustainable Chemistry
and the
9th Annual Green Chemistry and Engineering Conference
Taking Measure of Green Progress:
Opportunities to Meet Global Challenges
June 20-24, 2005
Hotel Washington • Washington, DC

TECHNICAL PROGRAM

R. D. Rogers, *Program Chair*

June 20, MONDAY MORNING

8:30 am - 10:00 am

Parkview Room

Green Chemistry and Engineering Education Student Workshop

M. Abraham, S. Austin, J. E. Hutchison, N. Nguyen, and J. C. Warner, *Organizers*

8:30 — Introduction to green chemistry: 12 principles. **J. Warner**

9:15 — Introduction to green engineering & sustainability science and engineering education. **S. Austin**

10:00 am - 10:30 am — Tea and Coffee Break

10:30 am - 12:00 pm

Parkview Room

Green Chemistry Education Student Workshop

J. E. Hutchison, J. C. Warner, *Organizers*

10:30 — Catalysis. **T. Collins**

11:15 — Solvents. **C.-J. Li**

Capital Room

Green Engineering Education Student Workshop

M. Abraham, S. Austin, and N. Nguyen *Organizers*

10:30 — A systems view of the chemical industry: Identifying critical technology needs in environmental catalysis. **B. Subramanian**

11:15 — Molecular design of solvents: Meeting functional and environmental objectives including risk, toxicity and exposure. **D. Allen**

12:00 pm — 1:00 pm **Lunch Break**

June 20, MONDAY AFTERNOON

1:00 pm - 2:30 pm

Parkview Room

Green Chemistry Education Student Workshop

J. E. Hutchison, J. C. Warner, *Organizers*

1:00 — Nanotechnology. **J. Hutchison**

1:45 — Polymers. **E. J. Beckman**

Capital Room

Green Engineering Education Student Workshop

M. Abraham, S. Austin, and N. Nguyen *Organizers*

1:00 — Petroleum refining/ethylene manufacturing: Using HRVOC as a case study. **D. Allen**

1:45 — Bio-based polymers and materials: Composite materials made from soybean oils. **R. Wool**

2:30 pm – 4:30 pm

Parkview Room

Green Chemistry and Engineering Education Student Workshop

M. Abraham, S. Austin, J. E. Hutchison, N. Nguyen, and J. C. Warner, *Organizers*

2:30 — Life cycle assessment as it applies to energy. **D. Allen and S. Austin**

3:30 — Impacts of chemical processes to the environment: Understanding eco-efficiency. **A. Kircherer**

4:15 — Closing Remarks. **Organizers**

5:30 pm 2005 Presidential Green Chemistry Challenge Awards Ceremony

National Academy of Sciences – Auditorium

(address….?)

June 21, TUESDAY MORNING

8:00 am -9:00 am Keynote Address

Ballroom

Beyond the Molecular Frontier: Green Approaches to a Sustainable Future.

Professor Ronald Breslow
University Professor, Chemistry and Biology
Columbia University

9:00 am - 10:00 am Visions for the Future: Panel Discussion

Ballroom

P. T. Anastas, *Organizer, Presiding*

Dr. Arthur B. Ellis, Chemistry Division Director, National Science Foundation

Professor Martyn Poliakoff, School of Chemistry, University of Nottingham

Janine M. Benyus, Biomimicry Guild (invited)

10:00 am —10:30 am Tea and Coffee Break

10:30 am — 12:00 pm Technical Sessions

Ballroom

Green Chemistry Awards I

R. E. Engler, *Organizer, Presiding*

10:30 —1. 2005 Academic Award Winner.

11:15 —2. 2005 Small Business Award Winner.

Council Room

Nanotech and the Environment I

J. E. Hutchison, *Organizer*
B. Karn, *Organizer, Presiding*

10:30 —3. Environmentally-benign nanomanufacturing: Merging green chemistry and nanoscience. **J. E. Hutchison**, L.C. McKenzie

11:00 —4. Green chemistry considerations in nanomanufacturing. **J. C. Warner**

11:30 —5. Advantages of tunable CO_2 solvent systems in metallic nanoparticle deposition and separation processes. **P. W. Bell**, M. C. McLeod, M. Anand, C. B. Roberts

Parkview Room

Green Synthesis I

S. V. Malhotra, *Organizer, Presiding*

10:30 —6. Design of dehydrative condensation catalysts directed toward GSC. **K. Ishihara**

11:00 —7. Novel chemical transformation in ionic liquids. **J. S. Yadav**

11:30 —8. Photochemistry vs. catalysis in green synthesis: A comparison in arylation reactions. **A. Albini**, M. Fagnoni

Washington Room

Catalysis in Water I

P. Savage and S. Kobayashi, *Organizers*
C.-J. Li, *Organizer, Presiding*

10:30 —9. Green chemistry for organic synthesis. **H. Alper**

11:10 —10. Homogeneous catalysis in aqueous medium: Applications in organic synthesis. **J.-P. Genêt**

11:40 —11. Efficient transition metal catalysts in fine organic synthesis. **I. P. Beletskaya**

Capital Room

Green Chemistry and Engineering Metrics I

D. Constable, *Organizer, Presiding*

10:30 —12. Evaluating metrics for green chemistries: Information and calculation needs. **R. L. Smith**, M. A. Gonzalez

11:00 —13. Metrics and computer-aided tools for assessing sustainability of chemical processes and products. **D. Shonnard**

11:30 —14. Concepts toward a sustainable synthesis design. **M. Eissen**, J. O. Metzger

12:00 —15. BASF eco-efficiency method as sustainable decision tool. **A. Kicherer**

Federal Room

Green Chemistry and Engineering Curriculum Development I

J. E. Hutchison, *Organizer*
J. C. Warner, *Organizer, Presiding*

10:30 —16. Designing green catalytic oxidation technologies. **T. J. Collins**

11:00 —17. GEMs for chemists: An interactive database of greener education materials. **J. A. Haack**

11:20 —18. Modules for incorporating green engineering into the chemical engineering curriculum. **R. P. Hesketh**, C. S. Slater

11:40 —19. Teaching teachers to teach green engineering from a student perspective. **S. Helak**, **J. Manzer**, **N. Austin**

12:00 pm —1:30 pm Lunch Break

June 21, TUESDAY AFTERNOON

1:30 pm — 5:00 pm Technical Sessions

Ballroom

Green Chemistry Awards II

R. E. Engler, *Organizer, Presiding*

1:30 —20. 2005 Focus Area 1 Award Winner.

2:15 —21. 2005 Focus Area 2 Award Winner.

3:00 —22. 2005 Focus Area 3 Award Winner.

