

## **Process Measurements Division (836)**

Outputs and Interactions

### **1. Publications**

Abbott, P.J., "*The Calibration of Vacuum Gauges*," Vacuum Technology and Coating Magazine, March 2006.

Aguilera, J., Yeh, T.T., and Wright, J.D., "*Inside Diameter Measurements for the Cylinder of a 20 L Piston Prover*," Proc. 6th International Symposium on Fluid Flow Measurement, Queretaro, Mexico (2006).

Avedisian, C.T., Cavicchi, R.C., and Tarlov, M.J., "*A New Technique for Visualizing Microboiling Phenomena and its Application to Water Pulse-Heated by a Thin Metal Film*," Rev. Sci. Instr. 77, Art. No. 063706 (2006).

Bandyopadhyay, A.K. and Olson, D.A., "*Characterization of a Compact 200 Mpa Controlled Clearance Piston Gauge as a Primary Pressure Standard using the Heydemann and Welch Method*," Metrologia (in press).

Bartran, D.S. and Ripple, D.C., "*Critical Frequency Estimates for Thermowells*," NIST IR (in press).

Bean, V.E., Espina, P.I., Wright, J.D., Houser, J.F., Sheckels, S.D., and Johnson, A.N., "*NIST Calibration Services for Liquid Volume*," NIST Special Publication 250-72 (2006).

Beebe, J.M., Kim, B.S., Gadzuk, J.W., Frisbie, C.D., and Kushmerick, J.G., "*Transition from direct Tunneling to Field Emission in Metal-Molecule-Metal Junctions*," Phys. Rev. Lett. (in press).

Benkstein, K.D. and Semancik, S., "*Mesoporous Nanoparticle TiO<sub>2</sub> Thin Films for Conductometric Gas Sensing on Microhotplate Platforms*," Sens. and Act. B: Chemical 113, 445-453 (2006).

Benkstein, K.D., Martinez, C.J., Li, G., Meier, D.C., Montgomery, C.B., and Semancik, S., "*Integration of Nanostructured Materials with MEMS Microhotplate Platforms to Enhance Chemical Sensor Performance*," J. of Nanoparticle Res. 8 (6), 809-822 (2006).

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Bertram, T.H., Cohen, R.C., Thorn, W.J., and Chu, P.M., "*Measurement Consistency of Ozone and Oxides of Nitrogen Standards at Tropospheric Relevant Mixing Ratios*," J. of Air and Waste Manage. Assoc. 55, 1473-1479 (2005).

Cavicchi, R.E. and Avedisian, C.T., "**Bubble Nucleation and Growth Anomaly for a Hydrophilic Microheater Attributed to Metastable Nanobubbles,**" Phys. Rev. Lett. (in press).

Chang, R.F. and Abbott, P.J., "**Reproducibility of the Accomodation Coefficient of the Spinning Rotor Gauge,**" J. of Vac. Sci. Tech. A (in press).

Choquette, S.J., Etz, E.S., Hurst, W.S., Blackburn, D.H., Leigh, S.D., "**Relative Intensity Correction of Raman Spectrometers: NIST SRM's 2241 - 2243 for 785 nm, 532 nm and 488/514.5 nm Excitation,**" Appl. Spectrosc. (in press, Feature Article in February, 2007).

Chu, P.M., Harden, C.S., Bishop, M., Meier, D.C., and Schantz, M., "**Performance Validation Strategies for Chemical Agent Detectors Based on Ion Mobility Spectrometry,**" NISTIR 7326, 1-13 (2006).

Chu, P.M., Hodges, J.T., Rhoderick, G.C., Lisak, D., and Travis, J.C., "**Methane-in-Air Standards Measured Using a 1.65  $\mu\text{m}$  Frequency-stabilized Cavity Ring-down Spectrometer,**" Chemical and Biological Sensors for Industrial and Environmental Monitoring, Proc. SPIE (in press).

Chu, P.M., Nelson, D.D., Zahniser, M.S., McManus, J.B., Shi, Q., and Travis, J.C., "**Amount of Substance Standards Towards Realization of Reactive Gas Through Spectroscopic Measurements,**" IEEE Transactions I&M, Special Issue, CPEM 2006.

Driver, R.G., Olson, D.A., Yadav, S., and Bandyopadhyay, A.K., "**Bilateral Comparison Between NIST (USA) and NPL (India) in the Hydraulic Pressure Region 40-200 MPa,**" Metrologia 43, Technical Supplement 07003 (2006).

Driver, R.G., Olson, D.A., Dilawar, N., and Bandyopadhyay, A.K., "**Bilateral Comparison between NIST (USA) and NPL (India) in the Pneumatic Region 0.4 to 4.0 Mpa,**" Technical Supplement to Metrologia (in press).

Evju, J.K., Meier, D.C., Montgomery, C.B., Boger, Z., and Semancik, S., "**Reliable Recognition of Low-Level Simulated Chemical Warfare Simulants,**" Proc. of 2005 IEEE Sensors Conference, 1263-1266 (2005).

Garcia, S.P. and Semancik S., "**Controlling the Morphology of Zinc Oxide Nanorods Crystallized from Aqueous Solutions: The Effects of Crystal Growth Modifiers on Aspect Ratio,**" Chem. Mater. (in press).

Gavioso, R., May, E.F., Schmidt, J.W., Moldover, M.R., and Yang, Y., "**Towards an Electromagnetic Pressure Standard: Dielectric Permittivity of Helium and Argon Measured with Quasi-Spherical Microwave Resonators and Cross Capacitors,**" Proc. of the Conference on Precision Electromagnetic Measurements (2006).

Gillis, K.A., Shinder, I.I., and Moldover, M.R., Bulk Viscosity, ***“Thermoacoustic Boundary Layers, and Adsorption Near the Critical Point of Xenon,”*** Phys. Rev. Lett. 97, 104502-1 - 104502-4 (2006).

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Huang, P.H., Harvey, A.H., ***“A Critical Review of Second Virial Coefficients for Water Vapor with Hydrogen,”*** Proc. 5<sup>th</sup> International Symposium of Humidity and Moisture (in press).

