

## CURRICULUM VITAE

Robert H. Hurt

Professor of Engineering, Brown University

### EDUCATION

Ph.D. in Chemical Engineering, Massachusetts Institute of Technology 1987  
B.S. in Chemical Engineering, Michigan Technological University 1982

### PROFESSIONAL APPOINTMENTS

Director, Institute for Molecular and Nanoscale Innovation (IMNI) 2007-present  
Professor of Engineering, Brown University, Providence, RI 1999-present  
Editor for archival scientific journal *Carbon* 2003-present  
Scientific Co-founder of new venture *Banyan Environmental* 2009  
Editorial Board for *Engineering of Biomaterials* 2008-present  
Scientific advisory board for firm, *NanoTox* 2005-present  
Visiting Professor, Department of Chemical Engineering  
University of Sydney, NSW Australia 2002  
Editorial Board for archival Elsevier journal, *Combustion and Flame* 2003-2009  
Editorial board of archival review journal, *Progress in Energy  
And Combustion Science* 2006-present  
Associate Professor of Engineering, Brown University, 1994-1999  
Senior Member of the Technical Staff, Combustion Research  
Facility, Sandia National Laboratories, Livermore, CA 1990-1994  
Sachgebietsleiter, Central Research and Development, Bayer AG,  
Leverkusen Germany 1987-1990

### HONORS

Lee Hsun Research Fellowship on Materials Science,  
Institute of Metal Research, Chinese Academy of Sciences 2011  
Inaugural *Robert A. Meyer Award* of the American  
Carbon Society for paper and presentation at Carbon 2010  
(award to student advisee Xinyuan Liu) 2010  
Tau Beta Pi *Dedicated Faculty Award* for superior  
teaching, dedication and involvement with undergraduates 2010  
Graffin Lecture Award of the American Carbon Society 2004/2005  
Silver Medal of the Combustion Institute, awarded for the one  
outstanding paper at the 25th International Symposium on  
Combustion" conferred at the 26th Symposium in Naples, Italy 1996  
National Science Foundation CAREER Award,  
Chemical and Transport Systems 1996

Best poster in environmental section at fall national meeting of the American Institute of Chemical Engineers: "Nanoparticle adhesion leads to impaired locomotor function and mortality in adult <i>Drosophila</i> " (award to advisee Daniel Vinson)	2008
First Place in the AIChE Rhode Island Paper Competition (award to advisee Natalie Johnson)	2008
Outstanding poster awards at the 2007 National Meeting of the American Institute of Chemical Engineers (awards to advisees Natalie Johnson and Will Turnbull)	2007
Award for outstanding poster presentation at the Gordon Research Conference on Hydrocarbon Resources, Ventura, CA "Creation of New Carbon Forms using Nanoscale Liquid Crystal Surface Anchoring Templates" (R. Hurt)	2003
Best poster in the environmental section at the National Meeting of the American Institute of Chemical Engineers, "Novel Nanostructured Sorbents for Mercury Capture" (Award to advisee Shawn Manchester)	2006
Top student paper of the Society for Information Display Journal, given to joint paper of the Crawford / Hurt groups.	2005
Award for outstanding poster presentation at the Gordon Research Conference on Hydrocarbon Resources, Ventura, CA, "Self-Assembly Rules for Discotic Polyaromatic Hydrocarbons" (R.Hurt)	2001
National Science Foundation Graduate Fellowship	1983-1986
Bredenkamp Award at Michigan Technological University	1982
Chevron Scholarship at Michigan Technological University	1981

## **PROFESSIONAL ACTIVITIES**

International Advisory Committee for <i>Carbon2011</i> , Shanghai	2011
Chair, review panel for NIH nano-bio-informatics program	2010
Site review panel member for Center for the Environmental Implications of Nanotechnology, UCLA	2010
Member Brown University President's Science Council	2010
International Selection Committee for the Utz-Hellmuth Felcht Award for outstanding contributions to the field of carbon materials and ceramic materials.	2010
International Advisory Committee for <i>Carbon2010</i> , Clemson	2011
Reviewer for EPA US/UK joint program on nanotechnology and the environment (London panel, Dec 09)	2009

Co-organizer of symposium on biocompatibility for the 2009 fall national meeting of the Materials Research Society	2009
Reviewer for NSF SBIR program on nanotechnology	2009
Member of international scientific advisory board for <i>Carbon2009</i> (Biarritz, France)	2009
Invited participant in US-Korea and US-China workshops on nanotechnology.	2008
Member of Study Section for NIEHS SBRP program	2007
International Advisory Committee for CESEP conferences in 2009 and 2011	2009-11
Primary organizer of the workshop: Nanomaterials and Living Systems, involving New England researchers from Brown, MIT, Yale, and the Marine Biology Laboratory at Woods Hole, Oct. 2007	2007
Member of International Advisory Board for journal: <i>Engineering of Biomaterials</i>	2007-present
Participation in NanoBusiness Alliance Public Policy Tour in Washington D.C. and met with congressmen and congressional committees on nanotechnology safety and policy	2007
Primary organizer of the <i>Small Forum</i> – a workshop on nanotechnology collaboration between industry and Brown researchers, Feb. 2007	2007
Member of scientific advisory board for Carbon 2008, Nagano Japan	2007-8
Member of NIH Study Section on Technology Development	2006
Member of International Advisory Board for Carbon2007	2006/7
Co-Editor of <i>Carbon</i> Special Issue on Toxicity of Carbon Nanomaterials	2005
Technical Program Chair for the American Chemical Society Division Of Fuel Chemistry	2006
Co-Chair of the Colloquium on Heterogeneous Combustion, 31 <sup>st</sup> International Symposium on Combustion, Heidelberg, August 2006	2006
Co-Organizer and Keynote Speaker in the Carbon Science Symposium at Carbon2005, Gyeongju, Korea, July 2005.	2005
Combustion Institute Gold Medal Nominations Committee	2005

