

JOYCELYN S HARRISON, Ph.D.

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Dr. Harrison is a senior scientist with more than 30 years of experience leading, managing and growing research programs both in the U.S. government and academia. She has committed her career to scientific discovery and holds 23 patents. She is a mentor and STEM champion and has won numerous awards for excellence in science and engineering.

EXPERIENCE

KENT STATE UNIVERSITY (KSU): 2019 - present

Associate Dean Research, Faculty Affairs and Graduate Studies

College of Aeronautics and Engineering (CAE)

AIR FORCE OFFICE OF SCIENTIFIC RESEARCH (AFOSR): 2016 – 2019

Director, Budget Plans, Integration and Communication Division

- Plan and manage the implementation of the AFOSR \$500M budget in support of more than 1200 grants at approx. 230 U.S. universities annually. Lead development of AFOSR Corporate Investment Strategy ensuring that basic science investments align with the National Defense Strategy and Air Force guidance.
- Develop and direct AFOSR's Corporate Communications Strategy and Strategic Partnerships
- Manage AFOSR intramural investments of approx. \$80M/year in support of STEM initiatives and basic research within the 8 AFRL technical directorates
- Support leadership decision-making using analytics and visualization platforms
- Manage AFOSR's response to taskers and inquiries from Congress, the General Accounting Office, Secretary of Defense, Secretary of the Air Force, Air Force Material Command, and Air Force Research Labs HQ.

AIR FORCE OFFICE OF SCIENTIFIC RESEARCH (AFOSR): 2009 – 2016

Program Officer, Complex Materials and Devices Division, Low Density Materials Program

- Established vision for a new AFOSR program, Low Density Materials, targeting transformative research in advanced aerospace materials and systems
- Established Interagency Memorandum of Agreement (MOA) between AFOSR and the National Science Foundation (NSF) Directorate of Engineering which has led to leveraged basic research funding between the agencies in excess of \$30M since 2011
- Developed Multidisciplinary University Research Initiation (MURI) topics on Nanofabrication of Tunable 3D Nanotube Architectures and 4D Electromagnetic Origami resulting in \$22.5M DoD research investment
- Established Memorandum of Agreement (MOA) with NASA for research on Structural Nanocomposites which led to a \$2M joint basic research investment between NASA's Early Stage Innovations and AFOSR's Low Density Materials Programs

- Invited to lead session entitled “Pushing the Materials Science Research Frontier through Collaboration,” at the 2015 Federal Interagency Materials Meeting. Session emphasized the benefits and mechanisms for interagency teaming and highlighted AFOSR’s successful collaborations with NSF and NASA in Origami Materials and Design, 2D Materials Beyond Graphene, and Nanomaterials for Aerospace Structures
- Member since 2010, Office of the Secretary of Defense Tri-Service Reliance Board and DoD Materials and Processing Community of Interest
- Member, government-wide Nanotechnology Science and Engineering Technology (NSET) Committee to facilitate coordination and advancement of US investments in nanotechnology
- Invited participant in White House forum to assess the manufacturing readiness of nano-material enabled structures as a potential Advanced Manufacturing Initiative
- Invited author in Material Research Society Bulletin, “**Structural Nanocomposites for Aerospace Applications**,” Vol. 40, Oct. 2015
- Dedicated service as a mentor to young professionals within academia and the government

NATIONAL SCIENCE FOUNDATION (NSF): 2007 – 2009 (Detailed from NASA)

Program Director, Materials Processing and Manufacturing Program (MPM), Civil Mechanical, and Manufacturing Innovation Division (CMMI), Engineering Directorate.

- Directed \$27M program in fundamental materials processing and manufacturing research. Effectively teamed with other NSF programs to gain additional \$2M for funding MPM core research
- CMMI coordinator for Broadening Participation of Under-represented Groups in Engineering (BRIGE)
- Facilitator for Engineering CAREER Proposal Writing Workshops, providing training for junior faculty from 30+ universities

NASA, LANGLEY RESEARCH CENTER: 1994 - 2009

Supervisory Branch Head, Advanced Materials and Processing Branch (AMPB) (1999-2009):

- Provided strategic direction and management of aerospace materials research organization with forty-five scientists and engineers (70% Ph.D.), covering disciplines in chemistry, polymers, composites, metallurgy, ceramics and nanoscience. Responsible for maintaining cutting-edge research capability and garnering support from NASA programs to deploy researchers. Accountable for safe operation and maintenance of five distinct material processing and characterization facilities
- Established vision for branch implementation of 1999 National Nanotechnology Initiative (NNI). Initiated broad-based nanomaterials research thrusts encompassing nanomaterial synthesis, characterization and processing; established cutting-edge atomic force microscopy and Raman spectroscopy capability; made strategic hiring decision for five new PhDs
- Received one of NASA’s highest honors, 2006 NASA Outstanding Leadership Medal for leadership excellence in achieving results; being an effective role model; and effectively leading people and influencing change