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Johnson, A.N. and Wright, J.D., ***“Gas Flowmeter Calibrations with the 26 m<sup>3</sup> PVTt Standard,”*** NIST Special Publication 250-1046 (2006).

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Miiller, A.P., Tilford, C.R., and Hendricks, J.H., ***“A Low Differential-Pressure Primary Standard for the Range 1 Pa to 13 kPa,”*** Metrologia 42, S187-S192 (2005).

Miiller, A.P., ***“Development of Argon Isotope Reference Standards for the U.S. Geological Survey,”*** NIST J. of Res. 111, 335-360 (2006).

Mohan, P. and Abbott, P.J., ***“Supplementary Comparison APMP.M.P-S2 (Bilateral Comparison) at a Nominal Pressure of 0.05 Pa,”*** Metrologia (in press).

Opdahl, A., Petrovyk, D.Y., Kimura-Suda, H., Whitman, L.J., and Tarlov, M.J., "**Single Stranded DNA Brushes with Grafting Density Controlled by Adenine Nucleotide Adsorption on Gold**," 2007 Proc. of the National Academy of Science 104, 9–14 (2007).

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- Scace, G.E., Meyer, C.W., Miller, W.W., and Hodges, J.T., ***“An Overview of the NIST Hybrid Humidity Generator,”*** Proc. 5th International Symposium on Humidity and Moisture (in press).
- Schmidt, J.W., Jain, K., Miiller, A.P., Bowers, W.J., and Olson, D.A., ***“Primary Pressure Standards Based on Dimensionally Characterized Piston/Cylinder Assemblies,”*** Metrologia 43, 53-59 (2006).
- Shao, L., Griffiths, P.R., Chu, P.M., and Vetter, T.M., ***“Quantitative Vapor-Phase Infrared Spectrometry of Ammonia,”*** Appl. Spec. (in press).
- Shirke, A.G., Cavicchi, R.E., Semancik, S., Jackson, R.H., Frederick, B.G., and Wheeler, M.C., ***“The Influence of Rate Factors on the Measurement of Desorption Kinetics with Microhotplate Sensors”***, J. Vac. Sci. and Tech. (in press).
- Steffens, K.L. and Sobolewski, M.A., ***“2-D Temperature Mapping in Fluorocarbon Plasmas,”*** AIP Conference Proceedings, Vol. 788: Characterization and Metrology for ULSI Technology, (American Institute of Physics, Melville, NY) pp. 333-337 (2005).
- Sobolewski, M.A., ***“Effects of Wafer Impedance on the Monitoring and Control of Ion Energy in Plasma Reactors,”*** J. Appl. Phys. 100, article #063310, 1-13 (2006).
- Sobolewski, M.A., ***“Real-Time, Noninvasive Monitoring of Ion Energy and Ion Current at a Wafer Surface during Plasma Etching,”*** J. Vac. Sci. Tech. A 24, 1892-1905 (2006).
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- Tew, W.L. and White, D.R., ***“Comment on Freezing Point Mixtures of  $H_2^{17}O$  and Those of Aqueous  $CD_3CH_2OH$  and  $CH_3^{13}CH_2OH$  Solutions,”*** J. of Sol. Chem. 34 (10), 1191-1196 (2006).
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White, D.R. and Strouse, G.F., ***“Observations on Non-Uniqueness and Uncertainty in the SPRT Interpolations of ITS-90,”*** Metrologia (in press).

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Zangmeister, R.A. and Tarlov, M.J., ***“Selective DNA Screening in Microfluidic Channels by Electrophoresis Through Hydrogel Matrices,”*** Proc. 2004 AIChE Natl. Meeting & Conf. (in press).

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Zhu, L., Meier, D.C., Semancik, S., and DeVoe, D.L., ***“An Integrated Gas Sensor-Microfluidic System”***, Proc. Hilton Head Transducers Conference, (in press).

Zhu, L., Meier, D.C., Semancik, S., and DeVoe, D.L., ***“Integrated Microfluidic Gas Sensor for Detection of Volatile Organic Compounds in Water,”*** Sens. and Act. B (in press).

## 2. Talks

Abbott, P.J., "***Anomalous Behavior of Teflon-Based Permeation Leak Artifacts***," 52<sup>nd</sup> Symposium of the American Vacuum Society, Boston, MA, October 2, 2005.

Abbott, P.J., "***Anomalous Behavior of Teflon Permeation Leak Artifacts***," NCSLI (National Conference of Standards Laboratories International) Conference, Nashville, TN, August 6, 2006.

Benkstein, K.D., "***Nanowires for Temperature-Controlled Sensing***," International Meeting on Chemical Sensors XI, Brescia, Italy, July 17, 2006.

Benkstein, K.D., "***Development of a Template-Directed Nanotube Array Gas Sensor Platform for Biosensing Applications***," Materials Research Society Spring 2006 Meeting, San Francisco, CA, April 18, 2006.

Benkstein, K.D., "***The Electrosynthesis and Evaluation of WO<sub>3</sub> Nanowires for Chemical Microsensor Applications***," Materials Research Society Fall 2005 Meeting, Boston, MA, December 1, 2005.

Berg, R.F., "***Gas Viscometry and Flow Metrology with Quartz Capillaries***," Air Products, Allentown, PA, November 15, 2005.

Berg, R.F., "***Gas Viscometry and Flow Metrology with Quartz Capillaries***," Praxair, Tonawanda, NY, November 17, 2005.

Berg, R.F., "***Gas Viscometry and Flow Metrology with Quartz Capillaries***," Schumacher / Air Products, Carlsbad, CA, January 31, 2006.

Berg, R.F., "***Viscoelasticity and Shear Thinning Near the Critical Point of Xenon***," Fundamental Physics Research in Space Conference, Warrenton, VA, May 22, 2006.

Berg, R.F., "***Viscoelasticity and Shear Thinning Near the Critical Point of Xenon***" (poster), From Quantum to Cosmos: Fundamental Physics Research in Space, Warrenton, VA, May 23, 2006.

