

# RAY H. BAUGHMAN

## ADDRESSES

### Business:

University of Texas at Dallas

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**EDUCATION** Harvard University: Ph.D. (1971) and M.S. (1966) in Materials Science Area  
Carnegie-Mellon University: B.S. (1964) in Physics

**EMPLOYMENT POSITIONS** **University of Texas at Dallas** (2001-present)  
Robert A. Welch Professor of Chemistry and Director of NanoTech Institute  
**Honeywell International** (formerly called Allied Signal and Allied Chemical)

- Staff Scientist (70-73)
- Manager (78-90)
- Group Leader (74-78)
- Corporate Fellow (90-01)

**RESEARCH INTERESTS**

Nanoscale Self-Assembly	Carbon Nanotubes
Nanomaterials Processing	Artificial Muscles
Electronics/Optics/Magnetics	Ferroelectrics
Nanoscale Devices	New Forms of Carbon
Photonic Crystals	Auxetic Materials
Electrochemical Devices	Solid-State Synthesis
Highly Conducting Organic Polymers	Nano-Bio Interface

**HONORS**

- Member National Academy of Engineering (Elected 2008)
- Member Academy of Medicine, Engineering and Science of Texas
- Foreign Member of Russian Academy of Natural Sciences (Elected 1997)
- *Honorary Professor* of Jilin University, China (Elected 2001)
- *Concurrent Professor* of Nanjing University, China (Elected 2002)
- *Advisory Professor* of Fudan University, China (Elected 2002)
- Fellow of the American Physical Society and the American Institute of Chemists
- Editorial Boards of *Science* (2000-), *Synthetic Metals* (1978-) and *Int. J. of Nanosci.* (2002-)
- Editorial Advisory Board of the *Encyclopedia of Nanoscience and Nanotechnology* (2002-)
- Chemical Pioneer Award of the American Institute Of Chemists (1995)
- Cooperative Research Award in Polymer Science and Engineering (PMSE, ACS, 1996)
- AlliedSignal Technical Achievement Awards for *Time-Temperature Indicators* (1988), *Polyaniline Compositions and Applications* (1994), *Sonar Hydrophones* (1996)
- New Materials Innovation Prize, Avantex Intern. Forum for Innovative Textiles (2005)
- Scientific American 50 List (06), NanoVic Prize (Australia, 06); Nano 50 Awards (06 & 07)
- CSIRO Metal for Technical Achievement (Australia, 06)
- Alumni Distinguished Achievement Award of Carnegie Mellon University (2007)
- Kapitza Metal of Russian Academy of Natural Sciences (2007)

### RECENT ADVISORY GROUPS (2000-Present)

- International Advisory Board, Intelligent Polym. Res. Inst. (Australia, 1997-present)
- Advanced Materials Institute, Univ. New Orleans (1999-2004)
- External Advisory Board, Alabama EPSCoR (1995-2000) and Oklahoma EPSCoR (05-present)
- International Conferences on Synthetic Metals (1981-present)
- NSF-STC Strategic Advisory Board for the University of Washington in Seattle (2002-present)
- Nanotechnology Advisory Board for Pacific Northwest National Laboratory (2002-2004)
- Advisory Board for the Alan G. MacDiarmid Institute of Jilin, China (2001-present)

## UNDERGRADUATE PUBLICATIONS

1. "Preparation, Analysis, and X-Ray Diffraction Identification of Barbiturate Silver Salts", S.M. Sax, P.J. Migliore, R.H. Baughman, *Analytical Biochemistry* **3**, 150-157 (1962).
2. "A Study of Malignolipin Picrate", S.M. Sax, P.L. Harbison, M. Sax, R.H. Baughman, *J. of Biological Chemistry* **238**, 3817-3819 (1963).
3. "The Structure of the Morpholine  $\beta$ -Iodophenylacetylene Complex" R.H. Baughman, *J. of Organic Chemistry* **29**, 964-965 (1964).

## LATER PUBLICATIONS

4. "NMR Calorimetric and Diffraction Study of Molecular Motion in Crystalline Carboranes", R.H. Baughman, *J. Chem. Phys.* **53**, 3781-3789 (1970).
5. "Vacancy Formation Parameters in Organic Crystals", R.H. Baughman and D. Turnbull, *J. Phys. Chem. Solids* **32**, 1375-1394 (1971).
6. "Diffraction Study of Solid State Photopolymerization of Trans,Trans-1,4- bis( $\beta$ -Pyridyl-2-Vinyl) Benzene", R.H. Baughman, *J. Appl. Phys.* **42**, 4579-4584 (1971).
7. "Self-Diffusion in Crystalline Hexamethylethane and Cyclooctane", R.H. Baughman and D. Turnbull, *J. Phys. Chem. Solids* **33**, 121-128 (1972).
8. "Solid-State Polymerization of Diacetylenes", R.H. Baughman, *J. Appl. Phys.* **43**, 4362-4370 (1972).
9. "Negative Thermal Expansion in Crystalline Linear Polymers", R.H. Baughman, *J. Chem. Phys.* **58**, 2976-2983 (1973).
10. "Raman Spectral Changes During the Solid-State Polymerization of Diacetylenes", A.J. Melveger and R.H. Baughman, *J. Polym. Sci., Polym. Phys. Ed.* **11**, 603-619 (1973).
11. "Relevance of Cage Recombination in the Plastic Deformation of Polymers", L.A. Davis, R.H. Baughman, and C.A. Pampillo, *J. Polym. Sci., Polym. Phys. Ed.* **11**, 2441-2451 (1973).
12. "Negative Thermal Expansion of a Polydiacetylene Single Crystal", R.H. Baughman and E.A. Turi, *J. Polym. Sci., Polym. Phys. Ed.* **11**, 2453-2466 (1973).
13. "Raman Spectral Shifts Relevant to Electron Delocalization in Polydiacetylenes", R.H. Baughman, J.D. Witt, and K.C. Yee, *J. Chem. Phys.* **60**, 4755-4759 (1974).
14. "Solid-State Synthesis of Large Polymer Single Crystals", R.H. Baughman, *J. Polym. Sci., Polym. Phys. Ed.* **12**, 1511-1535 (1974).

15. "Electron Delocalization Contribution to Single Crystal Thermal Expansion of a Polydiacetylene", R.H. Baughman, C.J. Exarhos, and W.M. Risen, Jr., *J. Polym. Sci., Polym. Phys. Ed.* **12**, 2189-2193 (1974).
16. "Solid-State Polymerization of a Cyclic Diacetylene", R.H. Baughman and K.C. Yee, *J. Polym. Sci., Polym. Chem. Ed.* **12**, 2467-2475 (1974).
17. "Deformation and Microstructure of Extended-Chain Polydiacetylene Crystals", R.H. Baughman, H. Gleiter, and N. Sendfeld, *J. Polym. Sci., Polym. Phys. Ed.* **13**, 1871-1879 (1975).
18. "Resonance Raman Study of the Thermochemical Phase Transition of Polydiacetylene", G.J. Exarhos, W.M. Risen, Jr., and R.H. Baughman, *J. Am. Chem. Soc.* **98**, 481-487 (1976).
19. "A Theoretical Investigation of the Solid-State Synthesis of Polymeric Sulfur Nitride (SN)<sub>x</sub>", R.H. Baughman, R.R. Chance, and M.J. Cohen, *J. Chem. Phys.* **64**, 1869-1876 (1976).
20. "Optical Nonlinearities in One-Dimensional Conjugated Polymer Crystals", C. Sauteret, J.P. Hermann, R. Frey, F. Pradere, J. Ducuing, R.H. Baughman, and R.R. Chance, *Phys. Rev. Lett.* **36**, 956-959 (1976).
21. "Photoconduction in Polydiacetylene Single Crystals", R.R. Chance and R.H. Baughman, *J. Chem. Phys.* **64**, 3889-3890 (1976).
22. "Optical Nonlinearities of Polymerized Diacetylenes", C. Sauteret, J.P. Hermann, R. Frey, F. Pradere, J. Ducuing, R.H. Baughman, and R.R. Chance, *Opt. Commun.* **18**, 55-56 (1976).
23. "Transient Photoconductivity of a Polydiacetylene Single Crystal", R.R. Chance, R.H. Baughman, P.J. Reucroft, and K. Takahashi, *Chem. Phys.* **13**, 181-185 (1976).
24. "A Laser Raman Study of the Stress Dependence of Vibrational Frequencies of a Monocrystalline Polydiacetylene", V.K. Mitra, W.M. Risen, Jr., and R.H. Baughman, *J. Chem. Phys.* **64**, 2731-2736 (1976).
25. "Comments on the Optical Properties of Fully Conjugated Polymers: Analogy Between Polyenes and Polydiacetylenes", R.H. Baughman and R.R. Chance, *J. Polym. Sci., Polym. Phys. Ed.* **14**, 2037-2045 (1976).
26. "The Nature and Origin of Structural Defects in Polymeric Sulfur Nitride", R.H. Baughman and R.R. Chance, *J. Polym. Sci., Polym. Phys. Ed.* **14**, 2019-2035 (1976).
27. "Point Defects in Fully Conjugated Polymers", R.H. Baughman and R.R. Chance, *J. Appl. Phys.* **47**, 4295-4300 (1976).