Founding Member, Nanomaterials Safety Working Group, Brown	2005-present
Member, Editorial Board for Eurasian Chemico-Technological Journal	2004-present
Member, Advisory Committee for the American Carbon Society	2004-present
Member, Advisory Committee for the Gordon Research Conference on Hydrocarbon Resources	2004-2005
Technical Program Chair for <i>Carbon2004</i> , the leading international conference on the science and technology of carbon materials.	
Co-Organizer of Symposium on Carbon Materials and Nanomaterials at the American Chemical Society Spring 2005 Meeting.	2004-2005
Faculty Vice Chair, Brown University Research Advisory Board	2004-2007
Discussion leader (session chair and organizer) for the topical area "Advanced Carbon Materials" at the Gordon Conference on <i>Hydrocarbon Resources</i>	2005
Discussion leader (session chair and organizer) for the topical area "Combustion" Gordon Conference on <i>Hydrocarbon Resources</i>	2003
Co-chair of session on "Chemistry of Fly Ash Formation and Utilization," at the American Chemical Society National Meeting, Boston	2002.
Co-Chair of the Colloquium on the Combustion of Solid Fuels for the Twenty-Ninth International Symposium on Combustion, held in Sapporo, Japan	2002
Guest Editor for special edition of the <i>MRS Bulletin</i> on "Ecomaterials" November, 2001	2001
Member of the Honorary Editorial Advisory Board for the Journal <i>Carbon</i> .	2001-2003
Author of review of the <i>Chemistry and Physics of Carbon, Vol. 27</i> , published in the <i>Journal of the American Chemical Society</i>	2001
Member of the Silver Medal Committee of the Combustion Institute	2000-2002
Co-Chair of session on Ash Chemistry at the American Chemical Society Fall Meeting, 2002, Boston	2001
Chair of Ph.D. Dissertation Examination Committee for Alfredo Zolin, Technical University of Denmark	2001
Presenter of Nordic Countries Short Course on "Solid Fuel Combustion" at the	2001

Technical University of Denmark, April, 2001

Member of User's Executive Committee for the Combustion Research Facility, Sandia National Laboratories, Livermore, CA. 1999-present

External Examiner for Ph.D. Theses of Guisu Liu, Kathy Benfell, and Daniel Roberts, University of Newcastle, New South Wales, Australia, and David Ross, University of Adelaide, South Australia, and Bo Feng, University of Queensland 1998-2000

Lead investigator in International Energy Agency Annex I collaboration 1998-1999

Gutachter for the Habilitation Thesis of Dr. Gernot Krammer, University of Graz, Austria. 1997

Member of the program committee for the 26th Symposium 1996

Member of technical advisory panel for the NSF's Advanced Combustion Engineering Research Center at the University of Utah and Brigham Young University. 1994,1995

Member of the Program Advisory Subcommittee on Combustion for the American Chemical Society. 1996

Member of program and editorial subcommittees for the 25th International Combustion Symposium. 1994

Proposal reviewer for NSF, US/DOE

External reviewer for *Nature Nanotechnology*, *Advanced Materials*, *ACS Nano*, *Environmental Science and Technology*, *Chemistry of Materials*, *Carbon*, *Microporous and Mesoporous Materials*, *Energy and Fuels*; *Combustion and Flame*; *Industrial and Engineering Chemistry, Research*, *Journal of Hazardous Materials*, *AIChE Journal*, *Combustion, Science, and Technology*, *Fuel*, and *The Proceedings of the Combustion Institute*.

Current or former member of the *American Chemical Society* the *Combustion Institute*, the *American Carbon Society*, the *American Institute of Chemical Engineers*, and the *Materials Research Society*.

### **Patents and Commercial Products**

US Patent US6136089 Hurt, R.H., Suuberg, E., Gao, Y., Burnett, A. "Apparatus and method for deactivating carbon in fly ash," filed: Aug. 31, 1998; issued: Oct. 24, 2000

US Patent 6,521,037 Hurt, R.H., Suuberg, E., Gao, Y., Chen, X., Mehta, A., Ozone Treatment of Fly Ash, , issued Feb. 18, 2003.

US Patent 6,890,507 Chen, X., Gao, Y.M., Hurt, R.H., Suuberg, E.M., Mehta, A. Ozone Treatment of Fly Ash, Continuation in Part, issued May 10, 2005

US Patent: 6746654 Mehta, A., Hurt ,R.H., Gao, Y., Chen, X., Suuberg, E.M., "Dry and

Semi-Dry Methods for Removal of Ammonia from Fly Ash," Filed: Dec. 4, 2002, issued: June 8, 2004

US Patent: 6,890,507 Ozone Treatment of Fly Ash, Continuation in Part, filed September 17, 2002, issued May 10, 2005, Xu Chen, Yuming Gao, Robert Hurt, Eric Suuberg, Arun Mehta.

Patent application: Nanostructured Sorbent Materials for Capturing Environmental Mercury Vapor, filed February 2008.

Co-Developer of the NOxLOI PREDICTOR, a commercial software package for utility fuel selection.

Developer of the "Carbon Burnout Kinetic Model" (CBK), used in a variety of commercial computer codes for combustion system design, including *Fluent*, *AspenPlus*, *PC-CoalLab*, and EPRI's *NOxLOI Predictor*.

#### **ARCHIVAL PUBLICATIONS** (reverse chronological order)

103. Shi X, Vom dem Bussche A, Hurt RH, Kane AB, Gao H, "Cell Entry of One-Dimensional Nanomaterials Occurs by Tip Recognition and Rotation" *Nature Nanotechnology*, in press, 2011.
102. Sanchez V, Jachak A., Hurt R.H., Kane A.B., "Biological Interactions of Graphene-Family Nanomaterials – An Interdisciplinary Review" Invited review article for *Chemical Research in Toxicology*, in press, 2011.
101. Fei Guo, Franklin Kim, Tae Hee Han, Vivek Shenoy, Jiaying Huang, Robert H. Hurt, "Hydration-Responsive Folding and Unfolding in Graphene Oxide Liquid Crystal Phases," *ACS Nano*, in press 2011.
100. Jodie R. Pietruska, Xinyuan Liu, Ashley Smith, Kevin McNeil, Paula Weston, Anatoly Zhitkovich, Robert Hurt, Agnes B. Kane, "Bioavailability, intracellular mobilization of nickel, and HIF-1a activation in human lung epithelial cells exposed to metallic nickel and nickel oxide nanoparticles," *Toxicological Sciences*, in press, 2011
99. Liu, X, Sen S, Liu J, Kulaots I, Geohegan D, Kane A, Poretzky AA, Rouleau CM, More KL, Palmore GTR, Hurt RH, "Antioxidant deactivation on graphenic nanocarbon surfaces", *Small*, in press, 2011
98. Jingyu Liu, Kelly Pennell, Robert H. Hurt, "Kinetics and Mechanisms of Nanosilver Oxysulfidation," *Environmental Science and Technology*, in press. 2011.