Berg, R.F., "***Reference Values of the Viscosity of Hydrogen, Methane, Argon, and Xenon Determined with Capillary Viscometers***" (poster with E.F. May and M.R. Moldover), 16<sup>th</sup> Symposium on Thermophysical Properties, Boulder, CO, August 2, 2006.

Cavicchi, R.E., "***Nanomaterials for Chemical Sensing***," National Science Foundation Advisory Board Meeting, University of Maine, Orono, ME, June 13, 2006.

Chu, P.M., "***Testing the Feasibility of Delivering Gas Standards Based on Intrinsic Molecular Properties***," Measurement Science Conf., Anaheim, CA, March 2, 2006.

Chu, P.M., ***“Testing the Feasibility of Delivering Gas Standards Based on Intrinsic Molecular Properties,”*** Pittcon, Anaheim, CA, March 16, 2006.

Chu, P.M., ***“NIST High Accuracy Spectroscopic Reference Data Programs for Gas Phase Species,”*** Spectral Signatures Conference, VA, May 23, 2006.

Chu, P.M., ***“Developing Intrinsic Spectroscopic Standards for Quantitative Gas Analysis,”*** Gas Analysis Working Group Workshop, Torino, Italy, July 12, 2006.

Chu, P.M., ***“Amount-of-substance standards for reactive gases realized through spectroscopic measurements,”*** 25<sup>th</sup> Conference on Precision Electromagnetic Measurements, Torino, Italy, July 14, 2006.

Defibaugh, D.R., ***“Interlaboratory Comparison of Low Gas Flow in the Range of 10-13 to 10-11 mol/s using Helium Permeation Leak Artifacts,”*** NCSLI (National Conference of Standards Laboratories International) Conference, Nashville, TN, August 6, 2006.

Estrada-Alexanders, A.F., ***“Viscosity of Ar, CO, CO<sub>2</sub>, NH<sub>3</sub>, SF<sub>6</sub>, SiF<sub>4</sub> and C<sub>4</sub>H<sub>8</sub> Gases Measured with a Greenspan Acoustic Viscometer,”*** 16th Symposium on Thermophysical Properties, Boulder, CO, July 31, 2006.

Evju, J., ***“Detecting Chemical Warfare Simulants at Low Concentrations,”*** 20<sup>th</sup> International Forum and Exhibition Process Analytical Technologies, IFPAC ON-SITE, Arlington, VA, February 22, 2006

Evju, J., ***“Reliable Recognition of Low Level Simulated Chemical Weapons,”*** IEEE Sensors Meeting, Irvine CA, November 2, 2005.

Gavioso, R.M., ***“Progress Toward a Primary Pressure Standard Based on the Dielectric Permittivity of Helium,”*** 16th Symposium on Thermophysical Properties, Boulder, CO, August 1, 2006.

Gillis, K.A., ***“Bulk Viscosity of Stirred Xenon near the Critical Point,”*** 16th Symposium on Thermophysical Properties, Boulder, CO, August 2, 2006.

Hendricks, J.H., ***“Calibration of Vacuum Gauges in the Range 13 Pa to 133 kPa (0.1 Torr to 1000 Torr) using Resonant Silicon Gauges as Transfer Standards,”*** NCSLI (National Conference of Standards Laboratories International) Conference, Nashville, TN, August 7, 2006.

Hendricks, J.H., ***“Development of a New High-Stability Transfer Standard Based on Resonant Silicon Gauges for the Range of 0.1 kPa –130 kPa,”*** 52<sup>nd</sup> Symposium of the American Vacuum Society, Boston, MA, November 1, 2005.

Hodges, J.T., ***“Frequency-Stabilized Cavity Ring-Down Spectroscopy: A New Method for High Resolution Line Shape Measurements,”*** 18th International Conference on Spectral Line Shapes, Auburn AL, June 4-9, 2006.

Hodges, J.T., ***“Frequency-Stabilized Cavity Ring-Down Spectroscopy Measurements of Water Vapor Line Intensities,”*** IUPAC H<sub>2</sub>O Line List Task Group Meeting II, Cambridge MA, June 28-29, 2006. (Invited)

Hodges, J.T., ***“Amount-of-Substance Metrology Based on Absorption of Near-Infrared Electromagnetic Radiation,”*** 2006 Conference on Precision Electromagnetic Measurements, Turin Italy, July 9-14, 2006.

Hodges, J.T., ***“Frequency-Stabilized Cavity Ring-Down Spectroscopy: A New Method for High Resolution Line Shape Measurements,”*** presented at Istituto Nazionale di Ottica Applicata (INOA), Pozzuoli, Italy, July 12, 2006. (Invited)

Huang, P.H., ***“A Critical Review of Second Virial Coefficients for Water Vapor with Hydrogen,”*** 5<sup>th</sup> International Symposium of Humidity and Moisture, Rio de Janeiro, Brazil, May 3, 2006.

Huang, P.H., ***“A Reference Standard for Measuring Humidity of Air Using a Re-Entrant Radio Frequency Resonator,”*** 5<sup>th</sup> International Symposium of Humidity and Moisture, Rio de Janeiro, Brazil, May 4, 2006.

Hurly, J.J., ***“Improved Ab Initio Values of the Thermophysical Properties of Helium as Standards,”*** 16<sup>th</sup> Symposium on Thermophysical Properties, Boulder, CO, August 3, 2006.

Hurst, W.S., ***“FT-IR Detection of Gas Phase Species Present During ALD of HfO<sub>2</sub>,”*** Electrochemical Society Spring Meeting, Denver, CO, May 9, 2006.

Labenski, J., ***“Johnson Noise Thermometry in the range 505 K to 933 K,”*** 2006 March Meeting of the American Physical Society, Baltimore, MD, March 15, 2006.

Labenski, J., ***“Johnson Noise Thermometry in the Range 505 K to 933 K Using Resistance-Based Scaling,”*** 2006 Sixteenth Symposium on Thermophysical Properties, Boulder, CO, August 8, 2006.