28. "The Solid-State Synthesis and Properties of Photoconducting, Metallic, and Superconducting Polymer Crystals", R.H. Baughman, *Contemp. Topics in Polym. Sci.* **2**, 205-233 (1977).
29. "Shear Transformation to Produce a New Phase of Polymeric Sulfur Nitride (SN)<sub>x</sub>", R.H. Baughman, P.A. Apgar, R.R. Chance, A.G. MacDiarmid, and A.G. Garito, *J. Chem. Phys.* **66**, 401-409 (1977).
30. "A New Phase of Polymeric Sulfur Nitride", R.H. Baughman, P.A. Apgar, R.R. Chance, A.G. MacDiarmid, and A.F. Garito, *J. Chem. Soc., Chem. Commun.* **49-50** (1977).
31. "Electronic Structure Change at a Phase Transition in a Polydiacetylene Crystal", Z. Iqbal, R.R. Chance, and R.H. Baughman, *J. Chem. Phys.* **66**, 5520-5525 (1977).
32. "Thermochromism in a Polydiacetylene Crystal", R.R. Chance, R.H. Baughman, H. Mueller, and C.J. Eckhardt, *J. Chem. Phys.* **67**, 3616-3618 (1977).
33. "Optical and Electrical Properties of a Polydiacetylene Crystal: Poly(5,7-Dodecadiyne-1,12-diol-bisphenylurethane)", H. Mueller, C.J. Eckhardt, R.R. Chance, and R.H. Baughman, *Chem. Phys. Lett.* **50**, 22-25 (1977).
34. "Sample Modulated Raman Spectroscopy and Frequency Modulated Visible Light: Resonance Raman Spectrum of a Polydiacetylene Fiber", C.T. Tzinis, S.K. Bahl, P. Davidson, W.M. Risen, Jr., and R.H. Baughman, *Rev. Sci. Instrum.* **49**, 1725-1728 (1978).
35. "Deformation Mechanisms in Polymer Crystals. Part 1. The Geometry of the Stress-Induced Phase Change of Polymeric Sulfur Nitride (SN)<sub>x</sub>", R.J. Young and R.H. Baughman, *J. Mater. Sci.* **13**, 55-61 (1978).
36. "Raman Scattering in Brominated Sulfur Nitride (SN)<sub>x</sub> Crystals", Z. Iqbal, R.H. Baughman, J. Kleppinger, and A.G. MacDiarmid, *Solid State Commun.* **25**, 409-413 (1978).
37. "Solid-State Reaction Kinetics in Single-Phase Polymerizations", R.H. Baughman, *J. Chem. Phys.* **68**, 3110-3121 (1978).
38. "The Structures of Cis-Polyacetylene and Highly Conducting Derivatives", R.H. Baughman, S.L. Hsu, G.P. Pez, and A.J. Signorelli, *J. Chem. Phys.* **68**, 5405-5409 (1978).
39. "Highly Conducting Iodine Derivatives of Polyacetylene: Raman, XPS, and X-Ray Diffraction Studies", S.L. Hsu, A.J. Signorelli, G.P. Pez, and R.H. Baughman, *J. Chem. Phys.* **69**, 106-111 (1978).
40. "Solid-State Polymerization of Linear and Cyclic Acetylenes", R.H. Baughman and K.C. Yee, *J. Polym. Sci., Macromol. Rev.* **13**, 219-239 (1978).

41. "Fully Conjugated Polymer Crystals: Solid-State Synthesis and Properties of the Polydiacetylenes", R.H. Baughman and R.R. Chance, *Ann. N.Y. Acad. Sci.* **313**, 705-725 (1978).
42. "New Metallic Linear Polymers", unsigned contributions by R.H. Baughman for *Physics News* in 1978, 51-53 (A.I.P. publications).
43. "Structure of Brominated Polysulfur Nitride (SN)<sub>x</sub>: Raman Scattering and X-Ray Diffraction Studies", Z. Iqbal, R.H. Baughman, J. Kleppinger, and A.G. MacDiarmid, *Ann. N.Y. Acad. Sci.* **313**, 775-787 (1978).
44. "Structure of Brominated (SN)<sub>x</sub> and Tetrasulfur Tetranitride", Z. Iqbal, J. Sharma, R.H. Baughman, M. Akhtar, and A.G. MacDiarmid, *Lecture Notes Physics, Quasi One-Dimensional Conductors, Part 2 78*, 432-436 (1979).
45. "Structural Perspectives for Polymeric Metals", R.H. Baughman, S.L. Hsu, L.R. Anderson, G. Pez, and A.J. Signorelli, *NATO Conf. Ser.* **6**, 187-201 (1979).
46. "Static Lattice Calculations for Cis-Polyacetylene", R.H. Baughman and S.L. Hsu, *J. Polym. Sci., Polym. Lett. Ed.* **17**, 185-193 (1979).
47. "Characterization of the Ladder Polymerization of a Crystalline Cyclotetradiene Monomer", A. Banerjee, J.B. Lando, K.C. Yee, and R.H. Baughman, *J. Polym. Sci., Polym. Phys. Ed.* **17**, 655-662 (1979).
48. "Polyacetylene and Highly Conducting Charge Transfer Complexes", R.H. Baughman, S.L. Hsu, and A.J. Signorelli, *Mol. Cryst. Liq. Cryst.* **52**, 555-561 (1979).
49. "Highly Conducting Charge-Transfer Complexes of Poly(p-phenylene)", D.M. Ivory, G.G. Miller, J.M. Sowa, L.W. Shacklette, R.R. Chance, and R.H. Baughman, *J. Chem. Phys.* **71**, 1506-1507 (1979).
50. "New Highly Conducting Polymers: Charge Transfer Complexes of Poly(p-phenylene)", R.H. Baughman, D.M. Ivory, G.G. Miller, L.W. Shacklette, and R.R. Chance, *Organic Coatings and Plastics Chemistry* **41**, 139-145 (1979).
51. "Electrical and Optical Properties of Highly Conducting Charge-Transfer Complexes of Poly(p-phenylene)", L.W. Shacklette, R.R. Chance, D. M. Ivory, G.G. Miller, and R.H. Baughman, *Synthetic Metals* **1**, 307-320 (1980).
52. "Highly Conducting Charge-Transfer Complexes of a Processible Polymer: Poly(p-phenylene Sulfide)", R.R. Chance, L.W. Shacklette, G.G. Miller, D.M. Ivory, J.M. Sowa, R.L. Elsenbaumer, and R.H. Baughman, *J.C.S. Chem. Comm.*, 348-349 (1980).
53. "Electronic Spectra of Two Polydiacetylene Isomorphs", R.R. Chance, K.C. Yee, R.H. Baughman, H. Eckhardt, and C.J. Eckhardt, *J. Polym. Sci., Polym. Phys. Ed.* **18**, 1651-1653 (1980).

54. "Theory of Single-Phase Solid-State Polymerization Reactions", R.H. Baughman and R.R. Chance, *J. Chem. Phys.* **73**, 4113-4125 (1980).
55. "Solid-State Synthesis of Highly Conducting Polyphenylene from Crystalline Oligomers", L.W. Shacklette, H. Eckhardt, R.R. Chance, G.G. Miller, D.M. Ivory, and R.H. Baughman, *J. Chem. Phys.* **73**, 4098-4102 (1980).
56. "Macromolecular Metals and Semiconductors: A Comparative Study", R.H. Baughman, R.R. Chance, R.L. Elsenbaumer, D.M. Ivory, G.G. Miller, A.F. Preziosi, and L.W. Shacklette, *Org. Coat. Plast. Chem.* **43**, 762-767 (1980) and *Polym. Sci. Technol.* **15**, 137-148 (Plenum, 1981).
57. "Conducting Complexes of a Processible Polymer: Poly(p-phenylene Sulfide)", R.R. Chance, L.W. Shacklette, H. Eckhardt, J.M. Sowa, R.L. Elsenbaumer, D.M. Ivory, G.G. Miller, and R.H. Baughman, *Polym. Sci., Technol.* **15**, 125-135 (Plenum, 1981).
58. "Highly Conducting Poly(p-phenylene) via Solid-State Polymerization of Oligomers", L.W. Shacklette, H. Eckhardt, R.R. Chance, G.G. Miller, D.M. Ivory, and R.H. Baughman, *Polym. Sci. Technol.* **15**, 115-123 (Plenum, 1981).
59. "Conducting Complexes of Polyphenylene Sulfides", L.W. Shacklette, R.L. Elsenbaumer, R.R. Chance, H. Eckhardt, J.E. Frommer, and R.H. Baughman, *J. Chem. Phys.* **75**, 1919-1927 (1981).
60. "Asymmetric Crystal Topography of Diacetylene and Polydiacetylene Macroscopic Single Crystals", R.G. Rosemeier, R.E. Greene, Jr., and R.H. Baughman, *J. Appl. Phys.* **52**, 7129-7135 (1981).
61. "Nonempirical Studies of the Electronic Properties of Highly Conducting Polymers", J.L. Bredas, R.R. Chance, R.H. Baughman, and R. Silbey, *Int. J. Quantum Chem.* **15**, 231-241 (1981).
62. "Conducting Complexes of Conjugated Polymers", H. Eckhardt, R.H. Baughman, J.L. Bredas, R.R. Chance, R.L. Elsenbaumer, and L.W. Shacklette, *Mater. Sci.* **7**, 121-126 (1981).
63. "Diacetylene Monomers and Polymers with Chiral Substituents: Structure, Solid-State Polymerization, and Properties", R.B. Wilson, E.N. Duesler, D.Y. Curtin, I.C. Paul, R.H. Baughman, and A.F. Preziosi, *J. Am. Chem. Soc.* **104**, 509-516 (1982).
64. "Conducting Complexes of Conjugated Polymers: A Comparative Study", R. R. Chance, R.H. Baughman, J.L. Bredas, H. Eckhardt, R.L. Elsenbaumer, J.E. Frommer, L.W. Shacklette, and R. Sibley, *Mol. Cryst. Liq. Cryst.* **83**, 1249-1259 (1982).
65. "Structural Basis for Semiconducting and Metallic Polymer Dopant Systems", R.H. Baughman, J.L. Bredas, R.R. Chance, R.L. Elsenbaumer, and L.W. Shacklette, *Chem. Rev.* **82**, 209-222 (1982).