Council Room

Nanotech and the Environment II

B. Karn, *Organizer*
J. E. Hutchison, *Organizer, Presiding*

1:30 —23. Supramolecular design of a nanoporous material. **S. W. Gordon-Wylie**, S. M. McCarthy, G. R. Clark

2:00 —24. Green nanotechnology though industrial ecology tools. **B. Karn**

Parkview Room

Green Synthesis II

S. V. Malhotra, *Organizer, Presiding*

1:30 —25. Microwave-assisted chemistry: Synthesis of amines and heterocycles *via* carbon-nitrogen bond formation in aqueous media. **R. S. Varma**, Y. Ju

2:00 —26. Synthesis of a selective estrogen receptor modulator. **J. L. Leazer, Jr.**, A. Kassim, Z. Song, A. King, M. Waters, F. Lang, D. Zewge, M. Bio, G. J. Javadi, D. Tschaen, P. Dormer

2:20 —27. Salt-free process to epichlorohydrin. **J. M. Renga**, R. A. Periana, K. A. Frazier

2:40 —28. Methylenation of aldehydes and ketones using dimethyl carbonate and triphenylphosphine. **J. M. Renga**, K. A. Frazier

Washington Room

Catalysis in Water II

C.-J. Li and S. Kobayashi, *Organizers*
P. Savage, *Organizer, Presiding*

1:30 —29. Lewis acid catalysis in aqueous media. **S. Kobayashi**

2:00 —30. Water-soluble ligands from carbohydrates for asymmetric catalysis. **T. V. RajanBabu**, Y.-Y. Yan, S. Shin

2:30 —31. Catalytic asymmetric carbon-carbon bond formation in water in the presence of surfactants. **D. Sinou**

3:00 — Intermission.

3:30 —32. Aqueous phase catalytic hydrogenation of *alpha*-substituted organic acids. **J. E. Farrugia**, J. E. Jackson, D. J. Miller

3:50 —33. Green decontamination system for chemical and biological weapons of mass destruction. **T. J. Collins**, D. Banerjee, S. Khetan, A. Chanda

4:10 —34. Oxidative coupling revisited: Solvent-free/heterogeneous/in water. **P. J. Wallis**, K. J. Booth, J. L. Scott, A. F. Patti

4:30 —35. Stereoselective synthesis in water: Targeting small heterocyclic compounds. **U. M. Lindstrom**

4:50 —36. Rh(II) catalyzed intramolecular C-H insertion of diazo substrates in water. **C. A. M. Afonso**, N. R. Candeias, P. M. P. Gois

Capital Room

Green Chemistry and Engineering Metrics II

D. Constable, *Organizer, Presiding*

1:30 —37. Evaluation tools for green and sustainable chemistry. **I. Yasui**

1:50 —38. Green degree approach: A new methodology for ranking environmental friendly chemical processes routes. **X. Zhang**, **S. Zhang**

2:10 —39. Three key engineering tools to analyze how green a process is, part 1: Green Scar, Green Area Classification and G-Analysis. **J. García Serna**, M. J. Cocero Alonso

2:30 —40. Three key engineering tools to analyze how green a process is, part 2: Case study: Terephthalic acid synthesis from *para*-xylene by selective partial oxidation in sc-H_2O. **J. García Serna**, M. J. Cocero Alonso, M. Santos Martínez

2:50 —41. Chemistry-based design process to create environmentally benign consumer products: The Greenlist^{TM} Process. **D. Long**, J. A. Weeks

3:10 — Intermission.

3:30 —42. Hierarchical metrics of assessment of green chemical technologies. **A. Lapkin**

3:50 —43. Integrating green chemistry into metrics and design criteria for industrial and institutional cleaning products. **R. McFadden**, **L. G. Heine**

4:10 —44. Biobased Products Compliance Analytical System (BBP-CAS). **G. R. Thompson**

4:30 —45. "Green" Product and Munitions Compliance Analytical Systems (GP-CAS and G-MACS). **G. R. Thompson**

Federal Room

Green Chemistry and Engineering Curriculum Development II

J. C. Warner and J. E. Hutchison, *Organizers, Presiding*

1:30 —46. Green chemistry education at the beginning level. **S. E. Manahan**

1:50 —47. Integrating the principles of green engineering in the project-based process synthesis curriculum. **S. A. Morton III**, R. M. Counce

2:10 —48. Green Chemistry at Wellesley College: The development of a new course for January 2005 Wintersession. **D. K. Wicht**

2:30 —49. Exposing green chemistry to non-chemistry majors. **A. F. Patti**, J. L. Scott

2:50 — Intermission.

3:30 —50. Transforming the organic chemistry laboratory experience with greener laboratory experiments. **J. E. Hutchison**, L. C. McKenzie, K. M. Doxsee

4:00 —51. "Green" synthesis intended for the undergraduate organic chemistry laboratory. **C. J. Kimmell II**, J. Bennett

4:20 —52. Introducing green chemistry in sophomore organic chemistry lectures and laboratories. **M. Hunsen**

4:40 —53. Development of a green organic chemistry laboratory: Principles, practices and procedures. **T. E. Goodwin**

Council Room

Sustainable Energy

S. W. Gordon, *Presiding*

3:30 —54. Alternative chemical and fuel feedstocks from Ponderosa pine wood treated in supercritical methanol. **J. A. Soria**, A. G. McDonald, S. Shook, B. He

3:50 —55. Green approaches to printable nanoparticle thin film solar cells.

O. I. Asensio, V. K. Kapur

4:10 —56. Making biodiesel from waste vegetable oil. **S. W. Gordon**

4:30 —57. Methyl ester of sal oil as a substitute to diesel fuel: A study on its preparation, performance and emissions in direct injection diesel engine. **N. Vedaraman**, S. Puhan, B. V. Bharat Ram, **B. V. Ramabrahmam**

Ballroom

Design for Degradation: Biodegradable and Biobased Materials I

R. Narayan, *Organizer, Presiding*

3:30 —58. Bio-based composite materials for structural applications. **M. A. Dweib**, B. Ho, H. W. Shenton III, R. P. Wool

3:50 —59. Novel thermosetting materials from commercially available vegetable oils: Synthesis and their structure-property relationships. **D. D. Andjelkovic**, M. Valverde, P. Henna, F. Li, R. C. Larock

4:10 —60. Synthesis of biodegradable polymers from itaconic anhydride and stearyl methacrylate. **S. Shang**, R. A. Weiss, S. J. Huang

Parkview Room

Role of Supercritical Carbon Dioxide

M. Poliakoff, *Presiding*

3:30 —61. Supercritical fluids and green chemistry: Successes and challenges. **M. Poliakoff**, P. Licence

4:10 —62. Green resolution in pharmaceutical process research: Rapid access to kilograms of enantiopure intermediates using preparative SFC. C. J. Welch, **W. R. Leonard, Jr.**, M. Biba, J. O. Dasilva, D. W. Henderson, P. Sajonz

4:30 —63. Transport properties of gas-expanded liquids. **M. E. Janakat**, C. A. Eckert, C. L. Liotta, X. Lu, N. Maxey

4:50 —64. Supercritical fluid deposition of barrier layers for microelectronic devices. **S. A. O'Neil**, J. J. Watkins

5:10 —65. Effects of supercritical carbon dioxide on the zeolite-based heterogeneous acylation of anisole. **Y. G. Adewuyi**

5:30 —66. Supercritical fluid (carbon dioxide with cosolvents) extraction of cholesterol from cow brain: Extraction and modeling. **N. Vedaraman**, C. Srinivasakannan, B. V. Ramabrahmam, P. G. Rao, G. Brunner

5:50 —67. Novel method to fabricate dual structure of porous silica: With silk as template in supercritical CO_2. **Q. Xu**

5:00 pm - 7:00 pm General Poster Session I

Ballroom

K. E. Parent, *Organizer*

Odd numbered poster presenters should be stationed at their posters 5:30-6:15 p.m.

Even numbered poster presenters should be stationed at their posters 6:15-7:00 p.m.