May, E.F., ***“High-Accuracy Measurements of the Electric and Magnetic Susceptibilities of O<sub>2</sub> and H<sub>2</sub> using a Quasi-Spherical Resonator and a Cross Capacitor,”*** 16<sup>th</sup> Symposium on Thermophysical Properties, Boulder, CO, August 2, 2006.

May, E. F., ***“Accurate Values of the Transport Properties of Argon,”*** 16<sup>th</sup> Symposium on Thermophysical Properties, Boulder, CO, August 2, 2006.

Meier, D.C. ***“Effects of Materials Chemistry on Conductometric Sensor Signals,”*** Materials Research Society (MRS) Fall 2005 Meeting, Boston MA, December 1, 2005.

Meier, D.C., ***“Temperature-Programmed Conductometric Chemical Microsensors for Rapid Detection of Toxic Industrial Chemicals in Air Backgrounds with Interferences,”*** OnSite 2006, Arlington VA, February 23, 2006.

Meier, D.C., ***“Temperature-Programmed Conductometric Chemical Microsensors for Rapid Detection of Toxic Industrial Chemicals in Air Backgrounds with Interferences,”*** 2006 Pittsburgh Conference, Orlando FL, March 16, 2006.

Meier, D.C., ***“Temperature-Programmed Conductometric Chemical Microsensors for Rapid Detection of Toxic Industrial Chemicals in Air Backgrounds with Interference,”*** 2006 IEEE Conference on Technologies for Homeland Security – Enhancing Transportation Security and Efficiency, Cambridge MA, June 7, 2006.

Meier, D.C., ***“Temperature-Programmed Conductometric Chemical Microsensors for Rapid Detection of Trace Toxic Chemicals in Realistic Backgrounds,”*** 11<sup>th</sup> International Meeting on Chemical Sensors, University of Brescia, Brescia, Italy, July 18, 2006.

Meyer, C.W., ***“Automated Continuous-Flow Gravimetric Hygrometer as a Primary Humidity Standard,”*** 5<sup>th</sup> International Symposium on Humidity and Moisture, Rio de Janeiro, Brazil, May 3, 2006.

Moldover, M. R., ***“Acoustic Determination of the Boltzmann Constant and the Thermodynamic Temperature,”*** Physical Acoustics Summer School, Santa Fe, NM, June 18-25, 2006. Invited

Moldover, M.R., ***“Acoustic Measurements of the Properties of Process Gases,”*** Physical Acoustics Summer School, Santa Fe, NM, June 18-25, 2006. Invited

Moldover, M.R., ***“Quantitation of Trace Gases Using Photoacoustic Spectroscopy”;*** “Bulk Viscosity of Xenon” Physical Acoustics Summer School, Santa Fe, NM, June 18-25, 2006. Invited

Nannan, R., ***“Speed of Sound and Ideal-Gas Heat Capacity Data of Selected Siloxanes from Acoustic Measurements: [(CH<sub>3</sub>)<sub>2</sub>SiO]<sub>4</sub> and [(CH<sub>3</sub>)<sub>2</sub>SiO]<sub>5</sub>,”*** 16th Symposium on Thermophysical Properties, Boulder, CO, August 3, 2006.

Pitre, L., ***“Will Acoustic Gas Thermometry Lead to a New Temperature Scale?,”*** 16th Symposium on Thermophysical Properties, Boulder, CO, August 1, 2006.

Presser, C. ***“Absorption Coefficient Measurements of Carbonaceous-Based Aerosol Particles Using a Laser Driven Thermal Reactor,”*** 44th AIAA Aerospace Sciences Meeting & Exhibit, Reno, NV, January 9-12, 2006.

Presser, C., ***“Droplet Size and Velocity Measurements from Commercial 'Fogger' Type Pepper Spray Products,”*** 19th Annual Conf. on Liquid Atomization and Spray Systems (ILASS Americas 2006), Irvine, CA, May 23-26, 2006.

Presser, C., ***“Measurement of Carbonaceous Aerosol Particle Absorptivity Using Laser Heating,”*** poster presented at the 7th Int'l Aerosol Conf., St. Paul, MN, September 10-15, 2006

Presser, C., ***“The Need for Spray and Aerosol Benchmark Databases,”*** Forum on Liquid Atomization and Spray Combustion at the 2006 ASME Int'l Mechanical Engineering Congress and Exhibition, Chicago, IL, November 8, 2006.

Ripple, D. C., ***“Inhomogeneity Measurements of Base Metal Thermocouples,”*** Meeting of ASTM Committee E20 on Temperature Measurement, Dallas, TX, November 8, 2005. Invited

Scace, G.E., ***“An Overview of the NIST Hybrid Humidity Generator”***, 5<sup>th</sup> International Symposium on Humidity and Moisture, Rio de Janeiro, Brazil, May 3, 2006.

Semancik, S., ***“Update on NIST Chemical Microsensor Array Technology”*** AIGER Consortium Meeting, Gaithersburg, MD, October 17, 2005.

Semancik, S., ***“NIST Chemical Microsensor Technology: Making MEMS Platforms, Nanomaterials and Neural Nets Work Together,”*** Nano-Enabled Technology Initiative Seminar Series, MITRE, McLean, VA, October 18, 2005. Invited

Semancik, S., ***“NIST Chemical Microsensor Technology and The Importance of Sensing Film Reproducibility,”*** ATMI Technology Seminar Series, ATMI, Danbury, CT, October 19, 2005. Invited

Semancik, S., ***“Advanced Chemical Microsensors Based on Nanomaterial Oxides, MEMS Platforms and Neural Networks”***, Department of Chemistry and Biochemistry Seminar/UMD, December 9, 2005. Invited

Semancik, S., ***“Application-Tunable Microsensor Arrays for Gas Phase Chemical Monitoring,”*** Habitation 2006: Conference on Habitation Research and Technology Development, Rosen Plaza Hotel, Orlando, FL, February 7, 2006.

Semancik, S., ***“Using Temperature-Dependent Phenomena at Oxide Surfaces for Species Recognition in Chemical Sensing,”*** 2006 March Meeting of the American Physical Society, Baltimore, MD, March 15, 2006.