66. "Ab Initio Effective Hamiltonian Study of the Electronic Properties of Conjugated Polymers", J.L. Bredas, R.R. Chance, R.H. Baughman, and R. Silbey, *J. Chem. Phys.* **76**, 3673-3678 (1982).
67. "Electrochemical Doping of Poly(p-phenylene) with Application to Organic Batteries", L.W. Shacklette, R.L. Elsenbaumer, R.R. Chance, J.M. Sowa, D.M. Ivory, G.G. Miller, and R.H. Baughman, *Chem. Soc., Chem. Commun.*, 361-362 (1982).
68. "Electrically Conducting Polyaromatic Sulfides", R.L. Elsenbaumer, L.W. Shacklette, J.W. Sowa, and R.H. Baughman, *Mol. Cryst. Liq. Cryst.* **83**, 229-238 (1982).
69. "Interchain Contributions to Soliton Properties in Polyacetylene", R.H. Baughman and G. Moss, *J. Chem. Phys.* **77**, 6321-6336 (1982).
70. "Nonlinear Optical Properties of Polydiacetylenes", R.R. Chance, M.L. Shand, and R.H. Baughman, *A.C.S. Polymer Preprints* **23**, No. 2, 141 (1982).
71. "Organic Batteries Based on Polyphenylenes", R.L. Elsenbaumer, L.W. Shacklette, J.M. Sowa, R.R. Chance, D.M. Ivory, G.G. Miller, and R.H. Baughman, *Polym. Prepr.* **23**, 132-133 (1982).
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73. "Organic Batteries Based on Conductive Polymers", L.W. Shacklette, R.R. Chance, R.L. Elsenbaumer, and R.H. Baughman, *30th Power Sources, Electrochem. Soc. Conf. Procs.*, pp. 66-68 (1982).
74. "Theoretical Study of the Electronic Properties of Biphenylene Polymers: Prediction of New Highly Conducting Polymer Complexes", J.L. Bredas and R.H. Baughman, *J. Poly. Sci., Polym. Letter Ed.* **21**, 475-479 (1983).
75. "Staging in Polyacetylene-Iodine Conductors", R.H. Baughman, N.S. Murthy, G.G. Miller, and L.W. Shacklette, *J. Chem. Phys.* **79**, 1065-1074 (1983).
76. "The Structure of Metallic Complexes of Polyacetylene with Alkali Metals", R.H. Baughman, N.S. Murthy, and G.G. Miller, *J. Chem. Phys.* **79**, 515-520 (1983).
77. "Structure and Properties of Conducting Polyacetylene Complexes", R.H. Baughman, N.S. Murthy, G.G. Miller, L.W. Shacklette, and R.M. Metzger, *J. de Physique Colloque C3* **44**, 53-59 (1983).
78. "An In Situ EPR Study of Electrochemically Doped Trans Polyacetylene", L.D. Kispert, J. Joseph, T.V. Jayaraman, L.W. Shacklette, and R.H. Baughman, *J. de Physique Colloque C3* **44**, 317-320 (1983).

79. "Electrochemical Cells Employing Polyacetylene and Poly(p-phenylene) As Active Materials", L.W. Shacklette, R.L. Elsenbaumer, and R.H. Baughman, *J. de Physique Colloque C3* **44**, 559-563 (1983).
80. "Vibrational Spectra and Structure of Undoped and Doped Polyparaphenylene", Z. Iqbal, H. Bill, and R.H. Baughman, *J. de Physique Colloque C3* **44**, 761 (1983).
81. "Polymers as Electronic Materials - Today's Possibilities and Tomorrow's Dreams", R.H. Baughman, in Japanese in *Kobunshi* **33**, 247-254 (1984) and in English in *Contemporary Topics in Polymer Science* **5**, 321-350 (1984).
82. "Structural Changes During Annealing and during Acceptor Doping of Oriented Poly(p-phenylene Sulfide)", N.S. Murthy, R.L. Elsenbaumer, J.E. Frommer, and R.H. Baughman, *Synthetic Metals* **9**, 91-96 (1984).
83. "Conducting Polymers Synthesized by Dopant-Induced Polymerization of Insulating Charge-Transfer Crystals", H. Eckhardt, G.G. Miller, and R.H. Baughman, *Synthetic Metals* **9**, 441-450 (1984).
84. "EPR Study of Polarons in a Conducting Polymer with Nondegenerate Ground States: Alkali Metal Complexes of Poly(p-phenylene) and Phenylene Oligomers", L.D. Kispert, J. Joseph, G.G. Miller, and R.H. Baughman, *J. Chem. Phys.* **81**, 2119-2125 (1984).
85. "Electro-Reflectance Spectra of One-Dimensional Excitons in Polydiacetylene Crystals", Y. Tokura, Y. Oowaki, T. Koda, and R.H. Baughman, *Chem. Phys.* **88**, 437-442 (1984).
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87. "The Evolution of Structure During the Alkali-Metal Doping of Polyacetylene and Poly(p-phenylene)", R.H. Baughman, L.W. Shacklette, N.S. Murthy, G.G. Miller, and R.L. Elsenbaumer, *Mol. Cryst. and Liq. Cryst.* **118**, 253-261 (1985).
88. "Chiral Metals: Synthesis and Properties of a New Class of Conducting Polymers", R.L. Elsenbaumer, H. Eckhardt, Z. Iqbal, J. Toth, and R.H. Baughman, *Mol. Cryst. and Liq. Cryst.* **118**, 111-116 (1985).
89. "New Structural Phases of Polymer Battery Anode Materials: Alkali-Metal Doped Polyacetylene and Polyphenylene", L.W. Shacklette, N.S. Murthy, and R.H. Baughman, *Mol. Cryst. and Liq. Cryst.* **121**, 201-209 (1985).
90. "The Crystal Structure of Trans, Trans-1,3,5,7-Octatetraene as a Model for Fully-Ordered Trans-Polyacetylene", R.H. Baughman, B.E. Kohler, I.J. Levy, and C. Spangler, *Synthetic Metals* **11**, 37-53 (1985).

91. "EPR Study of Polarons In A Conducting Polymer with Nondegenerate Ground States: AsF<sub>5</sub> Complexes of Poly(p-phenylene)", L.D. Kispert, J. Joseph, G.G. Miller, and R.H. Baughman, *Mol. Cryst. and Liq. Cryst.* **118**, 313-318 (1985).
92. "The Synthesis, Properties, and Structures of Poly(peri-naphthalene: A Conducting, Undoped Organic Polymer)", Z. Iqbal, D.M. Ivory, J. Marti, J.L. Bredas, and R.H. Baughman, *Mol. Cryst. and Liq. Cryst.* **118**, 103-109 (1985).
93. "Theoretical Study of the Electronic Properties and Crystal Structure of Poly(perinaphthalene): On the Origin of High Observed Conductivities", J.L. Bredas and R.H. Baughman, *J. Chem. Phys.* **83**, 1316-1322 (1985).
94. "Polyacetylene and Polyphenylene as Anode Materials for Nonaqueous Secondary Batteries", L.W. Shacklette, J.E. Toth, N.S. Murphy, and R.H. Baughman, *J. Electrochem. Soc.* **132**, 1529-1535 (1985).
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96. "Application of Diacetylene Monomers and Polymers as Color-Responsive Materials", R.H. Baughman and R.R. Chance, *Polym. Prepr. (Am. Chem. Soc., Div. Polym. Chem.)* **27**, 67-68 (1986).
97. "Characterization and Properties of Metallic Poly(carbon diselenide)", Y. Okamoto, L.S. Choi, Z. Iqbal, and R.H. Baughman, *Synthetic Metals* **15**, 281-288 (1986).
98. "Electrical Conductivity of Pristine and Doped Polyperinaphthalene", Z. Iqbal, C. Maleysson, and R.H. Baughman, *Synthetic Metals* **15**, 161-167 (1986).
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A.F. Preziosi, G.N. Patel, R.G. Denkwalter, and R.H. Baughman  
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R.H. Baughman, G.G. Miller, and G.N. Patel  
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14. Electrically Conductive Compositions of Doped Polyphenylenes and Shaped  
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R.L. Elsenbaumer, D.M. Ivory, Z. Iqbal, and R. H. Baughman  
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J.F. Wolf, L.W. Shacklette, G.G. Miller, R.L. Elsenbaumer, and  
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L.W. Shacklette, K. Jen, H. Eckhardt, R.L. Elsenbaumer, and  
R.H. Baughman  
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32. Dual Pane Thermal Window with Liquid Crystal Shade  
R.H. Baughman, E.D. Buff, H. Eckhardt, and G.H. Fuchs  
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J.F. Wolf, G.G. Miller, L.W. Shacklette, R.L. Elsenbaumer, and  
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R.H. Baughman  
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37. Dual, Series/Parallel Battery Cell Connects  
R.H. Baughman, C. Becht, and L.W. Shacklette  
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R.H. Baughman, E.D. Buff, H. Eckhardt, and G.H. Fuchs  
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39. Superconducting Ceramics by Electrodeposition of Metals with Embedment of Particulate Matter Followed by Oxidation  
M. Maxfield, H. Eckhardt, R.H. Baughman, and Z. Iqbal  
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R.H. Baughman, E.D. Buff, H. Eckhardt, and G.H. Fuchs  
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51. Three Dimensionally Periodic Structural Assemblies on Nanometer and Longer Scales  
A.A. Zakhidov, R.H. Baughman, C. Cui, I. Khayrullin, L.-M. Liu, I. Udod, J. Su, and M. Kozlov  
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52. Colored Articles and Compositions and Methods for Their Fabrication