97. Vanesa C Sanchez, Paula Weston, Ahiui Yan, Robert H Hurt and Agnes B Kane, "A 3-dimensional in vitro model of epithelioid granulomas induced by high aspect ratio nanomaterials" *Particle and Fibre Toxicology*, **8**:17 2011.
96. Guo F, Mukhopadhyay A, Sheldon BW, and Hurt RH, "Vertically Aligned Graphene Layer Arrays from Chromonic Liquid Crystal Precursors," *Advanced Materials*, **23**(4) 508–513 (2011)
95. Tran PA, Sarin L, Hurt RH, Webster TJ, "Titanium surfaces with adherent selenium nanoclusters as a novel anticancer orthopedic material", *Journal of Biomedical Materials Research Part A*, **93A**(4) 1417–1428 (2010).
94. Liu X, Hurt RH, Kane AB., "Biodurability of Single-Walled Carbon Nanotubes Depends on Surface Functionalization," *Carbon*, **48**:7 1961-1969 (2010).
93. Tran PA, Sarin L, Hurt RH, Webster TJ, "Differential Effects of Nanoselenium Doping on Healthy and Cancerous Osteoblasts in Co-culture on Titanium," *Int J Nanomedicine*, **5**: 351–358 (2010).
92. Liu J, Sonshine D, Shervani S, Hurt RH, "Controlled Release of Biologically Active Silver from Nanosilver Surfaces," *ACS Nano*, **4**(11) 6903–6913 (2010).
91. Sarin L, Sanchez V, Yan A, Kane AB, Hurt RH, Selenium-Carbon Bifunctional Nanoparticles for the Treatment of Malignant Mesothelioma," *Advanced Materials*, 2010.
90. Liu J, Hurt RH, "Ion Release Kinetics and Particle Persistence in Aqueous Nano-Silver Colloids," *Env. Sci. & Tech.*, **44**:6, 2169–2175 (2010).
89. Tran PA, Sarin L, Hurt RH, Webster TJ, "Differential Effects of Nanoselenium Doping on Healthy and Cancerous Osteoblasts in Co-culture on Titanium," *Int J Nanomedicine*, **5**: 351–358 (2010).
88. Lee B, Sarin L, Johnson NC, Hurt RH, "A nano-selenium reactive barrier approach for managing mercury over the life-cycle of compact fluorescent lamps", *Environmental Science and Technology*, **43** 5915–5920 (2009).
87. Tran P, Sarin L, Hurt RH, and Webster TJ, "Opportunities for Nanotechnology-Enabled Bioactive Bone Implants", *J. Mater. Chem.*, **19** (18) 2653-2659 (2009).
86. Liu X, Abt D., Vison, D., Hurt RH, Rand D, Differential toxicity of carbon nanomaterials in *Drosophila*: Larval dietary uptake is benign but adult exposure causes locomotor impairment and mortality, *Environmental Science & Technology*, **43** (16), 6357–6363 (2009).

85. Jakubek L, Marangoudakis S, Raingo J, Liu X, Lipscombe D, Hurt RH, "The inhibition of neuronal calcium-ion channels by trace levels of yttrium released from carbon nanotubes," *Biomaterials*, 30 (31) 6351-6357 (2009).
84. Kothari AK, Konca E, Sheldon BW, Jian K, Xia Z., Ni W, and Hurt RH, "Mechanical behavior of anodic alumina coatings reinforced with carbon nanofibers", *J. Materials Science*, 44:22 6020-6027 (2009).
83. Hower JC, Senior CL, Suuberg EM, Hurt RH, Wilcox JL, Olson ES, "Mercury capture by native fly ash carbons in coal-fired power plants," *Progress in Energy and Combustion Science*, in press 2009.
82. Pietruska JR, Sanchez VC, Miselis NR, Hurt RH, Kane AB, Biopersistence and potential adverse health impacts of fibrous nanomaterials: What have we learned from asbestos? *Wiley Interdisciplinary Reviews: Nanomedicine*, 1(5) 511-529 (2009).
81. Hoover, E., Brown, P. Averick, M., Kane, A., Hurt, R.H., "Teaching Small and Thinking Large: Effects of Including Social and Ethical Implications in an Interdisciplinary Graduate Nanotechnology Course," *Journal of Nano-Education*, 1 86-95 (2009).
80. Bulut L, Hurt RH, "A magneto-catalytic writing technique for etching complex channel patterns in graphenic carbons," *Advanced Materials*, 21 1-5 (2009).
79. Kane AB, Hurt RH, Nanotoxicology: the asbestos analogy revisited, *Nature Nanotechnology*, 3 378-379 (2008).
78. Liu, X., Guo, L., Morris, D., Kane, A., Hurt, R.H., Targeted Removal of Bioavailable Metal as a Detoxification Strategy for Carbon Nanotubes, *Carbon*, 46(3) 489-500 (2008).
77. Manchester, S., Wang, X., Kulaots, I., Gao, Y., Hurt, R.H., High Activity Mercury Capture on Freshly Ozone-Treated Carbon Surfaces, *Carbon* 46(3) 518-524 (2008).
76. Bulut, L., Yan, A., Hurt, R.H., Catalytic Combustion as a Synthesis Tool for Micropatterned Carbon Materials, *Combustion and Flame*, 154 (1), p.206-216 (2008).
75. Guo, L., Von Dem Bussche, A., Buechner, M., Kane, A.B., Hurt, R.H., Adsorption of Essential Micronutrients by Carbon Nanotubes and its Implications for Nanotoxicity Testing, *Small*, 4 (6) 721-727 (2008).
74. Johnson NC, Manchester S, Sarin L, Gao Y, Kulaots I, Hurt RH, "Release of Mercury vapor from Broken Compact Fluorescent Lamps and In Situ Capture by

New Nanomaterial Sorbents,” *Environ. Sci. Tech.*, 42 5772-5778 (2008).  
(featured in *Nature Nanotechnology*)