Semancik, S., ***“MEMS Arrays of Temperature-Programmed Conductometric Gas Microsensors,”*** Workshop on Nanosensors for Nose-Like Sensing, MITRE Corporation, McLean, VA, April 5, 2006. Invited

Semancik, S., ***“Nanomaterials Research for Developing Rapid, Sensitive and Reliable Chemical Sensors”***, IEEE Homeland Security Conference, Cambridge, MA, June 7, 2006.

Semancik, S., ***“Fabrication, Characterization and Integration of Nanostructured Materials for Chemical Sensing,”*** International Conference on Nano-Structures Self-Assembly, Congress Center, Aix-En-Provence, France, July 4, 2006.

Semancik, S., ***“Using Temperature-Dependent Databases for Sensing Trace Species in Gas Mixtures,”*** 11<sup>th</sup> International Meeting on Chemical Sensors, University of Brescia, Brescia, Italy, July 19, 2006.

Schmidt, J.W. ***“Progress on an Electromagnetic Pressure Standard,”*** Physikalisch-Technische Bundesanstalt (PTB), Berlin, Germany, July 6, 2006.

Schmidt, J.W., ***“Progress on an Electromagnetic Pressure Standard,”*** Conf. Precision Electromagnetic Measurements, Torino, Italy, July 10, 2006.

Shinder, I.I., ***“Convective Stirring and Acoustic Spectra of Near-Critical Xenon,”*** 16<sup>th</sup> Symposium on Thermophysical Properties, Boulder, CO, August 2, 2006.

Sobolewski, M.A., ***“Monitoring Ion Energy at a Wafer Surface during Plasma Etching,”*** 58th Annual Gaseous Electronics Conference, San Jose, CA, October 20, 2005.

Sobolewski, M.A., ***“Monitoring Ion Energy at a Wafer Surface during Plasma Etching,”*** American Vacuum Society 52nd International Symposium, Boston, MA, November 4, 2005.

Sobolewski, M.A., ***“Real-time, Noninvasive Monitoring of Ion Energy at a Wafer Surface During Plasma Etching,”*** 33rd International Conference on Plasma Science, Traverse City, MI, June 8, 2006.

Strouse, G.F., ***“Proficiency Testing for Achieving Accreditation in Thermometry,”*** NCSLI (National Conference of Standards Laboratories International) Conference, Nashville, TN, August 6, 2006. Invited

Tarlov, M.J., ***“Controlling the Structure of DNA on Gold: A model system for nanotechnology?”*** Department of Chemistry, University of Maryland, College Park, MD, October 4, 2006.

Tarlov, M.J., ***“Controlling the Structure of DNA on Gold: A model system for nanotechnology?”*** NIST Nanotechnology Seminar Series, Gaithersburg, MD, February 10, 2006.

Tarlov, M.J., ***“Immobilization of DNA on Gold for Sensing and Diagnostics,”*** National Science Foundation, Ballston, VA, March 10, 2006.

Tarlov, M.J., ***“Immobilization of DNA on Gold for Sensing and Diagnostics,”*** Virginia Commonwealth University, Richmond, VA, April 6, 2006.

Tew, W. L., ***“IEC Temperature Standards: Organizational Aspects and 60751 Technical Update,”*** Meeting of ASTM Committee E20 on Temperature Measurement, Dallas, TX, November 7, 2005.

Tew, W. L., ***“The Isotopic Sensitivities and Corresponding Uncertainties in Cryogenic Triple Point Realizations using Commercially Purified Gases,”*** 16<sup>th</sup> Symposium on Thermophysical Properties, Boulder, CO, August 3, 2006.

Tew, W. L., ***“Recent Advances in Primary Thermometry at NIST,”*** University of Colorado Department of Physics, Boulder CO, August 4, 2006. Invited

Tew, W. L., ***“Recent Results in Noise Thermometry at NIST in the Range 505 K to 693 K,”*** Physikalisch-Technische Bundesanstalt (PTB), Berlin, Germany, September 26, 2006. Invited

van Zee, R.D., ***“Energy-Level Alignment of SAM/Metal Interfaces: Lessons for Moletronics,”*** Frontiers in Chemistry Series, Wayne State University, Department of Chemistry, Detroit, MI, October 26, 2005. Invited

van Zee, R.D., ***“Energy-Level Alignment of SAM/Metal Interfaces: Lessons for Moletronics,”*** Workshop on Molecular- and Nano-electronics, Korea Institute for Advanced Study, Seoul, Korea, November 11, 2005. (Keynote Speaker)

van Zee, R.D., ***“Energy-Level Alignment of Conjugated Self-Assembled Monolayer/Metal Interfaces,”*** Material Research Society Fall Meeting, Boston, MA, November 29, 2005. Invited

van Zee, R.D., ***“ $S_{B,dj}$  and  $S_{B,dIE}$  for Thiol SAMs on Metals,”*** Material Research Society Spring Meeting, San Francisco, CA, April 20, 2006. Invited

Whetstone, J.R., ***“Then and Now: NIST and Metrology for the 21st Century,”*** Sino - U.S. Symposium of Measurement Technology, Beijing, Shanghai, and Shenzhen, China, October 18-27, 2005. Invited

Whetstone, J.R., ***“The International Temperature Scale of 1990, A History and Overview,”*** Sino - U.S. Symposium of Measurement Technology, Beijing, Shanghai, and Shenzhen, China, October 18-27, 2005. Invited

Whetstone, J.R., ***“NIST Interactions with the U.S. and International Thermometry Communities,”*** Sino - U.S. Symposium of Measurement Technology, Beijing, Shanghai, and Shenzhen, China, October 18-27, 2005. Invited

Whetstone, J.R., ***“Developments at NIST Supporting Improvements to Future Temperature Scales,”*** Sino - U.S. Symposium of Measurement Technology, Beijing, Shanghai, and Shenzhen, China, October 18-27, 2005. Invited

Whetstone, J.R., *“Dissemination of the ITS 90 by NIST,”* Sino - U.S. Symposium of Measurement Technology, Beijing, Shanghai, and Shenzhen, China, October 18-27, 2005.  
Invited

Wright, J.D., *“NIST Fluid Metrology Group,”* American Industry/Government Emissions Research Meeting, Gaithersburg, MD, October 17, 2005.