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53. Colored Articles and Compositions and Methods for Their Fabrication  
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55. Actuators Using Double-Layer Charging of High Surface Area Materials  
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56. Spinning, Processing, and Applications of Carbon Nanotube Filaments, Ribbons, and Yarns  
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57. Composite Material Comprising Oriented Carbon Nanotubes in a Carbon Matrix and Process for Preparing Same  
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58. Spinning, Processing, and Applications of Carbon Nanotube Filaments, Ribbons, and Yarns  
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59. "Material and Device Properties Modification by Electrochemical Charge Injection in the Absence of Contacting Electrolyte for either Local Spatial or Final States", D.-S. Suh, R.H. Baughman, A. A. Zakhidov, PCT Int. Appl. (2005), 152 pp. CODEN: PIXXD2 WO 2005084378 A2 20050915.
60. "Polymer-free Carbon Nanotube Assemblies (Fibers, Ropes, Ribbons, Films)", R. H. Baughman, M. Kozlov, V. H. Ebron, R. Capps, J. Ferraris, PCT Int. Appl. (2006), 80 pp. CODEN: PIXXD2 WO 2006137893 A2 20061228
61. "Fabrication and Application of Nanofiber Ribbons and Sheets and Twisted and Non-Twisted Nanofiber Yarns", M. Zhang, S. Fang, R. H. Baughman, A. A. Zakhidov, K. R. Atkinson, A. E. Aliev, S. Li, C. Williams, Filed PCT Int. Application (2007), 425 pp, CODEN:PIXXD2 WO 2007015710 A2 20070208.
62. "Fuel Powered Actuators", V. H. Ebron, Z. Yang, D. J. Seyer, M. Kozlov, J. Oh, H. Xie, J. Razal, J. P. Ferraris, A. G. MacDiarmid and R. H. Baughman, Filed PCT International Application (2007), PCT US 2007/063241.

63. "Diameter-selective reversible closable peptides", G. R. Dieckmann, A. Ortiz-Acevedo, R. H. Baughman, A. B. Dalton, R. K. Draper, and I. H. Musselman, U.S. Pat. Appl. Publ. (2007), CODEN: USXXCO US 2007269364 A1 20071122 Application: US 2006-441480 20060526.
64. "Use of diameter-selective reversible cyclic peptides for purifying single walled carbon nanotubes", G. R. Dieckmann, A. Ortiz-Acevedo, R. H. Baughman, A. B. Dalton, R. K. Draper, I. H. Musselman, U.S. Pat. Appl. Publ. (2007), 13pp. CODEN: USXXCO US 2007269364.
65. "Method and apparatus for transferring an array of oriented carbon nanotubes", A. A. Zakhidov, R. Nanjundaswamy, S. Li, A. Zakhidov, M. Zhang, R. H. Baughman, U.S. Pat. Appl. Publ. (2008), 24pp. CODEN: USXXCO US 2008014443 A1 20080117 AN 2008:72209.
66. "Adjuvant-mediated reactivity enhancement of polymerizable polyacetylenic materials for indicator inks", T. Prusik, D. Smith, R. H. Baughman, PCT Int. Appl. (2008), 71pp. CODEN: PIXXD2 WO 2008002833 A2 20080103 CAN 148:102108 AN 2008:12323.

#### **INVITED LECTURES SINCE 1990**

"Conducting Polymers: Specialty Device and Volume Applications", European Physical Society Industrial Workshop (Lofthus, Norway, May 1990)

"Recent Advances in Conducting Polymer Research", ELORMA-90 (Dombaj, USSR, Sept. 1990)

"The Present and Future Applications of Conducting Polymers", IUPAC International Symposium on Specialty Polymers (Singapore, Nov. 1990)

"Charge Oscillation and Structure for Alkali-Metal Doped Polyacetylene", Intn. Winter School on "Electronic Properties of Polymers" (Kirchberg, Austria, March 1991)

"The Applications Horizon For Highly Conducting Polymers: From Fundamental Properties to Products", Society of Plastics Engineers (Montreal, May 1991)

"Applications of Conducting Polymers in Redox Devices and Intelligent Materials Systems", ACS Unilever Award Symposium (New York, August 1991)

"Structure-Property Relationships for Highly Conducting Organic Polymers", Second Pacific Polym. Conf. (Japan, Nov. 1991)

"Novel Synthetic Materials for Molecular Electronics: Conducting Polymers, C<sub>60</sub>, and Other New Forms of Carbon", Molecular Electronics Minisymposium, IEEE (Florida, Nov. 1991)

"Organic Polymeric Metals: From Fundamental Science to Products", Distinguished Lecture Series, New Jersey Institute of Technology (Dec. 1991)

"Conducting Polymers and Fullerenes in Intelligent Materials Applications", First International Conf. on Intelligent Materials (Kanagawa, Japan, March 1992)

"The Applications Horizon for Conducting Polymers: From Fundamental Properties to Products", Symposium on Advances in the Physics and Chemistry of Spatially Confined Systems, Michigan State University (June 1992)

"Conducting Polymer Applications: Today's Successes and Future Possibilities", NATO Advanced Research Workshop, Burlington, Vermont (Oct. 1992)

"Novel Cubic Conducting Polymers Proposed for Electrochemical Applications", Electrochemical Society Symposium on "Fundamentals of Solid Electrodes and Electrolytes" (Hawaii, May 1993)

"Conducting Polymers with Conjugated Chains in Three Dimensions", Plenary Lecture at 1993 MARM ACS Meeting (Hofstra Univ., June 1993)

"Polymers with Conjugated Chains in Three Dimensions", "Keynote Lecture" at the, Second International Symposium on "Polymers for Advanced Technologies" (Oxford, UK, Sept. 1993)

"Novel Structures and Properties of Conjugated Carbon Phases with Three-dimensional Connectivity", Harvard University, Division of Applied Sciences (Feb. 1994) and Cornell University, Department of Materials Science and Engineering (March 1994)

"Novel Properties of Conjugated Polymers Having Increased Dimensionality", 1994 Florida Advanced Materials Chemistry Conference (May 1994)

"Conducting Polymer Actuators and Related Devices", Plenary Lecture at ACS National Meeting (Washington DC, August 1994)

"Novel Structures and Properties of Carbon Phases with Three-Dimensional Connectivity", International Conference on Synthetic Polymers (Seoul Korea, July 1994)

"Conducting Polymer Actuators and Related Devices", 50th Southwest Regional Meeting of the American Chemical Society, Fort Worth, Texas (Nov. 1994)

"Conducting Polymer Electromechanical Actuators and Related Devices", Third International Conference on Frontiers of Polymers and Advanced Materials (Malaysia, Jan. 1995)

"Polymers That Function as Intelligent Materials", University of Wollongong (Australia, Feb. 1995)

“The Evolution of Conjugated Polymers from Single-Crystal Polydiacetylenes to Conducting Polymers and New Carbon Phases”, Chemical Pioneer Award Lecture, 73rd AIC National Meeting (Feb. 1995)

“Conducting Polymer Electromechanical Actuators”, Symposium on Charge Transport in Electronic Polymers: A Tribute to Ester Conwell, Univ. of Rochester (May 1995)

“Material Properties that Contradict Reason: Negative Linear, Area, and Volumetric Compressibilities and Negative Volumetric Thermal Expansion”, Workshop on the Computational Modeling of Materials, Princeton University (May 1995)

“Conducting Polymer Artificial Muscles”, University of Florida (June 1995)

“Conducting Polymer Electromechanical Actuators for Optical Applications”, SPIE Meeting on Optical and Photonic Applications of Electroactive and Conducting Polymers, San Diego, CA (July 1995)

“Conducting Polymer Artificial Muscles”, J. Clarence Karcher Lecture, University of Oklahoma (Sept. 1995)

“Conducting Polymer Electromechanical Actuators”, 4th Symposium on Polymer Gels, Tsukuba, Japan (Dec. 1995)

“Polymers that Automatically Change Properties to Satisfy Changing Performance Needs”, Workshop on Multifunctional Polymers and Smart Polymer Systems, University of Wollongong, Australia (Feb. 1996)

“The Evolution of Conjugated Polymers From Single Crystal Polydiacetylenes to Conducting Polymers and New Carbon Phases”, American Chemical Society Award Symposium to Honor Ray H. Baughman (New Orleans National ACS Meeting, March 1996)

“Non-Conventional Sensors and Actuators”, *Materials 2000*, University of Delaware (June 1996)

“Material Properties that Contradict Reason and their Application to Sensors”, Gordon Research Conference on Solid State Chemistry (New London, NH, July 1996)

“A Carbon Phase That Graphitizes at Room Temperature”, International Conference on Synthetic Metals (Snowbird, Utah, August 1996)

“Science and Technology Without Walls: Having the Most Fun With Ideas and Their Realization”, Keynote Lecture for the *Manhattan Poster Project*, University of Delaware (November 1996)

“New Directions for Novel Electronic and Optical Materials”, *Symposium on Organic Semiconducting and Non-Linear Optical Materials* (Callaway Gardens, GA, June 1997)

“Hierarchical Crystals: New Types of Intelligent Materials, Symposium on Advances in Intelligent Polymer Research (University of Wollongong, Australia, September 1997)

“Hierarchical Redox Materials for Sensors, Actuators, and Supercapacitors”, *Focus on the Future Symposium*, Department of Chemistry, University of Florida (October 1997)