73. Guo, L., Liu, X., Sanchez, V., Vaslet, C., Kane, A.B., Hurt, R.H., A Window of Opportunity: Designing Carbon Nanomaterials for Environmental Safety and Health,” *Materials Science Forum* 544-545, 511-516 (2007).
72. Liu, X., Gurel, V., Morris, D., Murray, D., Zhitkovich, A., Kane, A.B. Hurt, R.H., Bioavailability of Nickel in Single-Wall Carbon Nanotubes, *Advanced Materials* 19, 2790–2796 (2007).
71. Guo, L., Morris, D., Liu, X., Vaslet, C., Hurt, R.H., Kane, A.B. Iron Bioavailability and Redox Activity in Diverse Carbon Nanotube Samples, *Chemistry of Materials*, 19(14) 3472-3478 (2007).
70. Jian, K. Truong T.C., Hoffman, W.P., Hurt, R.H., Mesoporous carbons with self-assembled surfaces of defined crystal orientation, *Microporous and Mesoporous Materials*, 108 143-151 (2007).
69. Burgess, W.A., Zhuang, M.S. Hu, Y.: Hurt, R.H. and Thies, M.C., "SAFT-LC: An Equation of State for Predicting Liquid Crystalline Phase Behavior in Carbonaceous Pitches," accepted for publication in *Ind. Eng. Chem. Research* 46(21) 7018-7026 (2007).
68. Yan, A., Von Dem Bussche, A., Kane, A.B., Hurt, R.H., Tocopheryl Polyethylene Glycol Succinate as a Safe, Antioxidant Surfactant for Processing Carbon Nanotubes and Fullerenes, *Carbon* 45(13) 2463-2470 (2007).
67. Hurt, R.H., Monthieux, M., Kane, A., “Toxicology of Carbon Nanomaterials: Status, Trends, and Perspectives on the Special Issue,” *Carbon*, 44(6) 1028-1033 (2006).
66. Jian, K., Hurt, R.H., Sheldon, B.W., Crawford, G.P., Visualization of Liquid Crystal Director Fields within Carbon Nanotube Cavities, *Applied Physics Letters* 88 163110 (2006).
65. Jian K, Kulaots I, Yan A, Crawford GP, Hurt RH. Reconstruction and hydrophobicity of nanocarbon surfaces composed solely of graphene edges, *Carbon*, 44(10) 2102-2106 (2006).
64. Yan, A., Lau, B.W., Weissman, B.S., Kulaots, I., Yang, N.Y.C., Kane, A.B., and Hurt, R.H. Biocompatible, Hydrophilic, Supramolecular Carbon Nanoparticles for Cell Delivery *Advanced Materials* 18, 2373–2378 (2006).

63. Yan, A., Xiao, X., Kūlaots, I., Sheldon, B.W., Hurt, R.H., Controlling water contact angle on carbon surfaces from 5° to 167°, *Carbon*, 44, (14) 3116-3120 (2006).
62. Hurt R.H., Haynes B.S., "On the Origin of Power-Law Kinetics in Carbon Oxidation," *Proc. Comb. Inst.* 30 2161-2168 (2005).
61. Jian K., Xianyu H., Eakin J., Gao Y., Crawford G.P., Hurt R.H., "Orientationally Ordered and Patterned Discotic Films and Carbon Films from Liquid Crystal Precursors," *Carbon*, 43 (2) 407-415 (2005).
60. Khanna, R., Sahajwalla, V., Hurt, R.H., An atomistic technique for large ensembles of high-molecular-weight polyaromatics: simulation of carbonaceous mesophase, *Carbon*, 43 67-77 (2005).
59. M. E. Sousa, C, Chan, K. Jian, Y. Gao, N. Yang, R. Hurt, and G. P. Crawford, "Novel Carbon Nanotubes Based on Disc-Rod Assemblies of Lyotropic Liquid Crystals," *Molecular Crystals and Liquid Crystals*, 435: 767-776 (2005).
58. Chan, C., Crawford, G., Gao, Y., Hurt, R.H., Jian, K., Li, H., Sheldon, B.M., Sousa, M., Yang, "Liquid Crystal Engineering of Carbon Nanofibers and Nanotubes" *Carbon* 43(12) pp. 2431-2440 (2005).
57. M. E. Sousa, S. G. Cloutier, K. Q. Jian, B. S. Weissman, R. H. Hurt, and G. P. Crawford, "Patterning Lyotropic Liquid Crystals as Precursors for Carbon Nanotube Arrays," *Applied Physics Letters*, 87, 173115 (2005).
56. Sousa, M.E., Chan, C., Gao, Y., Cloutier, S., Jian K., Weissman, B., Crawford, G.P., Hurt, R., Yang, N., "Pen-writable nanocarbon arrays fabricated using liquid-crystalline materials for potential use in displays," *Journal of the Society for Information Display*, 13 (9) 735-741 (2005) - *outstanding student paper prize*
55. Jian K., Xianyu H., Eakin J., Gao Y., Crawford G.P., Hurt R.H., "Orientationally Ordered and Patterned Discotic Films and Carbon Films from Liquid Crystal Precursors," *Carbon*, 43 (2) 407-415 (2005).
54. Niksa, S., Hurt, R.H., Tominaga, H., Ando, T., "Development of an Evaluational Prediction Tool for Coal Combustion Histories, *Journal of the Japan Institute of Energy*, 82 849-855 (2003).
53. Kulaots, I., Hurt, R.H., Suuberg E.M., Size Distribution of Unburned Carbon in Coal Fly Ash and its Implications," *Fuel* 83 (2) 223-230 (2004).

52. Jian, K., Shim, H.-S., Schwartzman, A., Crawford, G.P., Hurt, R.H., "Orthogonal Carbon Nanofibers by Template-Mediated Assembly of Discotic Mesophase Pitch," *Adv. Materials*, 15 (2) 164-167 (2003) (inside cover feature).
51. Sun, J., Hurt, R.H., Niksa, S., Muzio, L., Mehta, A., Stallings, J., "A Simple Numerical Model to Estimate the Effect of Coal Selection on Pulverized Fuel Burnout," *Combustion Sci. Technol.* 175(6) 1085-1108 (2003).
50. Chen, X., Farber, M., Gao, Y., Kulaots, I., Suuberg, E.M., Hurt, R.H., "Mechanisms of Surfactant Adsorption on Nonpolar, Air-Oxidized, and Ozone-Treated Carbon Surfaces," *Carbon* 41 (8) 1489-1500 (2003).
49. Yang, N.Y.C., Jian, K.J., Kulaots, I., Crawford, G.P., Hurt, R.H. "Template Synthesis of Nanophase Mesocarbon," *Journal of Nanoscience and Nanotechnology*, 3 (5) 386-391 (2003).
48. Jian, K. Shim, H.S., Tuhus-Dubrov, D., Woodward, C., Bernstein, S. Pfeffer, M. Steingart, D., Sachsmann, S., Gournay, T., Crawford, G.P., Hurt, R.H., "Liquid Crystal Surface Anchoring of Mesophase Pitch," *Carbon*, 41 (11) 2073-2083 (2003).
47. Niksa, S., Liu, G.S., and Hurt, R.H., "Coal Conversion Submodels for Design Applications at Elevated Pressures. Part I. Devolatilization and Char Oxidation" *Progress in Energy and Combustion Science*, 29 425-477 (2003).
46. Kulaots, I., Hsu, A., Hurt, R.H., Suuberg, E.M., "Adsorption of Surfactants on Unburned Carbon in Fly Ash and Development of a Standardized Foam Index Test," *Cement and Concrete Research*, Vol 33(12) 2091-2099 (2003).
45. Kulaots, I., Aarna, I., Callejo, M., Hurt, R.H., Suuberg, E.M., "Development of Porosity During Coal Char Combustion," *Proc. Comb. Institute*, Vol 29 495-501 (2002).
44. Hurt, R.H., "The Role of Carbon Surface Chemistry in Fly Ash Utilization and the Potential for Ash Beneficiation by Ozone," *Energieia*, 13 4 2002.
43. Gao, Y., Chen, X., Fujisaki, G., Mehta, A., Suuberg, E.M., Hurt, R.H., "Dry and Semi-Dry Methods for Removal of Ammonia from Fly Ash," *Energy and Fuels*, 16 1398-1404 (2002).
42. Hurt, R.H., Krammer, G., Crawford, G., Jian, K., Rulison, C., "Polyaromatic Assembly Mechanisms and Structure Selection in Carbon Materials," *Chemistry of Materials*, 14 4558-4565 (2002).