68. Super-atomization of fluids in supercritical media. **A. E. Alkhalidi**

69. SaFE: A new concept for plant protection. **Y. Arimoto**

70. Promoting cleaner production in industries in Ethiopia. **N. Asfaw,** D. Yilma, G. Gebeyehu

71. Development of a novel electrochemical cell for the production of sodium chlorate from sodium chloride. **M. A. Aziz**

72. New cost-effective, environmentally benign method for PCB reduction in azo pigment synthesis. **N. Bayarri**, C. Estevez, J. Castells

73. Incorporating environmental and green chemistry into the liberal arts college chemistry curriculum. **D. M. Brown**, C. D. Hauser

74. Green chemistry curriculum applications in teaching and research at

Bridgewater State College. **E. J. Brush**

75. Noncovalent forces in dye sensitization of titanium dioxide solar energy devices. **T. E. Cain**, J. C. Warner

76. Lab scale feasibility studies of organic reactions in supercritical media: Technical considerations. **R. P. Ciccolini**, S. M. Paap, **M. Fröling**, A. J. Allen, J. W. Tester, J. R. Dunetz, R. L. Danheiser, A. B. Holmes, C. Smith, M. W. Tsang

77. Preparation and potentially environmental application of Pt/TiO_2-nanotube catalysts. **S.-H. Chien**, M.-C. Kuo, Y.-C. Liou

78. Surface modified silica gel for bio-extraction of chromium from tannery effluent affected sites: Designing of a greener analytical method. **S. Chopra**, R. K. Sharma, A. Adholeya, P. Pant

79. Wash n Walk floor care system. **B. Cords**, S. Lentsch

80. Formula 1 laundry system. **B. Cords**, T. Klos

81. Comparison of the effect of temperature in aqueous biphasic systems (ABS) and aqueous biphasic extraction chromatographic resins (ABEC®). S. T. Griffin, **M. Dilip**, S. K. Spear, R. D. Rogers

82. Towards greener environmental remediation: Use of aqueous biphasic extraction chromatographic resins (ABEC®) for perchlorate removal. **M. Dilip**, S. T. Griffin, S. K. Spear, R. D. Rogers

83. Developing a student lead undergraduate environmental research organization: The Society of Environmental Engineers and Scientists. **P. S. Dimick**, A. S. Baker, L. S. Vanzler, A. D. Kney, S. A. Morton III, S. E. Mylon

84. SOLVSAFE Project: Advanced safer solvents for innovative industrial eco-processing. **C. Estevez**

85. Use of ionic liquids as alternative NMR solvents for the study of natural polymeric materials in their native state. **D. A. Fort**, G. Moyna, P. Moyna

86. Green chemistry and benign chemistry for the synthesis of an antimalarial drug. T. Ellison, t. de Souza, S. Qadeer, **J. M. Fortunak**

87. Novel approach to development of bio-based specialty plastics: Production of D-lactic acid by bacterial fermentation of aged rice and synthesis of stereoblock poly(lactic acid) by direct polycondensation. **K. Fukushima**, Y. Kimura

88. Friedel-Crafts acylation process in ionic liquids. **L. Galia**, C. Estevez, J.

Castells

89. Development of hydroxyapatite-supported palladium catalysts for environmentally-friendly organic syntheses. **T. Hara**, K. Mori, T. Mizugaki, K. Ebitani, K. Kaneda

90. Proposal for a new metrics for GSC (Part 2): Evaluation result of electrolytic soda processes as a case study. I. Yasui, **K. Hiyoshi**, T. Goto, M. Kitajima, Y. Naito

91. Synthesis and characterization of some biodiesel constituent. **R. D. Hunashal**, P. Ronad

92. Halochromate catalyzed oxidation of alcohols and aldehydes. **M. Hunsen**

93. Expanded starch as renewable separation medium for column chromatography. **A. J. Hunt**, J. H. Clark, J. J. E. Hardy, F. M. Kerton, V. L. Budarin, F. E. I. Deswarte

94. Isolation of long-chain aliphatic alcohols from beeswax using lipase-catalyzed methanolysis in supercritical carbon dioxide. **M. A. Jackson**, F. J. Eller

95. Ultrasonically activated facile synthesis of 2-methoxy-3-methyl-1,4-benzoquinone using developed methodology in aqueous media. G. L. Kad, V. Singh, **V. Sapehiy**

96. Metrics for GSC. Y. Naito, **M. Kitajima**, T. Goto, I. Yasui

97. Generation of endocrine disrupting chemicals from plastics and its biodegradation. **K.-O. Kwak**, S. Yada, S.-Y. Chung, Y. Kodera, K. Saido

98. New aspect of green chemistry: Efficient C-C bond formation methods *via* the cross-dehydrogenative-coupling (CDC) reaction. **Z. Li**, P. D. MaCleod, C.-J. Li

99. Synthesis of β-amino alcohols in pyridinium-based ionic liquid. R. P. Andal, **S. V. Malhotra**

100. Green Chemistry Network of Spain. **R. Mestres**

101. Influence of processing methods and fiber length on performance of kenaf fiber reinforced soy protein based biocomposites. W. Liu, **M. Misra**, L. T. Drzal, A. K. Mohanty

102. Study of the kinetics of the first reaction in the new tandem isomerization-telomerization reaction. **L. T. Murciano**, **A. Lapkin**

103. Highly atom-economical addition of active methylenes to alkenes in ionic liquids. **R.-V. Nguyen**, N. Eghbali, C.-J. Li

104. Production of biogas by anaerobic digestion of fortified animal waste. **E. S. Njoku, Jr.**

105. Manganese-substituted carbonic anhydrase as a new peroxidase: Enantioselective epoxidation. **K. Okrasa**, R. J. Kazlauskas

106. Control of transition state geometry through noncovalent derivatization. **J. E. Pyers IV**, J. C. Warner

107. Base catalyzed 2,4,6-trisubstituted pyrimidines: Ecofriendly technique. M. Kidwai, **S. Rastogi**

108. Fluorescence-based assay for DNA damage induced by toxic industrial chemicals. **K. R. Rogers**, S. Kailasam

109. Environmental chemistry field trip: Topics for Yellowstone National Park. **J. Rosentreter**, R. Rosentreter, M. Fisher

110. Polymerization to form poly(phenyleneoxide)s in water. **K. Saito**, H. Nishide

111. Friedel-Crafts acylation reactions in dense phase CO_2. **V. R. Sarsani**, M. A. Harmer, K. W. Hutchenson, B. Subramaniam

112. Novel and stereoselective glycosidations using environmentally benign and designable ionic liquids. **K. Sasaki**, C. Yamada, S. Matsumura, K. Toshima

113. Development of green chemical synthesis by solid strong base catalysts. **T. Seki**, M. Onaka

114. Green chemistry in an AP chemistry class. **M. G. Sibert**

115. Restructuring of curriculum for Indian universites. **I. T. Sidhwani**

116. Highly atom economical carbon-carbon bond formation in aqueous media. **R. Skouta**, C.-J. Li

117. Electrolytic remediation of chromated copper arsenate wastes. **H. A. G. Stern**, D. R. Sadoway, J. W. Tester

118. Phase change materials from fats and oils. **G. J. Suppes**, W. R. Sutterlin, C.-W. Chiu

119. Effect of sub-critical water hydrolysis on metal ion extraction by crude squid

oil and free fatty acids from metal aqueous solution. **O. Tavakoli**

120. Potential for using green technologies for biotransformation of PCBs in contaminated sludge. **J. Tharakan**

121. Palladium catalyzed cross-coupling of silylamines in supercritical carbon dioxide. A. B. Holmes, **M. W. Tsang**, C. J. Smith, R. L. Danheiser, J. W. Tester