“Optical Sensors Using Materials With Unusual Mechanical Properties or Photonic Bandgaps”, *IEEE Lasers and Electro-Optics Society Annual Meeting* (San Francisco, November 1997)

“Novel Phases of Carbon”, *Symposium on Semiconducting Polymers* (National American Chem. Soc. Meeting, Dallas, March 1998)

“Three-Dimensionally Periodic Nanostructured Foams and Hybrid Materials”, Nano-98 (Stockholm, Sweden, June 1998)

“Inverse Opal Photonic Crystals: A New Type of Multifunctional Material for Electronic and Optical Applications”, *3rd Workshop on Multifunctional & Smart Polymer Systems* (Pisa, Italy June 1998)

“PHOTONIC CRYSTALS FROM OPALS: Synthesis, Structure, and Properties”, *Norman Hascoe Distinguished Lecture Series on Frontiers of Science* (University of Connecticut, Nov. 1998), ACS National Meeting (Anaheim, CA, March 1999), and DARPA-AMRI *Symposium on Materials for the 21st Century* (University of New Orleans, February, 1999)

“Optical Photonic Crystals by Self-assembly: Synthesis, Structure, and Properties”, *Workshop on Electromagnetic Structures, Design, and Applications* (Laguna Beach, CA, Jan. 1999)

“Carbon Nanotube Artificial Muscles”, *XIIIth International Winter School on Electronic Properties of Novel Materials* (Austria, March 1999) and *Nanotube 99* (East Lansing, Michigan, July 23-27)

“Self-assembled Nanostructures: From Metallic and Dielectric Photonic Crystals to Carbon Nanotube Artificial Muscles”, Naval Research Laboratory (Washington, DC, April 1999) and Physics Department, Temple University (Oct. 11, 1999)

“Polymers for Novel Applications”, Keynote Address for AP-Tec'99 (Dublin, Ireland, Sept. 1999)

“Carbon Nanotube Artificial Muscles and Sensors”, *Third Workshop on Multifunctional and Smart Polymer Systems* (Dublin, Ireland, Sept. 1999)

“Carbon Nanotube Artificial Muscles: From Large Scale to Nanoscale Actuators for Aerospace Applications”, *RAMNAS Symposium* (Wright-Patterson Air Force Base, Oct. 27-28, 1999)

“Artificial Muscles From Electroactive Polymers: From Conducting Polymers to Carbon Nanotubes”, *Knowledge Foundation Symposium* (Coronado, CA, Oct. 28-29, 1999)

“Novel Self-Assembled Materials: From Photonic Crystals to Carbon Nanotube Artificial Muscles” *Eighth Annual Symposium on Advanced Materials* (Virginia Commonwealth Univ, Nov. 19, 1999)

“Carbon Nanotube Artificial Muscles and Sensors”, Materials Research Society (Boston, Massachusetts, Nov. 29 - Dec. 3, 1999)

“Artificial Muscles Based on Conjugated Materials”, Cambridge Healthtech Institute Symposium on *Bioengineering of Nanostructures for Biomedical and Biotechnical Applications*, Boston, Massachusetts (Dec. 1-3, 1999)

"Self-Assembled Nanostructures: From Metallic and Dielectric Photonic Crystals to Carbon Nanotube Artificial Muscles", Johns Hopkins Univ. (Jan. 26, 2000).

“Giant Non-Faradaic Charge Transfer for Carbon Single-Wall Nanotubes: Optical, Electronic, and Dimensional Effects, and their Applications”, *Fourth International Topical Conference on Optical Probes of Conjugated Polymers and Photonic Crystals* (Feb. 15-19, 2000)

“Multifunctional Carbon Nanotube Charge-Transfer Complexes: Structural, Actuator, Energy Storage, and Energy Harvesting Functions”, AMRI/DARPA Symposium (New Orleans, March 2-3, 2000) and XIV th International Winter School on Electronic Properties of Novel Materials (Austria, March 5-11, 2000)

“Carbon Nanotube Electromechanical Macro-Actuators and Micro-Actuators”, SPIE International Symposium on Smart Structures and Materials (Newport Beach, CA, March 5-9, 2000)

“Photonic Crystals Based on Metals, Semiconductors, and Insulators”, ACS National Meeting (San Francisco, CA, March 26-30, 2000)

“Carbon Nanotube Actuators”, Invited Lecture, American Physical Society March Meeting (Minneapolis, MN, March 20-24, 2000)

“The Science and Early Technology of Carbon Nanotube Artificial Muscles”, Knowledge Foundation Symposium (Miami, Florida, April 10-11, 2000)

“Carbon Nanotube Artificial Muscles”, *The 23rd Annual Condensed Matter Meeting of The Brazilian Physical Society* (São Lourenço, Brazil, May 9-13, 2000)

"Multifunctional Carbon Nanotube Charge-Transfer Complexes: Structural, Actuator, Energy Storage, and Energy Harvesting Functions", *Australia Workshop on Carbon Nanotechnology* (University of Wollongong, Australia, June 8-9, 2000)

"Carbon Nanotubes for Actuator, Energy Storage, and Energy Harvesting Applications", *International Conference on Synthetic Metals* (Gastein, Austria, July 15-21, 2000) and Argonne National Laboratory (Argonne, Illinois, Nov. 6, 2000).

"Carbon Nanotube Charge-Transfer Complexes for Artificial Muscle, Energy Storage, and Energy Harvesting", Royal Institute of Technology (Stockholm, Dec. 8, 2000).

"Electrical, Chemical, and Photoactuators Based on Single-Wall Carbon Nanotubes", *Fifth Workshop on Multifunctional Polymers and Smart Polymer Systems* (University of Wollongong, Australia, January 4-6, 2001) and *AMRI/DARPA Symposium* (New Orleans, Feb. 22-23, 2001).

"Carbon Nanotubes for Artificial Muscles, Energy Storage, and Energy Harvesting", (Columbia Univ., Feb. 26, 2001).

"Applications Arising from the Nobel Prize Winning Discovery of Conducting Polymers", *Symposium to Celebrate the 2000 Nobel Prize in Chemistry* (Univ. Penn., May 4-5, 2001).

"Photonic Crystals by Self-Assembly and Nanomolding: From Novel Lasers to Green Technology Colorants and Optical Switches" *Organic Thin Films Gordon Conference* (Newport, Rhode Island, June 24-29, 2001).

"Actuation, Energy Storage, and Energy Harvesting Using Carbon Nanotubes", *Materials Research for Defense-After-Next* (Woods Hole Center of the National Academy of Sciences, June 26-28, 2001).

"Carbon Nanotube Charge Transfer Complexes for Artificial Muscles, Energy Storage, and Energy Harvesting", *Conference on Electroactive Polymers and Biosystems* (Tuscany, Italy, July 30-August 3, 2001)

"Carbon Nanotubes for Artificial Muscles, Energy Storage, and Energy Harvesting", 2001 Tulane Engineering Forum, *Advanced Materials: Research, Development, and Applications* (Tulane University, Sept. 21, 2001).

"Carbon Nanotubes for Artificial Muscles, Energy Storage, and Energy Harvesting", *Annual Symposium of the Center for Collective Phenomena in Restricted Geometries* (Penn. State Univ., Oct. 12-14, 2001).

"Multifunctional Carbon Nanotube Composites for Actuation, Energy Storage, and Energy Harvesting", *Nanoscience in a Mega-City* (Hunter College, City University of New York, Oct. 20, 2001).

“Actuation, Energy Storage, and Energy Harvesting Using Carbon Nanotubes from Rice/CNI”, *Rice University* (Nov. 1, 2001).

“Publication of Your Best Work in Science and Nature: Requirements, Strategies, and Dangers” (Jilin University, China, Nov. 11, 2001).

“Carbon Nanotubes for Actuation in Artificial Muscles, Energy Storage, and Energy Harvesting” (Jilin Univ., China, Nov. 11, 2001 and Hong Kong University of Science and Technology, China, Nov. 16, 2001).

“Artificial Muscles Based on Carbon Nanotubes”, Materials Research Society Fall Meeting (Boston, Nov. 26-30, 2001).

“Artificial Muscles Based on Carbon Nanotubes”, *The First International Conference on Artificial Muscles* (National Institute of Advanced Industrial Science and Technology, Osaka, Japan, Dec. 12-14, 2001).

“Recent Advances for Carbon Nanotube Artificial Muscles”, *International Workshop on Advanced Materials for Sensors and Actuators: Role of Nanotechnology* (University of Wollongong, Wollongong, Australia, Feb. 12-14, 2002) and *AMRI/DARPA Symposium* (New Orleans, March, 2002).

“Carbon Nanotube Actuators Based On Double-Layer Charge Injection: From Materials Processing to Device Physics and Performance”, *SPIE's Electroactive Polymer Actuators and Devices* (San Diego, CA, March 17-21, 2002).

“Experimental and Theoretical Characterization of Artificial Muscles Based on Charge Injection in Carbon Nanotubes”, Invited Lecture, American Physical Society March Meeting (Indianapolis, Indiana, March 18-22, 2002).

“Carbon Nanotubes for Fun and Profit: Tiny Muscles, Noses, Capacitors, and Power Generators”, *Joint Symposium on Nanotechnology at the Border: Economic and Intellectual Impact of the Small World*, (University of Texas at Brownsville, May 3, 2002) and *First NJU-UTD Joint Workshop on Nanoscience and Technology* (Nanjing University, China, June 28-29, 2002).

“Carbon Nanotubes for Artificial Muscles, Energy Storage and Energy Harvesting”, *International Conference on Synthetic Metals* (Shanghai, China, June 29 to July 5, 2002).