Project Management (1995-1999)

- Served as Structures and Materials Manager for Aircraft Morphing Program managing interdisciplinary efforts between materials, aircraft acoustics and aeroelastic tailoring research groups leading to integration and wind-tunnel testing of active aircraft technologies
- Pioneered research on piezoelectric polymers resulting in the first piezoelectric polyimides and awarded three patents on thermally-stable piezoelectric polymers
- Received a NASA Exceptional Achievement Medal for technical achievements and leadership in smart materials

EDUCATION

NASA LANGLEY RESEARCH CENTER

National Research Council Post-Doctoral Associate

Advisor: Dr. Terry L. St. Clair, Head, Polymeric Materials Branch

Hampton, VA

August 1994

GEORGIA INSTITUTE OF TECHNOLOGY

Ph.D. Chemical Engineering

Thesis Title: "Structure-Dielectric Property Relationships in An Epoxy System: A Free Volume Analysis"

Minor: Experimental Statistics and Design of Experiments

Atlanta, GA

June 1993

M.S. Chemical Engineering, Cum Laude

December 1989

B.S. Chemical Engineering, Cum Laude

September 1987

SPELMAN COLLEGE

B.S. Chemistry, Magna Cum Laude

Atlanta, GA

May 1987

IMPERIAL COLLEGE

Completed Chemical Engineering Laboratory Exchange Program

London, England

Summer 1986

HONORS AND AWARDS

- 2018 Arlington Public Schools Model of Excellence Award
- 2017 Air Force Research Lab Superior Accomplishment Award
- 2016 NASA Group Achievement Award for Structural Carbon Nanotube Development Team
- 2015 Women of Color All-Star Award
- 2012 Inducted into the HistoryMakers: ScienceMakers, a multi-media archive of oral histories of 180 of the nation's leading African American scientists

- 2011 Eminent Chemical Engineer Award granted by the American Institute of Chemical Engineers Minority Affairs Committee for sustained, substantial contributions to the field of chemical engineering and to the mentoring and advancement of underrepresented groups in STEM
- 2010 H.J.E. Reid Award for Most Outstanding Langley Research Center Journal Publication
- 2006 NASA Outstanding Leadership Medal
- Superior Accomplishment Award for Exceptional Dedication to Success of LaRC Culture Change Team (2004)
- Superior Accomplishment Award for Carbon Nanotube Nanocomposite Development Team (2004)
- Superior Accomplishment Award for Exceptional Contributions to the Langley Future Business Base Team (2004)
- Superior Accomplishment Award for Outstanding Leadership in Promoting Equal Employment Opportunity at Langley Research Center (2003)
- Hampton Roads Technology Council Excellence in Innovation Award (2003)
- Superior Accomplishment Award for Outstanding Dedication and Teamwork in Planning and Execution of a NASA-wide Nanotechnology Initiative (2001)
- Hampton Roads Engineers Council Special Recognition for Nomination as Peninsula Engineer of the Year (2001)
- 2000 NASA Exceptional Achievement Medal for achievements in Smart Materials
- National Technical Association Scientist of the Year Award (2000)
- Paul F. Holloway Non-Aerospace Technology Transfer Award (1998)
- 1998 H.J.E. Reid Award for Most Outstanding Langley Research Center Technical Publication
- National Technical Association Top Minority Women in Science, Engineering and Technology Award (1998)
- Special Commendation for Outstanding Leadership and Superior Support of NASA Langley Research Center's Education and Outreach Student Programs (1998)
- American Vacuum Society Award for Best Paper at International Conference on Metallurgical Coatings and Thin Films (1997)
- Research and Development 100 Award Recipient for invention of high displacement ferroelectric actuator, THUNDER (1996)
- Certificate of Appreciation for Mentorship of Virginia Governor's Schools Program (1995)
- Spelman College Commendation for Outstanding Accomplishments in Science and Service as a STEM Role Model and Mentor (1994)
- National Research Council Post-doctoral Associateship Award, (1993 - 1994)
- Patricia Roberts Harris Graduate Fellowship (1989 -1992)
- Eastman Kodak Fellowship (1989)
- Consortium for Graduate Degrees for Minorities in Engineering Fellowship (GEM) (1987 - '89)
- Department of Energy Scholarship and ORNL Summer Internship (1982-1986)

MEMBERSHIPS

- Materials Research Society

- American Institute of Chemical Engineers
- Delta Sigma Theta Sorority
- Calloway United Methodist Church
- Parent Teacher Association, Yorktown High School Vice President (2017-2018)
- Challenging Racism, Arlington County civic organization

SELECTED REFEREED JOURNAL PUBLICATIONS

E.J. Siochi and **J.S. Harrison**, "Structural Nanocomposites for Aerospace Applications," *MRS Bulletin*, 40, 829, (2016).