41. Gao, Y., Kulaots, I., Chen, X., Suuberg, E.M., Hurt, R.H., Veranth J.M. "The Effect of Solid Fuel Type and Combustion Conditions on Residual Carbon Properties and Fly Ash Quality," *Proc. Comb. Institute*, Vol. 29 475-483 (2002).
40. Lang, T., Hurt, R.H. "Char Combustion Reactivities for a Suite of Diverse Solid Fuels and Char-Forming Organic Model Compounds," *Proc. Comb. Institute*, Vol 29 423-431 (2002).
39. Hu, Y., Hurt, R.H., "Thermodynamics of Carbonaceous Mesophase II: General Theory for Nonideal Solutions," *Carbon* 39 887-896 (2001).
38. Gao, Y., Kulaots, I., Chen, X., Aggarwal, R., Mehta, A., Suuberg, E.M., Hurt, R.H., "Ozonation for the Chemical Modification of Carbon Surfaces in Fly Ash," *Fuel* 80 765-768 (2001).
37. Hurt, R.H., Calo, J.M. "Semi-Global Intrinsic Kinetics for Char Combustion Modeling," *Combustion and Flame*, 125:1138-1149 (2001).
36. Shim, H.S., Hurt, R.H., Yang, N.Y.C. "A Methodology for Analysis of 002 LF Fringe Images and Its Application to Combustion-Derived Carbons", *Carbon*, 38 29-45 (2000).
35. Shim, H., Hurt, R.H. "Thermal Annealing of Chars from Diverse Organic Precursors under Combustion-Like Conditions" *Energy and Fuels*, 14 pp. 340-348 (2000).
34. Hurt, R.H., Chen, Z-Y. "Liquid Crystals and Carbon Materials," *Physics Today*, 53 (3) 39-44 March 2000.
33. Hurt, R.H. Crawford, G.P., Shim, H.-S. "Equilibrium Nanostructure of Primary Soot Particles" Proceedings of the Combustion Institute, Vol. 28, The Combustion Institute, Pittsburgh, 2000, pp. 2539-2546.
32. Sun, J.K., Hurt, R.H., "Mechanisms of Extinction and Near-Extinction in Pulverized Solid Fuel Combustion," Proceedings of the Combustion Institute, Vol. 28, The Combustion Institute, 2000, pp. 2205-221.
31. Yu, J., Kulaots, I., Sabanegh, N., Gao, Y., Hurt, R.H., Suuberg, E.S., Mehta, A. "Adsorptive and Optical Properties of Fly Ash from Coal and Petroleum Coke Cofiring," *Energy and Fuels*, 14 (3) 591-596 (2000).
30. Hu, Y., Calo, J.M., Hurt, R.H., Kerstein, A. "Kinetics of Orientational Order / Disorder Transitions and Their Application to Carbon Material Synthesis," *Modelling Simul. Mater. Sci. Eng.* 7 275-288 (1999).

29. Hurt, R.H., Hu, Y. "Thermodynamics of Carbonaceous Mesophase," *Carbon* 37 281-292 (1999).
28. Hurt, R.H., Davis, K.D., "Percolative Fragmentation and Spontaneous Agglomeration," *Combustion and Flame*, 116 662-670 (1999).
27. Hurt, R.H., Sun, J-K, and Lunden, M., "A Kinetic Model of Carbon Burnout in Pulverized Coal Combustion," *Combustion and Flame*, 113 181-197 (1998).
26. Hurt, R.H., *Structure, Properties, and Reactivity of Solid Fuels* (Invited Topical Review Paper), *Twenty-Seventh International Symposium on Combustion*, The Combustion Institute, Pittsburgh, 1998, 2887-2904.
25. Hachman, L., Burnett, A., Gao, Y., Hurt, R., Suuberg, E. "Surfactant Adsorptivity of Carbon Solids from Pulverized Coal Combustion under Controlled Conditions", *Twenty-Seventh Symposium (International) on Combustion*, 2965-2971, The Combustion Institute, Pittsburgh, 1998.
24. Freeman, E., Gao, Y.M., Hurt, R.H., Suuberg, E.S. "Interactions of Carbon-Containing Fly Ash with Commercial Air Entraining Agents for Concrete," *Fuel*, 76 (8) 761-765 (1997).
23. Gao, Y.; Shim, H.; Hurt, R.H.; Suuberg, E.M.; Yang, N.Y.C. "Effects of Carbon on Air-Entrainment in Fly Ash Concrete: The Role of Soot and Carbon Black," *Energy and Fuels*, 11, 457-462 (1997).
22. Baxter, L. L., Mitchell, R.E., Fletcher, T.H., and Hurt, R.H., "Nitrogen Release During Coal Combustion" *Energy and Fuels*, 10 1 188-196 (1996).
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7. Wall, T.F., A. G. Tate, J. G. Bailey, L. G. Jenness, R.E. Mitchell, and R. H. Hurt "The Temperature, Burning Rates and Char Character of Pulverised Coal Particles Prepared from Maceral Concentrates" *24<sup>th</sup> International Symposium on Combustion*, The Combustion Institute, Pittsburgh, PA, pp. 1207 -1215 (1992)
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5. Hurt, R. H., A. F. Sarofim, and J. P. Longwell. "Role of Microporous Surface Area in Uncatalyzed Carbon Gasification," *Energy and Fuels*, 5:2, 290-299 (1991).
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### ***Book Chapters***

Crawford, G.P., Hurt, R.H., "Nanomaterials from Discotic Liquid Crystals" in *Encyclopedia of Nanoscience and Nanotechnology* Vol 10 pp. 1-27 (H.S. Nalwa Ed.). American Scientific Publishers, 2003.

Jakubek L., Hurt RH, "Nanomaterials and Ion Channels: Observed Effects and Possible Mechanisms", *Nanomedicine and the Nervous System*, VR Preedy, Editor, Science Publishers, CRC Press, in press

### **BOOK REVIEW**

1. Review of *Chemistry and Physics of Carbon, Volume 27*. Marcel Dekker, for the *Journal of the American Chemical Society*, June 2001.