“Carbon Nanotubes for Artificial Muscles, Energy Storage and Energy Harvesting”, *International Interactive Textiles Conference for the Warrior System* (Nadick, MA, July 9-11, 2002) and *3M Corporation* (Minneapolis, MN, July 2002).

“Related Photo, Thermal, and Charge Injection Driven Processes and Devices Based on Single Walled Carbon Nanotubes” *NATO-ARW Meeting on Organic Nanophotonics* (Aix en Provence, France, August 25-29, 2002).

“Carbon Nanotubes for Artificial Muscles, Energy Storage and Power Generation”, Texas Systems Day Conference (Arlington, TX, Sept 28, 2002).

“Applications Prospects for Carbon Nanotubes”, Honeywell Bendix/JURID Guest Lecture, Society of Automotive Engineers 20<sup>th</sup> Annual Brake Colloquium (Phoenix, Arizona, Oct. 6-9, 2002).

"Carbon Nanotubes for Fun and Profit: Tiny Muscles, Noses, Capacitors, and Power Generators " (University of Texas at Arlington, Oct. 11, 2002).

“Carbon Nanotubes for Fun and Profit – Tiny Muscles, Noses, and Power Generators”, Raymond F. Boyer Lecture Series in Macromolecular Science and Engineering (Case Western Univ., Oct. 25, 2002).

“Carbon Nanotubes for Artificial Muscles, Energy Storage and Power Generation”, The American Vacuum Society (Denver, Nov. 4-8, 2002).

“Carbon Nanotube Actuators: From Fundamental Physics to Device Performance and Targeted Applications”, *First World Conference on Biomimetics and Artificial Muscles* (Albuquerque, NM, Dec. 9-11, 2002).

“Super Tough Nanotube Composite Fibers for Electronic Textiles”, *International Workshop on Electronic Fibers and Textiles* (University of Wollongong, Australia, Feb. 12-14, 2003) and *International Conference on Advanced Materials and Nanotechnology* (Wellington, New Zealand, Feb. 5-7, 2003).

"Carbon Nanotubes Arrays and Continuous Fibers for the Harvesting, Storage, Conversion, and Absorption of Energy", NANOVENTURES 2003 (Richardson, TX, Feb. 26-28, 2003).

“Super Tough Nanotube Composite Fibers for Electronic Textiles”, *XVI<sup>th</sup> International Winterschool on Electronic Properties of Novel Materials* (Kirchberg, Austria, March 9-14, 2003).

“Important Computational Challenges in Nanotechnology”, *24<sup>th</sup> Annual Meeting of the Council of Chemical Research* (Austin, Texas, April 5-8, 2004).

“Energy Transforming Carbon Nanotube Fibers”, *2003 Materials Research Society Spring Meeting* (April 21-25, 2003).

“Carbon Nanotubes for Fun and Profit: Tiny Muscles, Noses, and Power Generators”, Raymond F. Boyer Lecturer, Case Western Reserve University (April 18, 2003).

Purity and Dispersion Effects in Using Carbon Nanotubes for Super-Tough Continuous Fibers, Actuation, Energy Harvesting and Storage, and Electronic Textiles”, *NIST Workshop on Nanotubes* (Gaithersburg, MD, May 27-29, 2003).

“Carbon Nanotubes for Super-Tough Continuous Fibers, Actuation, Energy Harvesting and Storage, and Electronic Textiles”, *Oklahoma NSF EPSCoR Annual Conference* (May 15, 2003, Stillwater, OK).

“Super Tough Nanotube Composite Fibers for Artificial Muscle and Electronic Textile Applications”, *2003 Nano Summit Conference* (Houston, Texas, July 31, 2003) and “Carbon Nanotube Chemi-Mechanical and Piezo-Electrochemical Sensors”, *2003 Gordon Research Conference on Chemical Sensors and Interfacial Design* (Newport, RI, Aug. 2003,).

“Super Tough Nanotube Composite Fibers For Artificial Muscle and Electronic Textile Applications”, First Annual SPRING Meeting on Nanoscience and Nanotechnology (Austin, Texas, August 25-27, 2003).

“Super Tough Nanotube Composite Fibers for Artificial Muscle and Electronic Textile Applications”, *2003 Oesper Symposium* (Oct. 10-11, 2003, Cincinnati, OH) and 2003 Materials Research Society Spring Meeting (Dec. 1-5, Boston, MA, 2003).

"Carbon Nanotubes for Fun and Profit: Tiny Muscles, Noses, Capacitors, and Power Generators ", *Environmental Protection Agency* (Dallas, Texas, January 15, 2004).

“Multifunctional Carbon Nanotube Fibers”, *IEEE/NANO-2004* (, Miami, Florida, Feb. 15-19, 2004).

“Transforming Electrolyte-Free CNT Properties By Liquid-State Electrochemical Double-Layer Charge Injection”, *International Winter School on Electronic Properties of Novel Materials* (Kirchberg, Austria, March 6-13, 2004).

“Multifunctional Carbon Nanotube Fibers”, *NSF/AFRL/ARL/ONR Workshop on the Nanotube-Reinforced Composite Materials for Multifunctional Applications* (Florida State Univ., Tallahassee, March 23-24, 2004).

“The Future is Small: Nanotechnology”, National Association of Computer Consultant Businesses (Dallas, Texas, April 13, 2004).

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“Tough Nanotube Composite Fibers for Artificial Muscle Applications”, *The Second Conference on Artificial Muscles - Biomimetic System Engineering* (Osaka, Japan, May 20-21, 2004).

“Transforming Electrolyte-Free Carbon Nanotube Properties By Liquid-State Electrochemical Double-Layer Charge Injection”, *International Conference on Synthetic Metals* (Wollongong, Australia, June 28-July 2, 2004).

“Carbon Nanotubes for Super-tough Continuous Fibers, Actuation, Energy Harvesting and Storage, and Electronic Textiles”, Plenary Lecture, *XIII International Materials Research Congress* (August 22-26, 2004, Cancun, Mexico).

“High Performance Carbon Nanotube Fibers – A Glimpse at the Future”, *The Fibers Conference 2004* (Sept. 15-16, 2004, Greenville, SC).

“Continuous Nanotube Yarns and Fibers and Their Properties for Multifunctional Applications”, NASA Grand Challenge Workshop on *Nano for Space Exploration* (NASA Ames, Moffett Field, CA, August 24-26, 2004).

“Super Tough Carbon Nanotube Fibers for Artificial Muscle and Electronic Textile Applications”, After Dinner Speaker for American Institute for Chemical Engineers Meeting (Dallas, TX, Oct. 21, 2004).

“In Vacuo Retention of Nanostructure Properties Switched by Liquid-State Double-Layer Charge Injection”, Second Annual SPRING Meeting on Nanoscience and Nanotechnology (Dallas, Texas, Nov. 11-13, 2004).

“Strange, Useful, and Problematic Mechanical Properties of Carbon Nanotube Sheets and Fibers”, *2004 Materials Research Society Fall Meeting* (Boston, MA, Nov. 29-Dec. 3, 2004).

“Nanomaterial Properties Switched by Double-Layer Charge Injection and Retained in Vacuum”, *2004 Materials Research Society Fall Meeting* (Boston, MA, Nov. 29-Dec. 3, 2004).

“A New Type of Artificial Muscle Yarn for Artificial Muscle and Other Multifunctional Materials Applications”, *Second World Conference on Biomimetics, Artificial Muscles, and NanoBio* (Dec. 6-8, 2004, Albuquerque, NM).

“Strange, Useful, and Problematic Mechanical Properties of Carbon Nanotube Sheets and Fibers”, *Rice University* (Dec. 13, 2004, Houston, TX).

“A New Type of Artificial Muscle Yarn for Artificial Muscle and Other Multifunctional Materials Applications”, *Carbon Nanotube Reinforced Composites Workshop - NASA, CAER, UK* (Jan. 11-12, 2005, Univ. Kentucky, Lexington, Kentucky).

“A New Type of Artificial Muscle Yarn for Artificial Muscle and Other Multifunctional Materials Applications”, *Wright-Patterson Air Force Base* (Jan. 18, 2005, Dayton, Ohio).

“A New Type of Carbon Nanotube Yarn for Artificial Muscle and Other Multifunctional Materials Applications”, *NIST/NASA Workshop on Measurement Issues in Single-Walled Carbon Nanotubes* (Jan. 26-28, 2005, Gaithersburg, Maryland).

“Draw-Twist-Spun Multiwalled Carbon Nanotubes for Artificial Muscle and Other Multifunctional Applications”, *Workshop on Nanostructured Electronic Materials*, University of Wollongong (Feb. 2-3, 2005, Wollongong, Australia).

“Draw-Twist-Spun Multiwalled Carbon Nanotubes for Artificial Muscle, Structural, Energy Storage, Energy Harvesting, and Field Emission Applications”, *Workshop on NanoScience for Advanced Applications* (Feb. 16-19, 2005, Guanajuato, Mexico).

“Draw-Twist-Spun Multiwalled Carbon Nanotubes for Artificial Muscle, Structural, Energy Storage, Energy Harvesting, and Field Emission Applications”, University of Texas at Austin (Feb. 23, 2005, Austin, TX).

“Draw-Twist-Spun Multiwalled Carbon Nanotubes for Artificial Muscle and Other Multifunctional Applications”, *XIXth Annual International Winter School Euroconference on Electronic Properties of Novel Materials* (March 12-19, 2005, Kirchberg, Austria).

“A New Type of Carbon Nanotube Yarn for Artificial Muscle and Other Multifunctional Materials Applications”, *SPIE’s International Symposium on Smart Structures and Materials* (March 7-10, 2005, San Diego, CA).