122. Education for sustainability: A combining actor. **G. Tuncer**

123. Green & Sustainable Chemistry Network in Japan. **K. Uchino**, K. Matsuyama

124. Experimental investigation of mahua oil (*Madhuca indica* seed oil) into biodiesel. **N. Vedaraman**, S. Puhan, B. V. Ramabrahmam

125. Mahua oil (*Madhuca indica* seed oil) alkyl esters as a substitute to diesel: Preparation, performance and emission in direct injection diesel engine. **N. Vedaraman**, S. Puhan, B. V. Bharat Ram, **B. V. Ramabrahmam**

126. Novel integrated process for beneficial use of waste tires. **B. M. Weiss**, M. J. Castaldi

127. Evidence for multi-electron reduction of organic halides with iron porphyrins anchored to nanocrystalline TiO_2 thin films. **J. D. Wnuk**, S. O. Obare, G. J. Meyer

128. Green oxidation of thiophenes. **J. M. Workman**, B. C. Grieb

129. Photoreduction of CO_2 to renewable energy *via* photocatalysis. **J. C. S. Wu**

130. Novel solid acid catalyst UDCaT-5: Enhancement in activity of acid-treated zirconia—Effect of treatment with chlorosulfonic acid *vis-à-vis* sulfuric acid. **G. D. Yadav**, **A. D. Murkute**

131. Selective O-alkylation of hydroquinone with dimethyl carbonate. **G. D. Yadav**, A. Pawankumar

132. Selective synthesis of thymol over novel superacidic catalyst UDCaT-5. **G. D. Yadav**, G. S. Pathre

133. Waste minimization with cascade engineered synthesis of bisphenol-A from cumene hydroperoxide and phenol using Heteropoly acid supported clay catalysts. **G. D. Yadav**, S. S. Salgaonkar

134. Convergence of miniaturized, high throughput chromatographic technologies required for the analysis and isolation of new biomolecular targets

of green chemistry. **Y. Yin**, R. I. Boysen, M. T. W. Hearn

135. Comparison study on new technique with microwave-assisted and ultrasonic extraction flavonoids from leaves of *Hippohase rhamnoides L*. **H. R. Zhang, Sr.**

136. Investigation of adsorbed impurities extraction from palladium catalyst under supercritical and near-critical conditions. **X. Zhang**, B. Zong, X. Meng, E. Min

137. Desulfurization of fluid catalytic cracking gasoline by photochemical treatment. **D. Zhao**, C. Liu, X. Zhang, L. Chen, S. Ma, Y. Liu, Z. Zhang

138. Organoclay filled bio-based elastomers: Structure and properties. **L. Zhu**, R. P. Wool

June 22, WEDNESDAY MORNING

8:00 am - 9:00 am Keynote Address

Ballroom "TBA"

Professor George M. Whitesides

Woodford L. and Ann A. Flowers University Professor

Harvard University

9:00 am — 9:30 am Tea and Coffee Break

9:30 am — 12:00 pm Workshop

How to Write a Presidential Green Chemistry Challenge Nomination

Location: U.S. Environmental Protection Agency

R. E. Engler, *Organizer*

9:30 am — 12:00 pm Technical Sessions

Ballroom

International Efforts in Green Chemistry and Engineering

N. Asfaw, *Presiding*

9:30 —139. Building up a roadmap for green chemistry in South America. **O. Vainstok**

9:50 —140. Education for sustainability: Indications of a green curriculum application in Turkey. E. Alp, **H. Ertepinar**, C. Tekkaya, G. Tuncer, A. Yilmaz

10:10 —141. Green Chemical Technology Roadmap 2004: A UK perspective. **N. Hargreaves**

10:30 —142. Green chemistry in Ethiopia. **P. Licence**, N. Asfaw, M. Poliakoff

10:50 —143. Interuniversity Green Chemistry Ph.D. Program in Spain. **S. V. Luis**, C. Estevez

11:10 —144. Using collaboration technology to progress and promote green chemistry. **W. G. Russell**, K. M. C. Dye, T. Flanagan

11:30 —145. NOP: An international organic chemistry lab course for sustainability. **J. Ranke**, R. Störmann, P. Tundo, D. Lenoir, B. Koenig

Washington Room

Design for Degradation: Biodegradable and Biobased Materials II

R. Narayan, *Organizer, Presiding*

9:30 —146. Ecoflex®: 100% biodegradable plastic. **K. A. Edwards**

10:00 —147. BioPlastics in Europe: Market development, legislation, framework. **J. Reske**

10:30 —148. Biopolymer nanosphere adhesives. **S. Bloembergen**

11:00 —149. Biobased plastics and fibers from corn: The NatureWorks

PLA Story. **P. R. Gruber**

11:30 —150. Biodegradable plastics: Finding a place in today's markets. **S. A. Mojo**

Capital Room

Green Synthesis III

S. V. Malhotra, *Organizer, Presiding*

9:30 —151. Nexus between green synthetic transformations and soil chemistry. **A. F. Patti**, J. L. Scott

9:50 —152. Green chemistry in the redesign of the Pregabalin process. **J. Tao**, L. Tully, Y. Dumond, P. Kelleher, M. McLoughlin, P. O'Neill, S. Hu, C. Martinez

10:10 —153. Cleaner production of epichlorohydrin. **I. Ahmad**

10:30 —154. Green synthesis of novel macrocycles and their diverse supramolecular properties. **L. T. Higham**, U. P. Kreher, C. L. Raston, J. L. Scott, C. R. Strauss

10:50 — Intermission.

11:00 —155. Enzymatic synthesis of diphenyl methyl mercapto butyrate (DMMPB) under microwave irradiation. **G. D. Yadav**, P. S. Lathi

11:20 —156. Green chemistry tools in developing synthetic methodologies. **B. A. Roberts**, M. T. W. Hearn, C. R. Strauss

11:40 —157. Greener routes in organic preparations. Microwave-assisted synthesis of banana-shape liquid crystals. **K.-T. Liu**, C.-C. Hsieh, T.-J. Hsu, Y.-S. Liao

Federal Room

Catalysis in Water III

C.-J. Li and P. Savage, *Organizers*
S. Kobayashi, *Organizer, Presiding*

9:30 —158. Water: The ultimate green solvent for organic synthesis. **C. L. Liotta**, C. A. Eckert, J. P. Hallett, J. S. Brown III, S. A. Nolen, P. Pollet, J. Lu

10:10 —159. Heterogeneous aquacatalysis with amphiphilic resin-

supported palladium complexes. **Y. Uozumi**

10:40 —160. Homogeneous catalysis in high-temperature water. **P. E. Savage**, S. E. Hunter, C. Comisar

11:10 —161. Development of A^3-coupling and AA^3-coupling in water. **C.-J. Li**, C. Wei

11:40 —162. Ruthenium catalysts as contributors to green chemistry. D. Sylvie, C. Ricardo, B. Christian, **P. Dixneuf**

Parkview Room

Toxicology in Assessing Green Chemistry and Engineering Approaches I

K. R. Rogers, *Organizer*
T. J. Collins, *Organizer, Presiding*

9:30 —163. Toxicity assessment for freen chemistry: Methods, insights, uncertainty and ignorance. **J. Ranke**, B. Jastorff

10:10 —164. Role of the National Toxicology Program in green chemistry. **M. J. Hooth**, K. Thayer

10:40 —165. Linking mechanistic ecotoxicology and green chemistry within the pharmaceutical industry. **D. B. Huggett**, K. L. Toffer, R. T. Williams

11:10 —166. New signals from toxicology identify design opportunities for green chemistry. **J. P. Myers**

Council Room

Product Lifecycle

C. J. Ryan and V. M. Thomas, *Organizers, Presiding*

9:30 —167. Beyond the product: New approaches to eco-innovation. **C. J. Ryan**

10:10 — Discussion.