C. Park, J.-W. Kim, G. Sauti, J. H. Kang, C. S. Lovell, L. J. Gibbons, S. E. Lowther, P. T. Lillehei, **J. S. Harrison**, N. Nazem and L. T. Taylor, "Metallized Nanotube Polymer Composites via Supercritical Fluid Impregnation," *J. Poly. Sci.: Poly. Phys.*, **50**, 394 (2012).

M. W. Smith, K. C. Jordan, C. Park, J.-W. Kim, P. T. Lillehei, R. Crooks, **J. S. Harrison**, "Very Long Single and Few-walled Boron Nitride Nanotubes via the Pressurized Vapor/Condenser Method," *Nanotechnology*, **50**, 505604 (2009).

C. Park, J.H. Kang, **J.S. Harrison**, R. Costen, and S.E. Lowther, "Actuating Single Wall Carbon Nanotube Polymer Composites: Intrinsic Unimorphs," *Adv. Mat.*, 20, 2074,-2079, (2008).

J. H. Kang, C. Park, S. Gaik, S. E. Lowther, **J. S. Harrison**, "The Effect of Single-walled Carbon Nanotubes on the Dipole Orientation and Piezoelectric Properties of Polymeric Nanocomposites," *Nano*, **1**, 77 (2006).

C. Park, J. Wilkinson, S. Banda, Z. Ounaies, K.E. Wise, G. Sauti, P. T. Lillehei, and **J. S. Harrison**, "Aligned Single Wall Carbon Nanotube Polymer Composites Using an Electric Field," *J. Poly. Sci.: Poly. Phys.* **44**, 1751 (2006).

David S. McLachlan, Cosmas Chiteme, Cheol Park, Kristopher E. Wise, Sharon E. Lowther, Peter T. Lillehei, Emilie J. Siochi, and **J. S. Harrison**, "AC and DC percolative conductivity of single wall carbon nanotube polymer composites," *J. Poly. Sci.: Poly. Phys.* **43**, 3273 (2005).

C. Park, Z. Ounaies, K. E. Wise, and **J. S. Harrison**, "In-situ poling and imidization of partially cured polyimide," *Polymer*, **45** (2004) 5417.

K. E. Wise, C. Park, E. J. Siochi, and **J. S. Harrison**, "Stable dispersion of single wall carbon nanotubes in polyimide: the role of noncovalent interactions," *Chem. Phys. Lett.* **391** (2004) 207.

Park, C., Crooks, R.E., Siochi, E.J., **Harrison, J.S.**, Evans, N. and Kenik, E., Adhesion Study of Polyimide to SWNT Bundles by Energy-Filtered TEM, *Nanotechnology*, Vol 14, L11 (2003).

Ounaies, Z., Park, C., Wise, K. E., Siochi, E., and **Harrison, J. S.**, Electrical Properties of Single Wall Carbon Nanotube Reinforced Polyimide Composites. *Composites Science and Technology*, 63 (11) pp.1637-1646 (2003).

Park, C., Ounaies, Z., Watson A. K., Crooks, R. E.; Smith, Jr., J., Lowther, S., Connell, J., Siochi, E., **Harrison, J. S.**, and St. Clair, T. L., Dispersion of Single Wall Carbon Nanotubes by In-Situ Polymerization Under Sonication. *Chemical Physics Letters*, 364 (3 - 4) pp. 303-308 (2002).

Shahinpoor, M., Bar-Cohen, Y., **Simpson, J.O.**, and Smith, J.G., Ionic Polymer-Metal Composites (IPMCs) As Biomimetic Sensors, Actuators and Artificial Muscles - A Review, *Smart Materials and Structures*, Vol 7, R15-R30 (1999).

Simpson, J.O., Ounaies, Z., and Young, J., Mechanisms of Piezoelectricity in Amorphous and Semicrystalline Polymers. *American Chemical Society POLY Part 2* , pp.214-222, (1999).

Simpson, J.O. and St. Clair A.K., Fundamental Insight into the Development of Low Dielectric Constants Polyimides, *Thin Solid Films* Vol. 308, 380-485(1997).

Simpson, J.O. and Bidstrup, S.A., The Effect of Stoichiometry on Chain Segment and Ion Mobility in Partially Polymerized Epoxy Systems, *J. Polymer Science: Polymer Physics Ed.*, 33, 1, 43 (1995).