### **INVITED LECTURES**

1. Hurt R. H. and M. D. Allendorf "Rapid Growth of Ceramic Films by Particle-Aided Chemical Vapor Deposition" presented at the High Temperature Gas Dynamics Laboratory, Stanford University, (1991)
2. Sarofim, A.F. and Hurt, R.H. "The Origin, Evolution, and Ramifications of the Pore Structure in Chars" International Workshop on Heterogeneous Combustion, The Dead Sea, Israel., Jan. (1992)
3. Hurt R. H. "Kinetics and Mechanisms of Coal Char Oxidation" Chemical Engineering Department Seminar, Brigham Young University, Provo, Utah. March (1992)
4. Hurt, R.H., Davis, K.A., Sarofim, A.F., and Longwell, J.P. "Carbon Densification Mechanisms in Combustion," presented at the High Temperature Gas Dynamics Laboratory, Stanford University, (1994)
5. Hurt, R.H., Coal Char Heterogeneity and Its Implications for Carbon Burnout, Engineering Foundation Conference on Economic and Environmental Aspects of

Coal Utilization VI, Santa Barbara, CA, January 1995. (*invitation extended and expenses covered by EPRI*)

6. Hurt, R.H. "Heterogeneous Kinetics in the Late Stages of Coal Combustion," presented at the Mechanical and Aerospace Department of Princeton University, Princeton, N.J. February, 1995
7. Hurt, R.H. "Fundamental Characterization of Unburned Carbon Ash" presented at the DOE Workshop on Unburned Carbonaceous Material on Utility Fly Ash, Pittsburgh, February 28 - March 1, 1995.
8. Hurt, R.H., "Prediction of Carbon Burnout in Practical Combustors: The Role of Fuel Science" invited lecture given at the 1996 Annual Technical Conference on the Clean and Efficient Combustion of Fossil Fuels and Waste Materials, Advanced Combustion Engineering Research Center, University of Utah, March, 1996.
9. Hurt, R.H., "The Kinetics of Carbon Burnout", presented at ABB Combustion Engineering Research and Development, Windsor, Connecticut, May 23, 1996.
10. Hurt, R.H. "The Complex Kinetics of Carbon Burnout," presented at the Technical University of Graz, September, 1997.
11. Hurt, R.H., "Nanostructure and Properties of Flame-Formed Carbon Materials," Physical Chemistry Seminar Series, Department of Chemistry, Brown University, 1996
12. Hurt, R.H. "The Complex Kinetics of Carbon Burnout," Plenary Invited Lecture at the 1997 Eastern States Sectional Meeting of the Combustion Institute, Hartford, CN.
13. Hurt, R.H., "Heterogeneous Kinetics for Modern Solid-Fuel Combustion Processes", Department of Mechanical Engineering Seminar Series, Yale University, March, 1998.
14. Hurt, R. H., "Kinetic Models of Coal Char Combustion", Keynote Address given at the *Joint Black Coal and Power Systems CRC Conference on Coal Chemistry*, University of New South Wales, Sydney, Australia, February, 1998.
15. Hurt, R.H., "Structure, Properties, and Reactivity of Solid Fuels," Invited Topical Review Paper for the *Twenty-Seventh International Symposium on Combustion*, The Combustion Institute, Pittsburgh, 1998.
16. Hurt, R.H. "Chemical Engineering Approaches to Solid Fuel Combustion," Chemical Engineering Department Seminar at the University of Connecticut, November, 1998.

17. Hurt, R.H., Crawford, G., Calo, J.C., Hu, Y. "Nanostructures in Coal-Derived Carbons," Storch Award Symposium, American Chemical Society National Meeting, March 1999.
18. Hurt, R.H., *Modeling of Coal Combustion*, a Special Forum at the *International Conference on Coal Science*, Taiyuan, China, September, 1999.
19. Hurt, R.H., "Carbon Burnout in Coal Combustion," Plenary Lecture at the 1999 Australian Symposium on Combustion and Sixth Annual Australian Flame Days, Newcastle, New South Wales, September 1999.
20. Hurt, R.H., "Thermodynamic Rules for the Self-Organization of Carbon Materials" Materials and Mechanics Seminar Series, Brown University, March, 2000.
21. Thermodynamic Rules for the Self-Organization of Carbon Materials, Department of Chemical Engineering, Clemson University, March 2000.
22. Hurt, R.H., "Liquid Crystals and Self-Organized Carbon Materials", Physical Chemistry Seminar Series, Department of Chemistry, Brown University, April, 2000.
23. Hurt, R.H. "Thermodynamic Rules for the Self-Organization of Carbon Materials," presented at the Basic Energy Sciences Combustion Conference, Chantilly, Virginia, May 2000.
24. Hurt, R.H., "Liquid Crystals and Self-Organized Carbon Materials", Department of Chemical Engineering, University of Rhode Island, September, 2000.
25. Hurt, R.H., "Self Assembly Rules for Graphitic Carbon Materials" Department of Chemical Engineering, Tufts University, January, 2001.
26. Hurt, R.H., "Self Assembled Nanostructures in Carbon Materials" Department of Energy and Geoenvironmental Engineering, The Pennsylvania State University, February, 2001.
27. Hurt, R.H., "Designing Carbon Materials by Polyaromatic Self Assembly" Department of Chemical Engineering, The Technical University of Denmark, April, 2001.
28. Hurt, R.H., "Applications of Liquid Crystal Science to Mesophase Pitch," Conoco R&D Center, Ponca City, OK, May, 2001.