10:20 —168. Screening life cycle assessment of oxygenated gasoline alternatives. **R. L. Smith**, J. P. Abraham, J. C. Bare, M. A. Curran

10:40 —169. Assessment of new technologies: Case study of gasoline

oxygenates. **V. M. Thomas**, J. M. Davis

11:00 —170. Comparative life cycle assessment of biolubricants and mineral oils. **S. Miller**, T. L. Theis, A. E. Landis

12:00 pm — 1:30 pm Lunch Break

June 22, WEDNESDAY AFTERNOON

1:30 pm — 5:00pm Workshop

Sustainability 101: Metrics and Best Practices

Location: U.S. Environmental Protection Agency

E. Beaver, *Organizer*

1:30 pm — 5:00 pm Technical Sessions

Ballroom

Green Chemistry Awards III

R. E. Engler, *Organizer, Presiding*

1:30 —171. Development and industrialization of the vapor phase Beckmann rearrangement process for the production of □-caprolactam. **M. Kitamura**

2:10 —172. Development of environmentally benign aerobic oxidation method. **Y. Ishii**

2:50 — Intermission.

3:30 —173. Development of environmentally friendly heterogeneous catalysts using unique properties of inorganic crystallines. **K. Kaneda**

4:10 —174. Novel non-phosgen polycarbonate production process using by-product CO_2 as starting material. **I. Fukawa**, S. Fukuoka, M. Kawamura, K. Komiya, M. Tojo

Washington Room

Design for Degradation: Biodegradable and Biobased Materials III

R. Narayan, *Organizer, Presiding*

1:30 —175. Biobased and biodegradable polymeric materials. **R. Narayan**

2:00 —176. Preferred procurement program for biobased products: Status. **M. Duncan**

2:30 —177. Life cycle analysis of products made with bio-based 1,3-propanediol. **C. Muska**, C. M. Alles, S. R. Veith, R. Jenkins

3:00 — Intermission.

3:30 —178. Starch-based bioproducts in encapsulation applications and food packaging. **G. M. Glenn**, S. H. Imam, C. N. Ludvik, D. F. Wood, A. P. Klamczynski, W. J. Orts, B. S. Chiou

4:00 —179. Biobased materials of controlled performance. **S. H. Imam**, G. M. Glenn, W. J. Orts, C. Bor-Sen, A. P. Klamczynski, D. F. Wood

4:30 —180. Investigation of polyhydroxyalkanoates cast films as a potential biodegradable food packaging. **J. A. Ratto**, C. Thellen, D. Froio, E. Culhane, R. Whitehouse, A. Padwa

5:00 —181. Design and engineering starch foam plastics. **T. Colonnese**, R. Narayan

Capital Room

Environmentally Beneficial Catalysis I

R. V. Chaudhari, *Organizer*
B. Subramaniam, *Organizer, Presiding*

1:30 —182. Heteropoly and perovskite catalysts for green/sustainable chemistry (GSC) and a thought on the promotion of GSC. **M. Misono**

2:00 —183. Tunable solvents for sustainable technology. C. A. Eckert, **C. L. Liotta**, J. P. Hallett, P. Pollet, J. Lu, D. M. Bush

2:30 —184. Emerging concepts and environmentally benign catalytic processes. **R. V. Chaudhari**, S. P. Gupte

3:00 — Intermission.

3:30 —185. Practice of green chemistry through cascade engineered

phase transfer catalysis and acid catalysis. **G. D. Yadav**

4:00 —186. Enantioselective catalytic microreactors based on monolithic polymers. **S. V. Luis**, B. Altava, M. I. Burguete, E. García-Verdugo

4:20 —187. Smart biocatalysis for the formation of conformationally sensitive conducting polymer nanocomposites. **A. L. Cholli**

4:40 —188. Synthesis and application of hollow titanium silicate zeolite (HTS). **M. Lin**, B. Zhu, X. Shu, X. Wang

Federal Room

Entropy and Materials

B. Bakshi and T. G. Gutowski, *Organizers, Presiding*

1:30 —189. Ecothermodynamics: From dead matter to living materials. **J. de Swaan Arons**

2:00 —190. Materials entropy, economics and policy. **M. Ruth**

2:30 —191. Entropy, exergy and material flow in industrial and ecological systems. J. L. Hau, N. U. Ukidwe, **B. Bakshi**

3:00 — Intermission.

3:30 —192. Entropy-based metrics for sustainability assessments in green manufacturing. **D. P. Sekulic**

4:00 —193. Mixing entropy and product recycling. **T. G. Gutowski**, J. B. Dahmus

4:30 —194. Developing sustainable technology: Quantitative assessment metrics from thermodynamics. **J. Dewulf**, H. Van Langenhove

Parkview Room

Toxicology in Assessing Green Chemistry and Engineering Approaches II

T. J. Collins, *Organizer*
K. R. Rogers, *Organizer, Presiding*

1:30 —195. Tba. **W. Farland**

2:10 —196. Harp-N-Tek: An environmentally sound solution for crop health industry. **Z. Wei**

2:40 — Intermission.

3:30 —197. SAR knowledge acquisition from a global dataset: Toxicity and melting point. **K. Yano**, N. Yano

4:00 —198. Need for incorporating understanding of toxicity and ecotoxicity into green chemistry. **T. J. Collins**

Council Room

Non-Covalent Derivatization

M. J. Zaworotko, *Organizer*
W. Jones, *Presiding*

1:30 —199. Mechanical treatment: Solvent-less preparation of co-crystals and polymorphs. **W. Jones**

2:00 —200. Molecular dynamics in crystal in the presence of solvent vapor. **F. Toda**

2:30 —201. Role of co-crystals in supramolecular chemistry and drug formulation. **M. J. Zaworotko**

3:00 — Intermission.

3:30 —202. Template-controlled synthesis in the solid state: Quantitative syntheses in a solvent-free environment. **T. Friscic**, L. R. MacGillivray

3:50 —203. Green chemistry approaches to polymer – clay nanocomposites. **T. J. Pinnavaia**, S. Xue, M. Reinholdt, K. Triantafyllidis

4:10 —204. Green chemistry strategies using crystal-to-crystal reactions: Total syntheses of natural products with adjacent quaternary stereogenic centers. **M. A. Garcia-Garibay**, C. J. Mortko, M. Veerman, M. J. E. Resendiz

4:30 —205. Solvent-free environment of the solid state as a medium for constructing molecules. **L. R. MacGillivray**, T. Friscic, D. B. Varshney, G. S. Papaefstathiou

5:00 pm - 7:00 pm General Poster Session II

Ballroom

K. E. Parent, *Organizer*

(For details, please see Tuesday's 5:00 pm General Poster Session I listings)

June 23, THURSDAY MORNING

8:00 am - 9:00 am **Keynote Address**

Ballroom Molecular Catalysis: Today and Tomorrow.

