Dr. Jay H. Hendricks
National Institute of Standards and Technology
100 Bureau Drive, Stop 8363
Gaithersburg, MD 20899-8363
(301) 975-4836
jay.hendricks@nist.gov

A world-class expert in low pressure and vacuum metrology, Dr. Hendricks is the Deputy Program Manager for NIST on a Chip program and is the former leader of the NIST Thermodynamic Metrology Group. Jay received his M.A. and Ph.D. in Physical Chemistry from Johns Hopkins University, and his B.S. in Chemistry from Penn State University. In 1996, he started his career at NIST as a post-doctoral fellow conducting research on a novel low-temperature CVD that resulted in a US patent. He is currently the Scientific Director for IUVSTA.

Jay has 30 years of vacuum science and technology experience and has worked on many aspects of vacuum technology and metrology. He led a 5-year Innovation in Measurement Science project that has re-invented the realization and dissemination of pressure, temperature, and length using optical Fabry-Perot interferometer cavities. The research has resulted in 4 patents, 14 publications, 8 invited talks and has fundamentally changed the way pressure and standards are be realized and disseminated with technology transfer to the private sector currently underway. His current research interests focus on development novel photonic methods for realizing traditional vacuum and temperature metrology and extreme vacuum production and measurement.

Dr. Hendricks has authored 110 publications on vacuum science/ metrology/ technology/ surface chemistry/ ion-beam laser spectroscopy (source google scholar). He holds 6 patents in vacuum science technology. He has presented invited papers at both domestic and international vacuum symposia and has been a seminar instructor for the Measurement Science Conference 6 times. He is regularly sought out as invited/ key-note speaker (8 times over the past 5 years). Prominent awards include the being named a Fellow of the AVS for exceptional contributions to vacuum science, developing new and revolutionary vacuum standards and methods, and mentorship to early career scientists and engineers, the NIST French Award for development of a new NIST calibration service, and two US Department of Commerce Gold Medals for Fixed Length Optical Cavity (FLOC) and for his service in protecting US historical documents including the Waldseemüller Map, and Emancipation Proclamation, and the US Bill of Rights.

Dr. Hendricks leadership is nationally and internationally recognized is sought out on a variety of vacuum standards meetings, symposia program committees and vacuum societies. He is the Scientific Director of IUVSTA (International Union of Vacuum Science, Technique and Application) an organization representing nearly 15,000 physicists, chemists, materials scientists, engineers, and technologists who are linked through their common use of vacuum. He has served as an AVS Director. He has active roles in the AVS as the IUVSTA Rep. for the AVS VTD, member of the AVS Recommended Practices and AVS Publications Committee. He is active with IUVSTA and participates in IVC, and EVC program planning advisor. He is an active member of the CCM Pressure and Vacuum working group, AVS-Mid Atlantic Chapter Executive Committee, where he co-organizes annual chapter meeting at NIST for the past 12 years, he is active on the ISO TC112 Vacuum Standards Committee where he reviews documents and standards as a technical advisor, and is Chair of the IMEKO TC-16, and member of TC-25, international technical committees for *Pressure and Vacuum Metrology* and *Quantum Measurements and Information*.

Links to Latest Publications

- DETERMINATION OF DISTORTION CORRECTIONS FOR A FIXED LENGTH OPTICAL CAVITY PRESSURE STANDARD
- Quantum-Based Photonic Sensors for Pressure, Vacuum, and Temperature Measurements: A Vison of the Future with NIST on a Chip
- NIST on a Chip: Photonic and Quantum-Based Sensors for Measurements of Pressure, Vacuum, Temperature and Beyond!
- Transient heating in fixed length optical cavities for use as temperature and pressure standards
- Excess Electrons Bound to H2S Trimer and Tetramer Clusters
- Dual Cavity Refractivity measurements using a single Laser
- Towards Photonic based Pascal Realization as a Primary Pressure Standard
- Quantum-based vacuum metrology at NIST
- Recent Developments in Surface Science and Engineering, Thin Films, Nanoscience, Biomaterials, Plasma Science, and Vacuum Technology
- Recommended practice for calibrating vacuum gauges of the ionization type
- Perspectives for a new realization of the pascal by optical methods
- An integrated and automated calibration system for pneumatic piston gauges
- Performance of a dual Fabry-Perot cavity refractometer
- In Search of Better Pressure Standards
- Metrology for comparison of displacements at the picometer level