29. Lang, T., Hurt, R.H., Standard Combustion Reactivities of Chars from Diverse Solid Fuel Types, 2002 Australian Symposium on Combustion and Seventh Australian Flame Days, Adelaide, February 2002.
30. Hurt, R.H., "A Brief Tour of the Sixth Element: Its Assembly, Disassembly (Combustion), and Adsorptive Properties," presented at the Department of Chemical Engineering, University of Sydney, NSW, Australia, 2002.
31. Hurt, R.H., Krammer, G., Crawford, G., Jian, K., Rulison, C., "Assembly Mechanisms in Mesophase-Based Carbon Materials," invited for repeat presentation as poster in the interdisciplinary "Sci-Mix session" at the American Chemical Society Meeting, Boston, August, 2002.
32. Hurt, R.H., "A Brief Tour of the Sixth Element: Its Assembly, Disassembly (Combustion), and Adsorptive Properties," presented at the Department of Chemical Engineering, University of Queensland, Brisbane, Australia, 2002.
33. Hurt, R.H., "Polyaromatic Assembly Mechanisms in Carbon Materials," presented at Tohoku University, Department of Advanced Materials, Sendai, Japan, July 2002.
34. Hurt R.H., "Carbon Materials Research at Brown University," ATMI Inc., Danbury, Connecticut, August 2003.
35. Hurt R.H., Crawford G.P. New Nanocarbon Forms from Confined Liquid Crystals, Optiva Inc., South San Francisco, August 2003.
36. Hurt, R.H., "Heavy Discotic Polyaromatics: Phase Behavior, Surface Interactions, and Conversion into Novel Carbon Nanomaterials," ExxonMobil Central Research Laboratories, Clinton, NJ.
37. Hurt, R.H., "Controlling Where the Chips Fall: Novel Nanomaterials from Molecular Disks", Society for Information Display Chapter Meeting, Brown University, Sept. 18th, 2003.
38. Hurt, R.H., "Self Assembly During the Pyrolysis of Coking Coals and its Exploitation for the Synthesis of New Carbon Materials and Nanomaterials" Storch Award Session for Professor Harold Schobert, ACS National Meeting, Anaheim, March, 2004.
39. Hurt, R.H., "From gasification to templated synthesis - Pursuing carbon science in the footsteps of Akira Tomita," presented at Tohoku University, Sendai, Japan, May 2004.

40. Hurt R.H., "Oxidation on Carbon Surfaces with Complex Chemistry and Nanostructure," *19th Annual Symposium of the Israeli Section of the Combustion Institute, Haifa*, December 2003.
41. Hurt, R.H., "Liquid Crystal Engineering of Carbon Nanomaterials," 20th New England Complex Fluids Workshop, Brandeis University, September, 2004.
42. Hurt, R.H., "Nature's Minuet in C: Thermal, Catalytic, and Supramolecular Routes to New Carbon Nanomaterials," *The Graffin Lecture of the American Carbon Society*, given in the Distinguished Lecturer Series at the University of Utah, Dept. of Chemical and Fuels Engineering, Salt Lake City, October 19, 2004.
43. Hurt, R.H., "Nature's Minuet in C: Thermal, Catalytic, and Supramolecular Routes to New Carbon Nanomaterials," *The Graffin Lecture of the American Carbon Society*, The National Renewable Energy Laboratory, Golden, Colorado, October 21, 2004.
44. Hurt, R.H., "Nature's Minuet in C: Thermal, Catalytic, and Supramolecular Routes to New Carbon Nanomaterials," *The Graffin Lecture of the American Carbon Society*, Graftech International Ltd., December 2004.
45. Hurt, R.H., "Nature's Minuet in C: Thermal, Catalytic, and Supramolecular Routes to New Carbon Nanomaterials," *The Graffin Lecture of the American Carbon Society*, given at the Department of Mechanical and Aerospace Engineering, University of California, San Diego, January 2005.
46. Hurt, R.H., "Nature's Minuet in C: Thermal, Catalytic, and Supramolecular Routes to New Carbon Nanomaterials," *The Graffin Lecture of the American Carbon Society*, given at Michigan Technological University as part of the Arthur and Dorothy Sigel Lecture Series, January 28, 2005.
47. Hurt, R.H., "Nature's Minuet in C: Thermal, Catalytic, and Supramolecular Routes to New Carbon Nanomaterials," *The Graffin Lecture of the American Carbon Society*, given at Drexel University, Department of Materials Science, February, 2005.
48. Hurt, R.H., "Nature's Minuet in C: Thermal, Catalytic, and Supramolecular Routes to New Carbon Nanomaterials," *The Graffin Lecture of the American Carbon Society*, given at Louisiana State University, Department of Chemical Engineering, February, 2005.
49. Hurt, R.H., "The Rise and Fall: Synthesis and Destruction of Carbon Materials and Nanoforms in Flames," Plenary Lecture at the 2005 Joint U.S. Sectional Meeting of the Combustion Institute, Drexel University, Philadelphia, PA March 2005.

50. Hurt, R.H., "Nature's Minuet in C: Thermal, Catalytic, and Supramolecular Routes to New Carbon Nanomaterials," *The Graffin Lecture of the American Carbon Society*, given at Colorado School of Mines, Department of Chemical Engineering, April 1, 2005.
51. Hurt, R.H., "Nature's Minuet in C: Fabrication, Applications and Health Effects of New Carbon Nanomaterials," Keynote address at the Regional AIChE meeting at Lafayette College, Easton, PA., April 9, 2005.
52. Hurt, R.H., "The Supramolecular Approach to Nanocarbon Synthesis," Keynote lecture at Carbon2005, Gyeongju, Korea, July 2005.
53. "Mechanisms of Cytotoxicity of Carbon Nanomaterials" Lin Guo, Margaret Tsien, Jody Pietruska, Daniel Morris, Vanesa Sanchez, Xinyuan Liu, Charles Vaslet, Agnes Kane, Robert Hurt, *NanoDays 2005*, Center for Biological and Environmental Nanotechnology, Rice University, Houston, Texas, October 10-12, 2005.
54. "Green" Nanotechnology through Collaborative Research on the Mechanisms of Nanomaterial Toxicity, Agnes Kane, Robert Hurt, Superfund Seminar Series, Brown University, December 19 2005.
55. "A Window of Opportunity: Designing Carbon Nanomaterials for Environmental Safety and Health," Plenary Lecture at the 7<sup>th</sup> International Symposium on Eco-Materials Processing and Design, Kyushu, Japan, January 2007.
56. Hurt, R.H., Kane, A.B., Multidisciplinary Approaches to Nanotoxicology and Nanoparticle Delivery, presented at the Showcase of Nanomedicine at Brown, May, 2006.
57. Hurt, R.H., Nanotechnology in the ACS Fuel Division -- Executive Overview of Nanotechnology Programming, presented at the ACS National Meeting, Spring 2006, Atlanta.
58. R. Hurt, A. Kane, "Green" nanotechnology through collaborative research on the mechanisms of nanomaterial toxicity, presented at *Particles2006: Medical/Biochemical Diagnostic, Pharmaceutical, and Drug Delivery Applications of Particle Technology*, 13-16 May 2006, Orlando, Florida.
59. Toxicology of Carbon Nanotubes (Hurt and Kane), Workshop on Carbon Nanotube Commercialization, sponsored by the World Technology Evaluation Center, held at NSF Headquarters, Arlington, VA, June 2006.