Nobel Laureate Professor Ryoji Noyori

President
RIKEN (The Institute of Physical and Chemical Research)

9:30 am — 12:00 am **Workshop**

NSF Biorenewable Resources

Location: American Chemical Society

G. Schrader, *Organizer*

9:30 am — 12:00 pm **Technical Sessions**

Ballroom

Industrial Sustainability

M. A. Harmer and Q. Sun, *Organizers, Presiding*

9:30 —206. Developing sustainable process technology. **J. A. Kocal**

10:00 —207. Sustainable substitutes for ozone depleting substances and

compounds with high global warming potentials including HCFCs, HFCs, PFCs and halons. **K. T. Werner**

10:30 —208. Biorefinery concept: Using biotechnology to shift from crude oil to biomass feedstocks. **M. H. Emptage**

11:00 —209. Industrial process for the rearrangement of 3,4-epoxy-1-butene to 2,5-dihydrofuran in a phosphonium ionic liquid. **R. T. Hembre**

11:30 —210. Impacting producing of fertilizers on pollution of environment with heavy metals conditions of Uzbekistan. **S. Xolikulov**

12:00 —211. Industrial sustainability: A review of European initiatives. **C. Adams**

Federal Room

Life Cycle Assessment and Sustainable Design

T. G. Gutowski, *Organizer*
B. Bakshi, *Organizer, Presiding*

9:30 —212. Life cycle assessment using input-output models. **H. S. Matthews**

10:00 —213. Smoke-stack airborne emissions of a hot mix asphalt plant for life cycle inventory available data. R. Paranhos, **A. Ventura**, P. Monéron, A. Jullien

10:20 —214. Resilience engineering for sustainable systems. **J. Fiksel**

10:50 —215. Game-theoretic model for environmentally conscious material selection. **F. Lin**, L. Lin

11:10 —216. Incorporation of variability and uncertainty in life cycle assessments. **A. E. Landis**, T. L. Theis, S. Miller

11:30 —217. Multiscale statistical framework for hybrid life cycle assessment. N. U. Ukidwe, **B. Bakshi**

12:00 —218. Information technology for product lifecycle management. **V. M. Thomas**

Capital Room

Environmentally Beneficial Catalysis II

B. Subramaniam, *Organizer*
R. V. Chaudhari, *Organizer, Presiding*

9:30 —219. Green chemistry and catalysis in organic synthesis. **R. A. Sheldon**

10:10 —220. Ventures in the design of green homogeneous oxidation catalyst systems. **D. H. Busch**, B. Subramaniam

10:40 —221. Clean catalytic oxidation process for the chemical modifications of polysaccharides. **P. Gallezot**, A. Sorokin, S. L. Sorokina

11:00 —222. Minizymes. **S. W. Gordon-Wylie**, S. M. McCarthy, J. C. Morris, G. R. Clark

11:20 —223. Synthesis and characterisation of nanocrystalline TiO_2/RuO_2 catalysts for environmental applications. **A. O. Ibhadon**, Y. Yue, G. M. Greenway

11:40 —224. Studies on the vapor–phase photo–oxidation of methanol over nano–size titanium dioxide clusters dispersed in MCM–41 mesoporous material. **N. M. Gupta**, K. Bhattacharyya, D. Kumar, S. Varma, A. Tripathi

Washington Room

Alternative Synthesis I

J. L. Scott, *Organizer, Presiding*

9:30 —225. Synthesis of amino acids and peptides in ionic liquids. **S. V. Malhotra**

10:10 —226. Biocatalytic esterification of lavandulol in supercritical carbon dioxide using acetic acid as the acyl donor. **F. M. Kerton**, T. Olsen, G. Grogan, R. Marriott

10:40 —227. Green carbohydrate chemistry: Environmentally benign chemical glycosidations. **K. Toshima**

11:10 —228. Alternative syntheses using crude natural glycerin as a feed stock. **G. J. Suppes**, M. P. Dasari, W. R. Sutterlin

11:40 —229. Improved approach to the preparation of duloxetine and atomoxetine. **K. T. Lorenz**, M. A. Butchko

Parkview Room

Biobased Materials I

H. van Bekkum, *Organizer*
R. P. Wool, *Organizer, Presiding*

9:30 —230. Progress in carbohydrate conversion. **H. van Bekkum**

10:00 —231. Polysaccharide adhesive. **J. D. Combie**, J. Yavorsky

10:20 —232. Blends of cysteine-containing proteins. **J. R. Barone**

10:40 —233. Green processing of biopolymers and other value-added products from agricultural products. **D. E. Raynie**, W. R. Gibbons

11:00 —234. Starch modifications for co-continuous composite materials. **W. Thielemans**, A. Dufresne, M. N. Belgacem

11:20 —235. Green composites from recycled newspaper fibers and polyhydroxyalkanoate bioplastics: Challenges and opportunities. **A. K. Mohanty**, R. Bhardwaj

12:00 pm — 1:30 pm Lunch Break

June 23, THURSDAY AFTERNOON

1:30 pm — 5:00 pm Workshop

NSF Biorenewable Resources (cont…)

Location: American Chemical Society

R. E. Engler, *Organizer*

1:30 pm — 5:00 pm Technical Sessions

Ballroom

Industrial Success Stories I

R. Busch, *Organizer*
B. Cue Jr., *Organizer, Presiding*

1:30 —236. Green chemistry: An integrated component of R&D. **K. Cooper**

2:00 —237. Perspective on bio-industrial technology. **R. Busch**

2:30 —238. Ionic liquids: A BASF success story. **C. J. Emanuel**

3:00 — Intermission.

3:30 —239. Development of the aqueous-coated photothermographic material. **H. Tsuzuki**

4:00 —240. Discovery and development of a freen commercial process. **T. J. Grinter**

4:30 — Concluding Remarks.

Capital Room

Electrochemistry

J. W. Weidner and M. A. Matthews, *Organizers, Presiding*

1:30 —241. Recycling of post consumer tin cans using electrochemical methods. **J. M. Fenton**, J.-C. Lin, C. He, R. Venkataraman, A. Aldykiewicz

2:00 —242. Development of the brine electrolysis using an oxygen reduction cathode. **K. Saiki**, H. Aikawa, T. Osakabe, N. Okada, S. Nakamatsu, S. Katayama, N. Furuya

2:20 —243. H_2O_2 synthesis and oxidations by a H_2/O_2-fuel cell reactor. **I. Yamanaka**, T. Hashimoto, T. Onizawa, S. Takenaka, K. Otsuka

2:40 —244. Electrocatalytic hydrogenation of lactic acid using Ru/C electrodes. **T. S. Dalavoy**, J. E. Jackson, G. M. Swain, D. J. Miller

3:00 — Intermission.