“Gaint Double-Layer Charge Injection Without Contacting Electrolyte: Properties Tuning and Device Applications”, *Spring Meeting of the Materials Research Society* (March 28-April 1, 2005, San Francisco).

“Draw-Twist-Spun Multiwalled Carbon Nanotubes for Artificial Muscle, Structural, Energy Storage, Energy Harvesting, and Field Emission Applications”, *2<sup>nd</sup> Conference on Nanoscale Devices and System Integration* (April 4-6, 2005, Houston, Texas).

“Draw-Twist-Spun Multiwalled Carbon Nanotubes for Artificial Muscle, Structural, Energy Storage, Energy Harvesting, and Field Emission Applications”, Lockheed Martin (April 12, 2005, Fort Worth, Texas).

“The Science of Nanofabrication”, Online Discussion for EurekAlert (April 19, 2005).

“Knotty Carbon Nanotube Yarns”, *U.S.-Mexico Workshop on Knots in Biological Sciences* at the University of Texas at Dallas (April 28, 2005, Richardson, Texas).

“Draw-Twist-Spun Multiwalled Carbon Nanotubes for Artificial Muscle, Structural, Energy Storage, Energy Harvesting, and Field Emission Applications”, *First International Workshop of NANO Systems Institute* (May 30-31, 2005, Seoul, Korea).

“Gaint Double-Layer Charge Injection Without Contacting Electrolyte: Properties Tuning and Device Applications”, *Physics Department, Seoul National University* (June 1, 2005, Seoul, Korea).

“Artificial Muscles”, *IDGA’s Nanotechnology for Defense Conference* (July 26, 2005, Washington, DC).

“Draw-Twist-Spun Multiwalled Carbon Nanotubes for Artificial Muscle, Structural, Energy Storage, Energy Harvesting, and Field Emission Applications”, *Nano Summit Research Conference* (July 28, 2005, Houston, Texas).

“Multifunctional Carbon Nanotube Yarns and Textiles for Fun and Profit: *Artificial Muscle, Electronic Textile, Energy Storage and Harvesting, Display, Electron Emission,*

*and Other Applications*”, SPRING Consortium Taiwan Workshop, Omni Hotel (August 2, 2005, Dallas, Texas).

“Multifunctional Nanotube Yarns and Sheets: From Fabrication to Science and Applications”, *TiiMS URETI Annual Meeting*, Texas A&M (August 3, 2005, College Station, Texas).

“Multiwalled Nanotube Yarns and Sheets for Artificial Muscle, Structural, Energy Storage, Energy Harvesting, Field Emission, and Other Applications”, *Keynote Lecture, ASME Integrated Nanosystems Conference* (September 13, 2005, Berkley, California).

“Multifunctional Carbon Nanotube Yarns and Textiles for Fun and Profit: *Artificial Muscle, Electronic Textile, Energy Storage and Harvesting, Display, Electron Emission, and Other Applications*”, Textron Webex Lecture (September 12, 2005, Dallas, Texas).

“Multifunctional Carbon Nanotube Yarns and Textiles for Fun and Profit: *Artificial Muscle, Electronic Textile, Energy Storage and Harvesting, Display, Electron Emission, and Other Applications*”, *Dean’s Distinguished Lecture* (Sept. 26, 2005, Univ. of Texas, Brownsville).

“Multifunctional Carbon Nanotube Yarns and Textiles for Fun and Profit: *Artificial Muscle, Electronic Textile, Energy Storage and Harvesting, Display, Electron Emission, and Other Applications*”, DuPont Corporation (September 22, 2005, Columbus, Ohio).

“Draw-State fabricated Nanotube Yarns and Textiles for Artificial Muscle, Structural, Energy Storage, Energy Harvesting, Display, Field Emission and Other Applications”, *Santa Fe Workshop on Nanoengineered Materials and Macro-Molecular Technologies* (Oct. 3-7, 2005, Santa Fe, New Mexico).

“Multifunctional Carbon Nanotube Yarns and Textiles for Fun and Profit: *Artificial Muscle, Electronic Textile, Energy Storage and Harvesting, Display, Electron Emission, and Other Applications*”, Bell Helicopter (Oct. 5, 2005, Hurst, Texas).

“Multifunctional Carbon Nanotube Yarns and Textiles for Fun and Profit: *Artificial Muscle, Electronic Textile, Energy Storage and Harvesting, Display, Electron Emission, and Other Applications*”, Third Annual Spring Conference, Rice University (Oct. 10-11, 2005, Houston, Texas).

“Multifunctional Carbon Nanotube Yarns and Textiles for Fun and Profit: Artificial Muscle, Electronic Textile, Energy Storage and Harvesting, Display, Electron Emission, and Other Applications”, *1st Nanoscience and Applications Conference of NIST* (Oct. 17-19, 2005, Boulder, Colorado).

“Multifunctional Carbon Nanotube Yarns and Textiles for Fun and Profit”, *Evening Public Lecture* (Nov. 9, 2005, University of Texas at Dallas, Dallas, Texas)

“*POST PATENT FILING UPDATE ON: Multifunctional Carbon Nanotube Yarns and Textiles for Fun and Profit*”, *Materials Science and Engineering Seminar Program* (Nov. 11, 2005, Texas A&M, College Station, Texas).

“Carbon Nanotube Yarns and Sheets for Energy Generation, Storage, and Transmission”, *Energy and Nanotechnology Workshop III*, Baker Institute for Public Policy, Rice University (November 15, 2005, Houston Texas).

“Draw-State Fabricated Nanotube Yarns and Textiles for Artificial Muscle, Structural, Energy Storage, Energy Harvesting, Display, Field Emission and Other Applications”, *Vanderbilt University* (Dec. 6, 2005, Nashville, Tennessee).

“Multifunctional Carbon Nanotube Yarns and Transparent Sheets for Fun and Profit”, *3rd Taiwan/US Air Force Nanoscience and Nanotechnology Workshop* (Feb. 9-11, 2006, Hualien, Taiwan)

“Multifunctional Carbon Nanotube Yarns and Textiles for Fun and Profit”, *Electromaterials Science Symposium* (Feb. 15-17, 2006, Wollongong, Australia).

“Expanding the Nanotech Frontier”, *Dallas/Fort Worth American Chemical Society Meeting* (Feb. 23, 2006, Dallas Texas).

“Fuel Powered Artificial Muscles”, *SPIE Smart Structures and Materials Symposium* (Feb. 26-March 2, 2006, San Diego, CA).

“Solid-State Fabrication, Structure, and Multifunctional Applications of Carbon Nanotube Yarns and Transparent Sheets”, *XXth Annual International Winter School Euroconference on Electronic Properties of Novel Materials* (March 4-11, 2006 Kirchberg, Austria).

“The Solid-State Fabrication, Structure, and Multifunctional Applications of Strong Carbon Nanotube Yarns and Transparent Sheets”, *Invited Talk for the March Meeting of the American Physical Society* (March 12-17, 2006, Baltimore, Maryland).

“Multifunctional Carbon Nanotube Yarns and Textiles for Fun and Profit: *Artificial Muscle, Electronic Textile, Energy Storage and Harvesting, Display, Electron Emission, and Other Applications*”, *Techtextile North America 2006 Symposium* (March 28-30, 2006, Atlanta, Georgia).

“Solid-State Fabrication, Structure, and Multifunctional Applications of Carbon Nanotube Yarns and Transparent Sheets”, *International Meeting on Chemistry of Nanotubes: Science and Applications* (April 2-5, 2006, Arcachon, France).

“Multifunctional Carbon Nanotube Yarns and Self-Woven Nanotube Sheets by Solid-State Processing for Textile Applications”, *Materials Research Society Spring Meeting* (April 17-21, 2006, San Francisco).

“Solid-State Fabrication, Structure, and Applications of Carbon Nanotube Yarns and Transparent Sheets”, *2006 NanoMaterials for Defense Applications* (May 1-4, 2006, Virginia Beach, Virginia).

“The Future is Small”, *Eddie Bernice Johnson Math and Science Lecture for High School Students* (May 15, 2006, Townview Center, Dallas, Texas).

“Solid-State Fabrication, Structure, and Multifunctional Applications of Carbon Nanotube Yarns and Transparent Sheets”, *Oklahoma NSF EPSCOR Annual State Conference* (May 18, 2006, Norman, Oklahoma,).

“Nanostructured Materials and Their Applications: From Artificial Muscles and Electronic Textiles to Vaccine Indicators”, *MEDICAL DEVICES: TODAY AND TOMORROW*, *Medical Device Action Alliance* (Irving, Texas, May 23, 2006).

“The High Speed Production, Properties, and Applications of Carbon Nanotube Yarns and Transparent Sheets”, *International Conference on Synthetic Metals* (Dublin, Ireland, July 2-7, 2006).

“New Technologies from UTD's NanoTech Institute: From High Performance Nanotube Yarns and Sheets to Fuel-Powered Artificial Muscles”, The 6<sup>th</sup> Emerging Information Technology Conference (Dallas, Texas, August 10-11, 2006).

“Negative Poisson Ratios and Linear Compressibilities for Carbon Nanotube Sheets and Yarns”, *Auxetics 2006* (Univ. of Exeter, UK, Sept. 4-6, 2006).

“Multifunctional Carbon Nanotube Yarns and Transparent Sheets for Fun and Profit”, *Presidential American Chemical Society Symposium in memory of Richard Smalley* (Sept. 10-14, San Francisco).

“Fuel Powered Artificial Muscles”, NanoBio Convergence Group Lecture Series (Sept. 13, 2006, Menlo Park, CA).