60. "A Window of Opportunity: Designing Carbon Nanomaterials for Environmental Safety and Health," Plenary Lecture at the 7<sup>th</sup> International Symposium on Eco-Materials Processing and Design, Kyushu, Japan, January 2007.
61. "Toxicologically Relevant Characterization of Carbon Nanomaterials," presented at the *Tri-National Workshop on Standards for Nanotechnology at the National Research Council of Canada*, Ottawa, February 2007
62. "Toxicologically relevant characterization of carbon nanomaterials," at *Nanotoxicology 2007*, Venice, Italy (given by Agnes Kane), March 2007
63. "Molecular Design and Detoxification of Carbon Nanomaterials, Mechanical Engineering Department Seminar at Rutgers University, April 25, 2007.
64. "How Can Materials Chemistry Contribute to Nanotoxicology?" presented at the University of Oregon Material Science Institute, July 2007.
65. "Physical and Chemical Determinants of Carbon Nanotube Toxicity," presented at the Interagency Workshop on the Environmental Implications of Nanotechnology, Washington, D.C. September 6, 2007.
66. Nanoparticle Health Effects, Web-seminar to approximately 250 researchers and environmental professionals as part of the NIEHS Risk-e-Learning internet seminar series, October, 2007.
67. "Materials Chemistry of Nanotoxicology," Department of Chemistry, Brown University, Inorganic/Materials seminar series, October, 2007.
68. "New Research Approaches for Management of the Bio-Environmental Impacts of Nanotechnology," presented at the Workshop on Nano-Environmental Research at the NSF, Arlington, VA, December, 2007.
69. "The Materials Chemistry of Nanotoxicology," Department of Chemistry, George Washington University, February 15<sup>th</sup> 2008.
70. "Nanotechnology and the Environment: Applications and Implications," 2008 Green Technology Conference, Providence, R.I. Feb. 28, 2008.
71. "The Materials Chemistry of Nanotoxicology," invited seminar, Department of Chemistry, George Washington University, February 15<sup>th</sup> 2008.
72. "Nanomaterial Design for Environmental Safety and Health," R.Hurt, invited talk at the *Green Nanotechnologies Conference*, University of Oregon, March 2008

73. "Nanomaterial Design for Environmental Safety and Health," R.Hurt, invited talk at the US/Korea Joint Workshop on Nanobiotechnologies, Jeju Island Korea, April 2008.
74. "Near-Term Design and Processing Strategies for Safer Nanomaterials," R. Hurt Invited talk at the *Nanomaterials for Defense* conference, Arlington, VA, April 2008.
75. Hurt, RH, The Carbon Science of Nanotoxicology, invited talk at the Symposium on Future Challenges for Carbon-based Nanoporous Materials, Chiba, Japan, July 2008.
76. Hurt RH, Kane AB, Designing Nanomaterials for Environmental Health and Safety, invited talk at the 2008 Fall Meeting of the American Chemical Society, Division of Chemical Toxicology, August, 2008.
77. "A Nano-Selenium Reactive Barrier Technology for Managing Mercury over the Life-Cycle of Fluorescent Lamps Invited talk at the NIEHS SBRP Annual Meeting, Monterey, CA, Dec 2008
78. "Nanomedicine and nanobiology at the Nanobio-interface" (title by organizers), Kane AB, Hurt RH, Invited presentation at the annual meeting of the American Association for the Advancement of Science (AAAS), Chicago, February, 2009.
- 79."Design of Carbon Nanotubes for Bio- and Neuro-Compatibility" R. Hurt, invited talk at the Conference on *Nanotechnology for the Study of Cellular and Molecular Interactions*, Barga, Italy, June, 2009.
80. "Progress in the Design of Carbon Nanotubes for Environmental Health and Safety" Liu, Kulaots, Kane, Hurt, (given by X. Liu), keynote presentation at Carbon2009, Biarritz, France.
81. "Brown University Research on Nanotechnology, Health, and the Environment, R. Hurt, A. Kane, D. Lipscombe, D.Rand (given by R. Hurt) at the 27<sup>th</sup> Annual Nutmeg Meeting, Marine Biology Laboratory, Woods Hole, MA, Fall 2009.
82. "Design of Biocompatible Nanocarbons" Hurt RH, Kane AB, Lipscombe D, invited talk at the American Chemical Society Fall Meeting, 2009.
83. "Potential Human Health Impacts of Nanotechnology, MRS Annual Meeting, Dec. 2009 (A. Kane, R. Hurt, given by A.Kane)
84. "Chemistry and Materials Science of Hg Capture and Stabilization", Invited workshop at Corning Incorporated, Corning, New York, April 2010.
85. "Nanomaterial Design for Environmental Safety and Health", Invited lecture at the conference: "Toward the Regulation of Nanomaterials: Conversation

between academia, industry, law, and government”, University of Notre Dame, May 2010.

86. Applications and Implications of Nanomaterials for Human Health and the Environment, Cabot Corporation, Billerica, MA, June 2, 2010
87. “Challenges for Carbon Science at the Interface with Biological Systems,” R.Hurt, Plenary lecture at *Carbon2010*, July 2010.
88. Design and Engineering of Eco-Friendly Nanomaterials (title by organizers), American College of Toxicology Annual Meeting, Baltimore, November 8-10, 2010
89. Rusting of the Trojan Horse – Ion Mediation of the Biological and Environmental Response to Nanosilver, Nutmeg meeting, Marine Biology Laboratory, Woods Hole, MA, October, 2010.
90. Rusting of the Trojan Horse – Metal Ion Mediation of Nanoparticle Toxicity, seminar at the Center for the Environmental Implications of Nanotechnology, Duke University, October, 2010.
91. Hurt RH, “Nanotoxicology – A Search for the Fundamental Material Properties that Govern Biological Response”, Berkeley Nanosciences and Nanoengineering Institute seminar series, Univ. California, Berkeley, January 28, 2011.
92. Guo F, Shenoy V, Huang, J, Hurt RH, “Graphene oxide liquid crystal and shape memory gel phases,” International Conference on Materials for Advanced Technologies (ICMAT), Singapore, June 2011.
93. Hurt R.H. “Which material properties / features determine the biological response to carbon nanotubes?” NIST Workshop entitled: *The New Steel? Enabling the Carbon Nanomaterials Revolution: Markets, Metrology, Safety, and Scale-up*, National Institute of Standards and Technology, Gaithersburg, MD, February 2011.
94. Fei Guo, Amartya Mukhopadhyay, Brian W. Sheldon, Robert H. Hurt, “Vertically Aligned Graphene Layer Arrays Fabricated from Chromonic Liquid Crystals,” Keynote lecture at Carbon2011, Shanghai, July 2011.
95. Hurt RH, “Molecular Approaches to the Assembly and Biocompatibility of Nanocarbons”, Lee Hsun Lecture at the Chinese Academy of Sciences, Institute for Metal Research, Shenyang, China, May 2011.