3:30 —245. Kinetics of homogeneous reactions in ionic liquids using double potential step chronoamperometry. **J. W. Weidner**, I. M. AlNashef, M. A. Matthews

3:55 —246. Solvent-free ionic melts having lithium as the only mobile cation. **P. B. Hallac**, R. V. Rajagopal, O. E. Geiculescu, S. E. Creager, D. D. DesMarteau

4:20 —247. Tuning catalyst reduction potentials for organohalides

reactivity. **T. Ito**, S. O. Obare, G. J. Meyer

4:40 —248. Development of high capacity carbon material from coconut shell as anode for rechargeable lithium-ion batteries. **M. A. Aziz**, M. Alauddin

Federal Room

Solvent Selection

W. Leitner, *Organizer*
A. Curzons, *Organizer, Presiding*

1:30 —249. Using molecular models to select better solvents. **K. G. Joback**

2:10 —250. Glycol ether properties and potential uses as alternative solvents. **T. C. Frank**, S. P. Christensen, F. A. Donate, R. J. LaTulip, L. C. Wilson, J. E. Davis

2:50 —251. Understanding substitution reactions in ionic liquids. **J. B. Harper**, B. Y. W. Man, J. M. Hook

3:20 —252. Understanding ionic liquids: Links between chemical structure and solvation properties. **M. N. Kobrak**

3:50 —253. Green solvents for multiphase catalysis. **W. Leitner**

Washington Room

Alternative Synthesis II

J. L. Scott, *Organizer, Presiding*

1:30 —254. Enhanced applicability of green reaction media through alterations in chemical properties by physical influences. **C. R. Strauss**

2:10 —255. Chemistry under non-traditional conditions: Solvent-free synthesis using microwave irradiation. **R. S. Varma**

2:40 —256. Synthesis of amphiphilic copolymers in surfactant-free aqueous emulsion under the assistance of ultrasound. **L. Yan**, Q. Zhu

3:00 — Intermission.

3:30 —257. Developing green chemistry for organic synthesis. **C.-J. Li**

4:10 —258. From solvent-free reactions and ‘distillable’ ionic liquids to

novel multi-component reactions: Green chemistry tools for cleaner synthesis. **J. L. Scott**, C. R. Strauss

4:40 —259. Discovery of a new multi-component reaction through the use of an alternate reaction medium. **A. E. Rosamilia**, J. L. Scott, C. R. Strauss

Parkview Room

Biobased Materials II

R. P. Wool, *Organizer*
H. van Bekkum, *Organizer, Presiding*

1:30 —260. Selectivity: A challenge of catalysis for sustainable chemistry from bio- or agro-resources. **J. Barrault**, F. Jerome, Y. Pouilloux

2:00 —261. Synthesis and chemical recycling of green polyesters using environmentally Benign Catalyst. **S. Matsumura**

2:20 —262. Synthesis of surfactants and thickeners from carbohydrates *via* palladium-catalyzed telomerization of butadiene. **C. Pinel**, **P. Gallezot**

2:40 —263. Biocatalytically synthesized high performance macromolecular antioxidants. **A. L. Cholli**, V. Kumar, A. Dhawan, R. Kumar, S. Yang

3:00 — Intermission.

3:30 —264. Functional bio-polymer matrix composites *via* ionic liquid solution routes. **R. P. Swatloski**, J. H. Poplin, D. T. Daly, A. Haque, C. Mobley, R. D. Rogers

3:50 —265. Extraction of high value compounds from heather (*Calluna vulgaris*). **A. J. Hunt**, J. H. Clark, J. J. E. Hardy, F. M. Kerton

4:10 —266. Fracture behavior of triglyceride-based adhesives. **C. D. Lorenz**, M. J. Stevens, R. P. Wool

4:30 —267. Development of new elastomers from plant oils. **L. Zhu**, R. P. Wool

Council Room

Small Business Success Stories

A. Richards and J. B. Zimmerman, *Organizers, Presiding*

1:30 —268. EPA's small business innovation research (SBIR) program. **A. Richards**, **J. B. Zimmerman**

2:00 —269. Commercialization opportunities for green chemistry: A Maine example. **J. Ferland**

2:30 —270. Green chemistry as a strategic advantage for SMEs: A framework for integration into small business strategy. **S. B. Moore**

3:00 — Intermission.

3:30 —271. Small businesses find green chemistry a lucrative field. **S. Seydel**

4:00 —272. Lawn care in the United States is a billion dollar plus segment of the green industry. **P. E. Catron**

4:30 —273. Micell Technologies: Application of liquid and supercritical CO_2 to industrial processes in semiconductor processing, medical device manufacturing and textile treatment. **J. McClain**

June 24, FRIDAY MORNING

8:00 am — 9:00 am Keynote Address

Ballroom

Green Chemistry: Driving Sustainable Growth

Linda Fisher

Vice President and Chief Sustainability Officer

Dupont

9:30 am — 12:00 pm Workshop

NSF Biorenewable Resources (cont…)

Location: American Chemical Society

R. E. Engler, *Organizer*

9:30 am — 12:00 pm Technical Sessions

Washington Room

Industrial Success Stories II

B. W. Cue Jr., *Organizer*
R. Busch, *Organizer, Presiding*

9:30 —274. Clean and economic biocatalytic process for the key chiral intermediate for atorvastatin using three enzymes evolved to enable the process. **J. Grate**

10:10 —275. Case study on the environmental and economic advantages to early process research on a development candidate: The synthesis of CP-724,714. **D. H. B. Ripin**

10:40 —276. AstraZeneca SHE Triggers Model. **W. D. White**

11:10 —277. Environmentally friendly acrylic thermosets. **B. Weinstein**, G. Gappert

11:40 —278. Development of Nike brand footwear outsole rubber as environmentally preferred material. M. Predovic, **A. Chen**, **J. Yu**, T. Wilson, K. Ames, J. Bautista, J. Bailey-Darland

Capital Room

Fuel Cells I

J. S. Thrasher, *Organizer, Presiding*

9:30 —279. Proton-conducting fluorosulfonimide polymer electrolytes for fuel-cell power sources. **S. E. Creager**, D. D. DesMarteau

10:00 —280. New super proton-conductive, high acid-containing fluoropolymer PEMs from cured liquid precursors. **Z. Zhou**, J. M. DeSimone

10:30 —281. Miniature air/formic acid fuel cells based on surface-modified proton-conducting nanoporous silicon membranes. **K.-L. Chu**, R. Subramanian, R. I. Masel, M. A. Shannon

11:00 —282. Nafion®-PAMAM composites, micelles and solutions: New approaches to membrane electrode assembly (MEA) fabrication. **J. S. Thrasher**, L. Sun, H. Zhu, Z. Li, H. Wan, Y. Zhou, A. Waterfeld, S. C. Street, C. J. Cassady

11:30 —283. Towards the development of improved polymer electrolytes for fuel cell applications: Molecular modeling. **S. J. Paddison**

Ballroom

Environmentally Beneficial Catalysis III

B. Subramaniam and R. V. Chaudhari, *Organizers*
G. D. Yadav, *Presiding*

9:30 —284. Effect of H_2O_2 in conjunction with photocatalysis in a fluidized bed photocatalytic reactor. **M. F. Kabir**, E. Vaisman, C. H. Langford, A. Kantzas

9:50 —285. Photocatalytic decomposition of organic contaminants on new composite oxides under visible light irradiation. **J. Tang**, Z. Zou, J. Ye

10:10 —286. Bromide-assisted functionalization of alkenes and arenes with peroxides generated *in situ* by photoexcited heterogenized $W_{10}O_{32}^{4-}$. **A. Molinari**, A. Maldotti, G. Varani, S. Vaccari

10:30 —287. Novel additive for the *in situ* reduction of sulfur in FCC gasoline. **P. Wang**, H. Tian, J. Long

10:50 —288. Strategies in waste minimization with enhancements in rates using tri-liquid phase transfer catalysis: Insight into reduction of 4-nitro-*o*-xylene with sodium sulfide. **G. D. Yadav**, S. V. Lande

11:10 —289. ZrO_2-pillared clay: An efficient catalyst for solventless synthesis of biologically active multifunctional dihydropyrimidinones. **V. Singh**, V. Sapehiyia