Education

1996	**Ph.D. Physical Chemistry** *Advisor: Dr. K H Bowen, Jr.*	**Johns Hopkins University** Baltimore, MD USA
1992	**M.A. Chemistry**	**Johns Hopkins University** Baltimore, MD USA
1990	**B.S. Chemistry** *Advisor: Dr. A W Castleman, Jr.*	**Penn State University** State College, University Park, PA USA

Professional Experience

2020-present **NIST, Deputy Program Manager, NIST on a Chip Program**
United States Department of Commerce
National Institute of Standards and Technology, Gaithersburg, MD

- **Deputy Program Manager of the NIST on a Chip Program, a NIST wide program will $11M annual funding from internal sources and currently seeking an additional $49M in funding over 5 years from external sources. Program seeks to revolutionize standards and traceability by investing in photonics, and quantum-based sensor technologies that are both primary and can be reduced in size, weight, and power to enable chip-scale integrations.**
- **Sensor Science Division HQ, performing functions of Chief of Staff /HQ Administrative Supervisor.**
- **Team Lead on Fixed Length Optical Cavity technology transfer activities and R&D.**

2019-2020 **NIST, Acting Deputy Chief, Sensor Science Division**
United States Department of Commerce
National Institute of Standards and Technology, Gaithersburg, MD

- **Deputy Chief for the Sensor Science Division of NIST's Physical Measurement Laboratory, a program with $30M funding and employing 130 Scientists, Engineers, Guest Researchers, and Contractors.**

2015-2019 **NIST, Group Leader, Thermodynamic Metrology Group**
United States Department of Commerce
National Institute of Standards and Technology, Gaithersburg, MD

- Responsible for leading a team of up to 20 Scientists, Engineers, Technicians, and Guest Researchers.
- Responsible NIST for calibrations of temperature, pressure, vacuum, humidity, and helium leaks.
- Currently on Detail, serving as the **Deputy Chief for the Sensor Science Division of NIST's Physical Measurement Laboratory**.

2012-2015 **NIST, Thermodynamic Metrology Group, Team Lead IMS PTL**

- Team Lead of innovations in measurement science project to reinvent pressure, temperature and length metrology
- Development of a photonic, quantum-based pressure standard, the FLOC
- Pilot of international Key Comparison in low pressure
- Ran lowest uncertainty in the world Manometry pressure standards program

1998-2012 **NIST Pressure and Vacuum Group**

- Development of a new NIST Comparison Method Calibration Service for vacuum gauges with range of 0.65 Pa to 130 kPa
- Developed new ultrasonic interferometer manometer electronics
- Developed a high-stability transfer standard for international key comparisons 100 Pa to 130 kPa.
- Measured the effect of gas absorption on the density of octoil-s and developed and conducted temperature programmed desorption (TPD) studies of water and hydrogen from stainless steel surfaces
- Technical expert for a project by the Library of Congress to re-encase the historically significant documents
- Technical expert for the development of leak tight enclosures for National Archives Project to Re-encase the Charters of Freedom including the Declaration of Independence.
- Expert with NIST 140 Pa, 160 kPa, 13kPa, 360 kPa UIM Primary Standards
- Capacitance Diaphragm Gauges (CDGs) and Piston Gauge measurements
- Quartz Bourdon Gauges (QBGs) and MEMS RSG measurements and research
- Ion Gauges (IGs), He Leak measurements from $3x10^{-4}$ scc/sec to $1x10^{-10}$ scc/sec

1996-98 **NIST Reacting Flows Group of CSTL**
Postdoctoral Fellowship, NIST /National Research Council

CVD Reactor Development: Successfully designed, implemented, and developed a low-pressure co-flow sodium / metal-halide reactor process to produce **metal** and **ceramic** thin **films**. **US Patent # 6,113,983** awarded for this novel process. The nanostructured thin films were investigated by XPS, XRD, EDS SEM, TEM, WDS, SAED, and Raman spectroscopy. Low Pressure Chemical Vapor Deposition (CVD and LPCVD) Titanium and titanium nitride thin film growth (Ti, TiN).