Wright, J.D., *“NIST Liquid Volume Calibration Service,”* American Petroleum Institute, Dallas, TX, March 21, 2006.

Wright, J.D., *“Status of the Low-Pressure Gas Flow Key Comparison (CCM-FF-K6),”* CIPM, CCM, Working Group for Fluid Flow, Queretaro, Mexico, May 15, 2006.

Wright, J.D., *“Harmonization of Natural Gas Flow, Considered on Several Bases,”* International Symposium on Fluid Flow Measurement, Queretaro, Mexico, May 18, 2006.

Zangmeister, C., *“Factors Influencing Alignment in Molecular Materials,”* Department of Chemistry, Georgia Institute of Technology, Atlanta, GA, August 28, 2006.

Zangmeister, R.A., *“Adsorption of DNA-wrapped Carbon Nanotubes on SAM Modified Gold Surfaces,”* 52<sup>nd</sup> International Symposium of the American Vacuum Society, Boston, MA, October 31, 2005.

### **3. Cooperative Research and Development Agreements (CRADAs) and Consortia**

Correlation studies of plasma modeling versus external, chamber-based, and wafer-based in-situ plasma diagnostic measurements

M. A. Sobolewski

Advanced Energy Industries, Inc. (CRADA)

### **4. Patent Awards and Applications**

Balss, K.M., Ross, D.J., and Tarlov, M.J., “Mixing Reactions by Temperature Gradient Focusing,” (NIST Docket No. 04-020, Patent Pending)

Johnson, T.J., Waddell, E.A., Ross, D.J., Locascio, L.E., “Surface Charge Modification Within Preformed Microchannels to Modulate Flow and Fabrication of Microarrays by Laser Ablation in Performed Polymer Microchannels,” (NIST Docket No. 01-005 and 01-006, Patent Pending)

Pipino, A.C.R., “Optical Probes for Chemical and Biochemical Detection in Liquids,” (NIST Docket No. 03-006, Provisional Application Filed, Patent Pending)

Ross, D.J., Locascio, L.E., “Fluidic Temperature Gradient Focusing,” (NIST Docket No. 01-029, Patent Pending)

Ross, D.J., Howell, P., and Vreeland, W., “Micellar Gradient Focusing,” (NIST Docket No. 03-008, Patent Pending)

Ross, D.J., Balss, K.M., “Chiral Temperature Gradient Focusing,” (NIST Docket No. 04-007, Patent Pending)

## **5. SRM Activities**

None.

## **6. SRD Activities**

SRD 134 Thermophysical Properties Database for Semiconductor Process Gases

## **7. Calibrations/Special Tests**

Accurate Calibration, Inc.  
Airflow Technical Products, Inc.  
Alcatel Vacuum Products, Inc.  
Alcoa, Inc.  
Alyeska Pipeline Services Company  
AMETEK, Inc.  
Amgen  
Analysis & Measurement Services Corp.  
Arizona Public Service  
ARI Industries, Inc.  
ATA  
ATC, Inc.  
Barnstead International  
Baxter Healthcare Corporation  
Bechtel BWXT Idaho, LLC (BBWI)  
Bionetics/AFPSL  
Boeing Commercial Airplane Group  
Brooklyn Thermometer Company, Inc.  
Calvert Cliffs Nuclear  
Carmel Forge Ltd.  
Caterpillar, Inc.  
CI Systems Ltd.  
City of Amarillo, Texas  
Cleveland Electric Laboratories  
Coastal Flow Measurement, Inc.  
Conrad Kacsik Instrument Systems, Inc.  
Consolidated Ceramic Products, Inc.  
Constellation Power  
CSIR  
Cummins, Inc.

Daniel Measurement and Control  
Davis Instruments, Inc.  
Detroit Edison  
DH Instruments, Inc.  
DH-Budenberg, Inc.  
DHHS/FDA/CDRH/OSM  
Dow Chemical  
Duke Energy Corporation  
Duro-Sense Corp.  
Eastman Kodak Company  
Eli Lilly & Company  
Engelhard-Clal  
Ernie Graves Co., Inc.  
EVCO Technology  
Exelon Powerlabs  
FirstEnergy Corporation  
Fisher Scientific  
FMC Energy Systems  
Furnace Parts, LLC  
GE Industrial Systems  
GE-General Eastern  
Geocorp Industrial Controls  
H-B Instrument Company  
Hart Scientific, Inc.  
Helium Leak Testing, Inc.  
Hoffer Flow Controls, Inc.  
Honeywell FM&T  
Honeywell Inc., SGP  
Human Genome Sciences, Inc.  
ICL Calibration Laboratories, Inc.  
Idaho Laboratories Corp.

Inficon, Inc.  
INSCO Metrology, Inc.  
Inspectorate  
Instrulab  
Intech Automation Systems Corporation  
Intersil Corp  
Invensys Metering Systems  
Jim Beam Brands Company  
Johnson Gage & Inspection, Inc.  
Kahn Companies  
Kaman Aerospace Corporation  
Kanomax USA, Inc.  
Kanthal  
Kulas Systems, Inc.  
Ladish Co., Inc.  
LakeShore Cryotronics  
Leico Industries, Inc.  
Linco-Electromatic, Inc.  
Liquid Meter Services, Inc.  
Lockheed Martin Aeronautics Company  
Mahr Federal  
Marlin Manufacturing Corp.  
MD Department of Agriculture  
ME Department of Agriculture  
Meriam Process Technologies  
Meter Engineers, Inc.  
Meter Provers, Inc.  
Meyer Tool, Inc.  
MIDAC Corp  
Miller & Weber, Inc.  
Mine Safety and Health Administration  
Mississippi Space Services  
MJ Research, Inc.  
MKS Instruments, Inc.  
Modern Instrument Co., Inc.  
MVM Enterprises  
Mykrolis Corp  
Nanmac Corp.  
NASA/Goddard Space Flight  
NASA/Kennedy Space Center  
National Electric Wire Company  
National Institute for Standards (NIS)  
Navy Primary Standards Laboratory  
NIST  
NMC  
Newport News Shipbuilding