Simpson, J.O. and Bidstrup, S.A., Rheological and Dielectric Changes During Isothermal Epoxy-Amine Cure, *J. Polymer Science: Polymer Physics Ed.*, 33, 1, 55 (1995).

Simpson, J.O. and Bidstrup, S.A., Correlation Between Chain Segment Mobility and Ion Mobility in an Epoxy Resin System: A Free Volume Analysis, *J. Polymer Science: Polymer Physics Ed.*, 31, 5, 609 (1993).

INVITED BOOK CHAPTERS

Harrison, J.S. and Ounaies, Z., Piezoelectric Polymers in Biderman, A. (Ed.), *Encyclopedia of Smart Materials*, John Wiley and Sons, pp. 162-173, (2002).

Harrison, J.S. and Ounaies, Z., Piezoelectric Polymers in *Encyclopedia of Polymer Science*, John Wiley and Sons, (2003).

Ounaies, Z., Young, J.A., and **Harrison, J.S.**, An Overview of Piezoelectric Phenomenon in Amorphous Polymers in *Field Responsive Polymers: Electroresponsive, Photoresponsive, and Responsive Polymers in Chemistry and Biology*, Ed. Khan, I. and Harrison, J.S., ACS Symposium Series 726, Washington, DC, (1999).

Shahinpoor, M., Bar-Cohen, Y., Xue,T., **Harrison, J.S.**, and Smith, J.G., Ionic Polymer-Metal Composites (IPMC) As Biomimetic Sensors and Actuators-Artificial Muscles in *Field Responsive Polymers: Electroresponsive, Photoresponsive, and Responsive Polymers in Chemistry and Biology*, Ed. Khan, I. and Harrison, J.S., ACS Symposium Series 726, Washington, DC, (1999).

PATENTS

1. US Patent 7,998,368 B2, Aqueous Solution Dispersement of Carbon Nanotubes, Patent issued August 16, 2011.
2. US Patent 7,972,536 B2, Multilayer Electroactive Polymer Composite Material, Patent issued May 3, 2011.
3. US Patent 7,935,414 B2, Electrically Conductive, Optically Transparent Polymer/Carbon Nanotube Composites and Process for Preparation Thereof, Patent issued March 15, 2011.
4. US Patent 7,906,043 B2, Electrically Conductive, Optically Transparent Polymer/Carbon Nanotube Composites and Process for Preparation Thereof, Patent issued March 15, 2011.
5. US Patent No. 7,666,939 B2, Dispersions of Carbon Nanotubes in Polymer Matrices, Patent issued February 2010.
6. U.S. Patent No. 7,588,699 B2, Electrically Conductive, Optically Transparent Polymer/Carbon Nanotube Composites and Process for Preparation Thereof, Patent issued September 15, 2009.
7. U.S. Patent No. 7,527,751 B2, Method of Making an Electroactive Sensing/Actuating Material for Carbon Nanotube Polymer Composite, Patent issued May 5, 2009.
8. U.S. Patent No. 7,507,472 B2, Multilayer Electroactive Polymer Composite Material Comprising Carbon Nanotubes, Patent issued March 24, 2009.
9. U.S. Patent No. 7,402,264 B2, Sensing/Actuating Materials Made from Carbon Nanotube Polymer Composites and Methods for Making Same, Patent issued July 22, 2008.
10. U.S. Patent No. 6,867,533, Membrane Tension Control, Patent issued March 15, 2005.
11. U.S. Patent No. 6,734,603, Thin Layer Composite Unimorph Ferroelectric Driver and Sensor (THUNDER), Patent issued May 11, 2004.
12. U.S. Patent No. 6,379,809, Thermally Stable, Piezoelectric and Pyroelectric Polymeric Substrates and Method Relating Thereto, Patent issued April 30, 2002.
13. U.S. Patent No. 6,724,130, Membrane Position Control, Patent issued April 20, 2004.

14. U.S. Patent No. 6,689,288, Polymer Blends for Sensor and Actuation Dual Functionality, Patent issued February 10, 2004.
15. U.S. Patent No. 6,515,077, Electrostrictive Graft Elastomers, Patent issued February 4, 2003.
16. U.S. Patent No. 6,545,391, Polymer-Polymer Bilayer Actuator, Patent issued April 8, 2003.
17. U.S. Patent No. 5,909,905, Method of Making Thermally Stable, Piezoelectric and Pyroelectric Polymeric Substrates, Patent issued June 8, 1999.
18. U.S. Patent No. 5,891,581, Thermally Stable, Piezoelectric and Pyroelectric Polymeric Substrates, Patent issued April 6, 1999.
19. U.S. Patent No. 5,632,841. Thin Layer Composite Unimorph Ferroelectric Driver and Sensor (THUNDER), Patent issued May 27, 1997.