“*NanoTech Institute Inventions: From Multifunctional Carbon Nanotube Yarns and Transparent Metallic Sheets to Fuel-Powered Muscles and Devices for Energy Harvesting, Storage, and Conversion*”, NanoTX'06 Conference on *The Promise of Tomorrow, The Business of Nanotechnology* (Sept. 27-28, 2006, Dallas, TX)

“Giant Double-Layer Charge Injection Without Contacting Electrolyte”: Properties Tuning and Device Applications”, Shimane-Dallas Metroplex Workshop (Sept. 29, 2006, Richardson, Texas).

“Solid-State Fabrication, Structure, and Multifunctional Applications of Carbon Nanotube Yarns and Transparent Sheets”, *After Dinner Speech, American Institute of Aeronautics and Astronautics* (Oct. 19, 2006, Fort Worth, Texas).

“Solid-State Fabrication, Structure, and Multifunctional Applications of Carbon Nanotube Yarns and Transparent Sheets”, *US-Ireland R&D Partnership Nanotechnology Workshop* (Nov. 23-24, Belfast, Ireland).

“Novel Technologies for Fabricating and Applying Multifunctional Carbon Nanotube Yarns and Transparent Sheets”, Keynote Lecture for SAMPE Conference: *Global Advances in Materials and Process Engineering* (Nov. 6-9, 2006, Dallas, TX).

“Multifunctional Carbon Nanotube Yarns and Textiles for Fun and Profit”, *NASA Nanobriefs' National Nano Engineering Conference* (Nov. 9-10, 2006, Boston, MA).

“Solid-State Fabrication, Structure, and Multifunctional Applications of Carbon Nanotube Yarns and Transparent Sheets”, *North Carolina State Univ.* (Nov. 13, 2006, Raleigh, North Carolina).

“Solid-State Fabrication, Structure, and Multifunctional Applications of Carbon Nanotube Yarns and Transparent Sheets”, *Columbia, University* (Nov. 15, 2006, New York City).

“From Multifunctional Carbon Nanotube Yarns and Transparent Sheets to Fuel-Powered Muscles and Devices for Energy Harvesting, Storage, and Conversion”. *Carnegie Mellon University* (Nov. 21, 2006, Pittsburgh, PA).

“From Electrical to Fuel Powered Artificial Muscles”, *Fall Materials Research Society Meeting* (Nov. 29-Dec. 1, Boston, Massachusetts).

“Strain Amplification for Artificial Muscles and Sensors Using Giant Poisson Ratios and Giant Linear Compressibilities”, *Fall Materials Research Society Meeting* (Nov. 29-Dec. 1, 2006, Boston, Massachusetts).

“*NanoTech Institute Inventions: From Multifunctional Carbon Nanotube Yarns and Transparent Metallic Sheets to Fuel-Powered Muscles and Devices for Energy Harvesting, Storage, and Conversion*”, *International Conference on Nanoscience and Nanotechnology* (Dec. 7-8, 2006, Guangji, Korea).

“Solid-State Fabrication, Structure, and Multifunctional Applications of Carbon Nanotube Yarns and Transparent Sheets”, *Chonnam University* (Dec. 8, 2006, Guangji, Korea).

“From Electrical to Fuel Powered Artificial Muscles”, *KITECH* (Dec. 8, 2006, Seoul, Korea).

“From Electrical to Fuel Powered Artificial Muscles”, *Hanyang University* (Dec. 11, 2006, Seoul, Korea).

“From Electrical to Fuel Powered Artificial Muscles”, *2006 International Workshop on Innovations and Advanced Studies –Energy, Biomedicine, Enabling Materials and Micro-Nano Science and Technology*, *National Cheng Kung Univ.* (Dec. 13-15, 2006, Tainan, Taiwan).

“Solid-State Fabrication, Structure, and Multifunctional Applications of Carbon Nanotube Yarns and Transparent Sheets”, *Northrop Grumman Lecture Series* (January 8, 2007, Los Angeles, California).

“From Electrical to Fuel Powered Artificial Muscles”, *Award Lecture for Kapitza Metal* (Jan. 18, 2007, Moscow, Russia).

“From Multifunctional Carbon Nanotube Tarns and Transparent Sheets to Fuel-Powered Muscles and Devices for Energy Harvesting, Storage, and Conversion”, *Honeywell Corporation* (January 22, 2007, Morristown, New Jersey).

“Strain Amplification for Artificial Muscles and Sensors Using Giant Poisson Ratios and Giant Linear Compressibilities”, *2<sup>nd</sup> International Symposium on Electromaterials Science* (Feb. 7-9, 2007, Wollongong, Australia).

“From Electrical to Fuel Powered Artificial Muscles”, *Euroconference on Electronic Properties of Novel Materials* (March 10-16, 2007, Kirchberg, Austria).

“Autonomous Carbon Nanotube and Shape Memory Yarn, Sheet, and Wire Systems”, *SPIE Smart Structures and Materials Symposium* (March 18-22, 2007, San Diego, CA).

“Solid-State Fabrication, Structure, and Multifunctional Applications of Carbon Nanotube Yarns and Transparent Sheets”, *The Best Little Nano Conference in Texas* (Austin, Texas, April 4-5, 2007).

“Solid-State Fabrication of High Performance Carbon Nanotube Yarns and Transparent Sheets and Their Multifunctional Applications”, *3<sup>rd</sup> International Symposium on NANOSTRUCTURED AND FUNCTIONAL POLYMER-BASED MATERIALS AND NANOCOMPOSITES* (May 13-15, 2007, Corfu, Greece).

“New Technologies from UTD’s NanoTech Institute”, Banquet Lecture for *Raytheon’s 7<sup>th</sup> Electro-Optical Systems Technology Network Conference* (May 15-16, 2007, Richardson, Texas).

“From Multifunctional Carbon Nanotube Yarns and Transparent Sheets to Fuel-Powered Muscles and Devices for Energy Harvesting, Storage, and Conversion”, Dinner Lecture for *Institute for Innovation and Invention* (June 14, 2007, Richardson, Texas).

“From Electrical to Fuel Powered Artificial Muscles”, Southern Methodist University (July 13, 2007, Dallas, Texas).

“NanoTech Institute Inventions: From Multifunctional Carbon Nanotube Yarns and Transparent Metallic Sheets to Fuel-Powered Muscles and Devices for Energy Harvesting, Storage, and Conversion”, Evening lecture for *The Indus Entrepreneurs* (June 14, 2007, Dallas, TX).

“Solid-State Fabrication, Structure, and Multifunctional Applications of Carbon Nanotube Yarns and Transparent Sheets”, *Carbon 2007* (July 15-20, 2007, Seattle, Washington)

“From Electrical to Fuel Powered Artificial Muscles”, *Texas-Korea Nano Workshop* (August 6-8, 2007, Richardson, TX).

“Solid-State Fabrication, Structure, and Multifunctional Applications of Carbon Nanotube Yarns and Transparent Sheets”, *Department of Aerospace Engineering, University of Illinois* (Sept. 24, 2007, Urbana-Champaign, Illinois).

“NanoTech Institute Inventions: Transparent Metallic Sheets, Fuel-Powered Muscles and More”, *MetroCon (IEEE) Conference* (Oct. 10, 2007, Arlington, TX).

“From Multifunctional Carbon Nanotube Yarns and Transparent Sheets to Fuel-Powered Muscles and Devices for Energy Harvesting, Storage, and Conversion”, *General Electric* (Oct. 23, 2007, Niskayuna, NY).

“Nanotechnology for Fun and Profit”, *Carnegie Mellon University Lecture Series* - Lecture preceding receipt of 2007 Distinguished Alumni Award (Oct. 26, 2007, Pittsburgh, PA).

“From Electrical to Fuel-Powered Artificial Muscles”, Plenary Lecture at *2007 National Nano Engineering Conference*, prior to receiving Nano 50 Award for Fuel-Powered Artificial Muscles (Nov. 14, 2007, Boston, Massachusetts).

“Nanotechnology for Fun and Profit”, *Petersen Institute of NanoScience and Engineering, University of Pittsburgh* (Feb 4, 2008, Pittsburgh, PA).

“Diverse Carbon Nanotube Artificial Muscles Meet an Exciting New Family Member”, *Monash University* (Feb. 21-22, 2008, Melbourne, Australia).

“Diverse Carbon Nanotube Artificial Muscles Meet an Exciting New Family Member”, *US AFRL-Israeli Bio/Nano Workshop for Materials* (March 24-25, 2008, San Francisco, CA).

“Diverse Carbon Nanotube Artificial Muscles Meet an Exciting New Family Member”, *ChemOnTubes 08*, (April 6-9, 2008, Zaragoza, Spain).

“Diverse Carbon Nanotube Artificial Muscles Meet an Exciting New Family Member”, *Nano for Defense Applications* (April 21-23, 2008, Arlington, Virginia).

“Nanotechnology for Fun and Profit”, *Hoby Youth Leadership Conference* (May 16, 2008, Dallas, TX).

“Fabrication and Multifunctional Applications of Carbon Nanotube Yarns and Self-Woven Sheets”, *Third International Conference on Smart Materials Structures and Systems* (June 8-13, 2008, Acireale, Sicily).

“Solid-State Fabrication, Structure, and Multifunctional Applications of Carbon Nanotube Yarns and Transparent Sheets”, Keynote Lecture, *2<sup>nd</sup> New Diamond and Nano Carbon* (May 26-29, 2008, Taipei, Taiwan).

“Solid-State Fabrication, Structure, and Multifunctional Applications of Carbon Nanotube Yarns and Transparent Sheets”, *POLYMER FIBRES 2008* (July 9-11, 2008, University of Manchester, UK).

“Nanotechnology for Fun and Profit”, *Technology Club of Dallas* (August 12, 2008, Dallas, TX).