Nielson Kellerman Co.  
Northrop Grumman Space Technology  
Oak Ridge National Laboratory  
Omega Engineering, Inc.  
OSHA  
Pemberton Fabricators, Inc.  
Pennsylvania Standards Lab  
PMC Corporation  
Pratt and Whitney  
Pressurements Limited  
Primary Standards North America, Inc  
Process Instruments, Inc.  
Pyco, Inc.  
Pyromation, Inc.  
Pyrometric Service Company  
Raytheon Company  
RH Systems  
Rice Lake Weighting Systems  
Rosemount Aerospace, Inc.  
Sandia National Laboratories  
Santa Barbara Infrared, Inc.  
Sensing Devices, Inc.  
Sensus Metering Systems  
SGS Environmental  
Shinyei Corp. of America  
Shortridge Instruments, Inc.  
Sippican, Inc.  
SIRIM Berhad  
Smith Meter, Inc.  
South Carolina Electric and Gas Co.  
Special Metals Corporation  
Stillings Instrument Systems Company  
Structural Monitoring Systems  
Taylor Precision Products, L.P.  
Teledyne Hastings Instruments  
Tennessee Valley Authority  
Thermo Electric Wire & Cable L.L.C.  
Thermodynamic Sensors  
TOA Industry Co., Ltd.  
Tobacco Industry Testing Lab  
TRANSCAT  
TRW Systems & Info. Tech.  
TSI, Inc.  
US Army Aviation and Missile Command  
Vacuum Instrument Corporation  
Vacuum Technology Incorporated

Vaisala, Inc.  
Varian Vacuum Technologies  
Volumetrics  
Water Draws, LLC

Wood Group Production Services  
Wyeth-Ayerst Pharmaceuticals

## **8. Committee Assignments**

### **P.J. Abbott**

AVS Recommended Practices Standards Committee  
AVS Recommended Practices Subcommittee on Ionization Gauge Calibration  
AVS Vacuum Technology Division Executive Committee (Chair-Elect)  
CIPM C002 Consultative Committee on Mass and Related Quantities  
    SC.04 Low Pressure  
NIST Research Library Advisory Board  
Peer Review Board of NRLM AIST (Tsukuba, Japan) Pressure & Vacuum Calibration Facility  
Peer Review Board of NPL-India (New Dehli, India) Pressure and Vacuum Calibration Facility

### **M.J. Carrier**

NIST Information Technology Services Planning Team

### **R.E. Cavicchi**

Technical Program Committee for IEEE SENSORS 2006  
National Science Foundation IGERT (Integrative Graduate Education and Research  
    Traineeship) advisory board

### **P.M. Chu**

ASTM E13  
    SC03 Molecular Spectroscopy and Chromatography  
Calibration Coordination Group-Chemical and Biological Defense  
Carbon Cycle Interagency Working Group

### **C.D. Cross**

ASTM E020 Temperature Measurement  
    SC.05 Liquid-in-Glass Thermometers and Hydrometers, Secretary

### **R.G. Driver**

CSTL Diversity Committee  
NCSL Intrinsic and Derived Standards Committee, Deadweight Pressure Gauges

### **P.I. Espina**

CIPM Consultative Committee on Mass and Related Quantities  
    WG Fluid Flow (WGFF)  
Gas Technology Institute MTAG  
SIM TWG10 Flow and Related Quantities, Chair  
NORAMET TC: Mechanical Area  
API Committee on Petroleum Measurements

**K.M. Garrity**

ASTM E020 Temperature Measurement  
SC.04 Thermocouples

**K.A. Gillis**

NIST Information Technology Services Planning Team  
NIST Scientific Computing Working Group

**J.H. Hendricks**

CIPM Consultative Committee on Mass and Related Quantities  
WG6-Medium Pressure  
WG4-Low Pressure  
AVS Recommended Practices Subcommittee on Ionization Gauge Calibration  
AVS Vacuum Technology Division Executive Committee  
AVS Mid-Atlantic Chapter Executive Committee

**P.H. Huang**

ASTM D022 Sampling and Analysis of Atmospheres  
SC.09 ISO Tag for ISO/TC146 (Air Quality)  
SC.11 Meteorology  
CIPM International Committee on Weights and Measures  
CCT Consultative Committee on Thermometry  
WG6-Humidity Measurements, Chair  
SEMI C012 Test Methods and Recommended Practices  
SC.02 Gases/Semiconductor  
WG.02 Moisture Measurements in Gases  
US Fuel Cell Council  
Materials & Components Working Group  
Hydrogen Quality Working Group

**J.J. Hurly**

SEMI C012 Gases  
SEMI C014 Facilities

**W.S. Hurst**

ASTM E013 Molecular Spectroscopy and Chromatography  
SC.08 Raman Spectroscopy

**A.N. Johnson**

ASME Committee on Measurement of Fluid Flow in Closed Conduits

**C.W. Meyer**

ASTM E020 Temperature Measurement  
CIPM International Committee on Weights and Measures

CCT Consultative Committee on Thermometry  
WG3-Uncertainties

**M.R. Moldover**

CIPM International Committee on Weights and Measures  
CCT Consultative Committee on Thermometry  
WG4-Thermodynamic Temperature Determination and Extension of ITS-90 to  
Lower Temperatures

**D. Olson**

CIPM Consultative Committee on Mass and Related Quantities  
WG2-High Pressure  
NCSLI Intrinsic and Derived Standards Committee, Deadweight Pressure Gauges

**C. Presser**

AIAA Terrestrial Energy Systems Technical Committee  
AIAA Computational Fluid Dynamics Committee on Standards  
ASME HTD Committee on Heat Transfer in Energy Systems  
CCSP Atmospheric Composition Interagency Working Group  
CENR Air Quality Research Subcommittee  
Combustion Institute Program Review Subcommittee