Parkview Room

Biobased Materials III

R. P. Wool, *Organizer*
H. van Bekkum, *Organizer, Presiding*

9:30 —290. Bio-based materials: What shall we make? **J. Pierce**

10:10 —291. Progress in the commercialization of natural plastics. **J. Barber**

10:40 —292. Polyhydroxyalkanoate (PHA) production using activated sludge as microorganisms: Effect of different carbon sources. **S. Yan**, R. D. Tyagi, R. Y. Surampalli

11:00 —293. Biobased materials from triglycerides: Chemistry, physics and engineering. **R. P. Wool**

11:20 —294. Use of fatty acid monomers to make low VOC composite systems. **J. J. La Scala**, J. M. Sands, G. R. Palmese

11:40 —295. Bio-based foam synthesis from soybean oil. **L. M. Bonnaillie**, R. P. Wool

12:00 —296. New approaches to soy-based polyols. **G. J. Suppes**, P. Kiatsimkul, F.-H. Hsieh, Y.-C. Tu

Federal Room

Green Engineering: Process Design and Intensification

D. S. Schuster, *Organizer, Presiding*

9:30 —297. Process intensification: Microwave-initiated reactions using a continuous flow reactor. **R. J. J. Jachuck**, R. S. Varma, D. Selvaraj

9:50 —298. Inorganic membrane separations for emerging CO_2 technologies. **G. D. Bothun**, S. Ilias

10:10 —299. Zeolite membranes toward highly efficient synthesis of methanol. **M. Matsukata**, K. Sawamura, T. Izumi, Y. Sekine, E. Kikuchi, K. Sato, T. Nakane, T. Watanabe

10:30 —300. Novel, surface-treated anticorrosive pigments as chromate replacements. **W. J. van Ooij**, **L. Yang**, **A. Seth**, H. Manian

10:50 —301. Plasma processes for pretreatment of aluminum prior to adhesive bonding. **M. Gupta**, B. Bengu, F. J. Boerio

11:10 —302. Biobleaching of 100% cotton and cotton/polyester blends. C. Pang, **S. C. Ugbolue**, Q. Fan

11:30 —303. New packed bed photocatalytic reactor for gas-phase photocatalysis. **A. O. Ibhadon**, P. Falaras, I. Arabatzis

11:50 —304. Continuous production of biodiesel using intensified reactor technology. **R. J. J. Jachuck**, G. Pherwani, P. Leveson

12:10 —305. Water-based biphasic media for exothermic reactions: A novel green chemistry strategy for coumarin synthesis. **A. K. Bose**, M. S. Manhas, S. N. Ganguly, S. R. Pednekar, A. K. Jain, G. Chakraborty

Council Room

Green Chemistry and Engineering from A to Z

D. J. Raber, *Organizer, Presiding*

9:30 —306. Decision-making framework for studying ozone pollution in urban Atlanta. **V. C. P. Chen**, Z. Yang, M. E. Chang

9:50 —307. Unifying green chemistry resources for widespread public accessibility and use. **J. L. Young**, P. T. Anastas

10:10 —308. Cellular approach to continuous process chemistry in plant piloting. **T. Schwalbe**

10:30 —309. Controlled synthesis of hydroxyapatite by using polyelectrolytes. **M. Oner**, O. Dogan

10:50 —310. Green chemistry: Microwave-assisted one pot synthesis of novel formamide fungicides. **M. M. Bobylev**, L. I. Bobyleva

11:10 —311. Soybean- and castor oil-based thermosetting polymers. **E. Can**, R. P. Wool

11:30 —312. Buyrated kraft lignin as additive for unsaturated thermosetting polymers. **W. Thielemans**, R. P. Wool

12:00 pm — 1:30 pm Lunch Break

June 24, FRIDAY AFTERNOON

1:30 pm — 3:30 pm Technical Sessions

Washington Room

Industrial Success Stories III

B. W. Cue Jr. and R. Busch, *Organizers*
J. Solyst, *Presiding*

1:30 —313. Green chemistry: Theory vs. practice in a tough venue. **D. L. Hjeresen**

2:10 —314. Proven model for universal chemical reuse (Zero Waste). **P.**

Palmer

2:40 —315. Industrial sustainability exemplified by the thermal conversion process. **B. S. Appel**, T. N. Adams, P. J. Samson, L. A. Barone

Capital Room

Fuel Cells II

J. S. Thrasher, *Organizer, Presiding*

1:30 —316. Adsorption and oxidation of anode impurities on composite polymer electrolyte electrode. **J. W. Weidner**, V. A. Sethuraman

2:00 —317. New method for hydrolysis from chemical hydrides. **E. Y. Marrero-Alfonso**, J. R. Gray, T. A. Davis, M. A. Matthews

2:20 —318. Plug-in HEV roadmap to hydrogen economy. **G. J. Suppes**

2:40 —319. Tuning hydrogen content for improved PEMFC water management: A neutron radiography study. **B. Du**, D. L. Jacobson, G. Q. Wang, S. Eldrid, J. F. Elter, G. A. Eisman, M. Arif

3:00 —320. High temperature MEA development for PEM fuel cells. **J. M. Fenton**, L. J. Bonville, H. R. Kunz

Council Room

Greener Methods in Analytical Chemistry

E. Beary, *Organizer, Presiding*

1:30 —321. Bio-extraction of chromium from tannery effluent affected sites: A green analytical method. **R. K. Sharma**

1:50 —322. Detection of anionic surfactant and its removal from aquatic environment using low-cost adsorbent. **A. Pal**

2:10 —323. Trace determination of arsenic and its removal: An environmental overview. **T. Pal**

2:30 —324. Soil testing and use of integrated plant nutrient in combination with chemical fertilizers for sustainable agriculture. **N. V. Arora**

Parkview Room

Biobased Materials IV

H. van Bekkum, *Organizer*
R. P. Wool, *Organizer, Presiding*

1:30 —325. Adhesion properties of nanoscale protein polymers. **X. S. Sun**, X. Mo, X. Shen, J. M. Tomich, T. Iwamoto

2:00 —326. Self-assembled nanomaterials from renewable resources: A new paradigm. **G. John**

2:20 —327. Reactive compatibilization for biobased micro- and nano-composites. **J. Dorgan**, B. Braun

2:40 —328. 'Green' nanocomposites from cellulosic thermoplastics and organoclay for automotive application. **M. Misra**, H.-M. Park, L. T. Drzal, A. K. Mohanty, E. Lee, D. Mielewski

3:00 —329. Carbon nanotube composites from plant oil resins. **I. M. McAninch**, R. P. Wool

Federal Room

Politics and Economics of Green Chemicals

E. J. Woodhouse, *Organizer, Presiding*

1:30 —330. Political prospects for green chemistry, 2005. **E. J. Woodhouse**

2:00 —331. Defining green chemicals with stakeholder engagement. **L. G. Heine**

2:30 —332. Reorganizing knowledge for green chemistry: The case of electronics. **A. Iles**

3:00 —333. Political dimensions of green chemistry: A case study. **J. Howard**

3:30 —334. Chemicals' policy and green chemistry: Developments in California. **M. P. Wilson**

3:30 pm — 4:00 pm **Tea and Coffee Break**

4:00 pm — 5:00 pm **Closing Session**

Washington Room

Conference Wrap Up and Outcomes: Where Do We Go From Here?

P. T. Anastas, *Organizer, Presiding*