**D.C. Ripple**

ASME C019 Performance Test Codes  
SC.03 Temperature Measurement, Chair  
ASTM E020 Temperature Measurement  
SC.04 Thermocouples  
CIPM International Committee on Weights and Measures  
CCT Consultative Committee on Thermometry  
WG1-Defining Fixed Points and Interpolating Instruments, Chair

**J.W. Schmidt**

NCSLI 144 Intrinsic and Derived Standards  
SC.01 Consensus Standards Committee on Dead-Weight Pressure Gauges

**S. Semancik**

Steering Committee of the International Meeting on Chemical Sensors  
North and South America Regional Program Chair of the 12<sup>th</sup> International Meeting on Chemical  
Sensors

**K.L. Steffens**

AVS Plasma Science and Technology Executive Committee Member and Treasurer

**G.F. Strouse**

ASTM E020 Temperature Measurement  
SC.03 Resistance Thermometers

SC.06 New Thermometers and Techniques  
SC.07 Fundamentals in Thermometry  
CIPM International Committee on Weights and Measures  
CCT Consultative Committee on Thermometry  
WG7-Key Comparisons  
WG8-Calibration and Measurement Capabilities, Chair  
NIST Assessment Review Board  
SIM InterAmerican System of Metrology  
TC Technical Committee  
MWG3 Temperature, Chair

**M.J. Tarlov**

AVS Biomaterials Interfaces Steering Committee  
CSTL Colloquium Committee  
NIH National Center for Research Resources, Biomedical Research Technology Review Panel

**W.L. Tew**

ASTM E020 Temperature Measurement  
SC.03 Resistance Thermometers  
SC.06 New Thermometers and Techniques  
SC.07 Fundamentals in Thermometry  
IEC TC065 Industrial Process Measurement and Control  
SC65B Elements of Systems  
WG05 Temperature Sensors

**R.D. van Zee**

25<sup>th</sup> Conference on Precision Electromagnetic Measurements (Organizing Committee)  
NNI Strategic Planning Task Force (Chair)

**J.R. Whetstone**

ISA C002 Standards and Practices Board

**J.D. Wright**

CIPM Consultative Committee on Mass and Related Quantities Working Group for Fluid Flow (WGFF)  
SIM TWG10 Flow and Related Quantities  
API Committee on Petroleum Measurements  
ASTM Subcommittee E020.05, Liquid-in-Glass Thermometers and Hydrometers  
ASME Committee on Measurement of Fluid Flow in Closed Conduits

**T.T. Yeh**

ASME MFC  
SC.09, Ultrasonic Flowmeters

## **9. Editorships**

### **C. Presser**

Editorial Board of Atomization and Sprays

### **S. Semancik**

Editorial Board, Sensors and Actuators B

Editorial Board, Sensor Letters

## **10. Seminars**

### **November 8, 2005**

Dr. Piero Colonna, Delft University of Technology, Delft, "The Netherlands

Organic Rankine Cycle Turbines: A Promising Technology for Heat Recovery and Biomass Power Applications" (Division Sponsor: M. Moldover)

### **February 13, 2006**

Prof. Antoine Kahn, Princeton University, Princeton, NJ, "Energy Level Alignment at Metal/Organic Interfaces: Implication for Molecular and Polymer Devices" (Division Sponsor: C. Zangmeister)

### **April 13, 2006**

Dr. Leonard Pease, Princeton University, Princeton, NJ, "Patterning Thin Polymer Films without Photolithography" (Division Sponsor: M. Tarlov)

### **April 21, 2006**

Dr. Tony Massiello, Pacific Northwest National Laboratory, Richland, WA, "Analysis of High-Resolution Vibrational-Rotational Spectra of Simple Polyatomic Molecules" (Division Sponsor: M. Tarlov)

### **April 25, 2006**

Dr. Joshua Hertz, MIT, Cambridge, MA, "Microfabrication Methods for Solid Oxide Fuel Cells" (Division Sponsor: S. Semancik)

### **June 28, 2006**

Dr. David Nash, University of North Carolina, Chapel Hill, NC, "Aerosol Particle Mass Spectrometry with Low Photon Energy Laser Ionization" (Division Sponsor: M. Tarlov)

### **June 30, 2006**

Dr. Thomas D. Saul, University of Delaware, Newark, DE, "Reactive Uptake of Nitric Acid onto NaCl Aerosols Across a Wide Range of Relative Humidities" (Division Sponsor: M. Tarlov)

### **October 26, 2006**

Dr. James Fallabella, Georgia Institute of Technology, Atlanta, GA, "Air – Water Partitioning of Volatile Organic Compounds and Greenhouse Gases in Aqueous Solutions" (Division Sponsor: M. Tarlov)

**November 2, 2006**

Dr. Jovan Bojkovski, Laboratory of Metrology and Quality, Ljubljana, Slovenia,  
“European Directives: Experiences of a European Measurement & Testing Laboratory”  
(Division Sponsor: D. Ripple)

**November 16, 2006**

Takeshi Shimazaki, National Metrology Institute of Japan (NMIJ), Japan, “Development of a Gifford-McMahon/Joule-Thomson Cryocooler for Thermometer Calibration Down to 0.65 K”  
(Division Sponsor: W. Tew)

**December 19, 2006**

Dr. Georg Heimel, Georgia Institute of Technology, Atlanta, GA, “Understanding the Intrefacial Electronic Structure in Self-Assembled Monolayers” (Division Sponsor: C. Zangmeister)

**11. Conferences/Workshops/Sponsored or Co-Sponsored Sessions**

**February 27-28, 2006**

NIST Pressure and Vacuum Measurement Course, Measurement Science Conference  
Symposium and Workshop, Anaheim, CA (J. Hendricks, P. Abbott)

**February 27-28, 2006**

“Selection, Calibration, and Use of Contact Thermometers,” Measurement Science Conference  
NIST Tutorial, Anaheim, CA (G. Strouse, K. Garrity)

**July 12, 2006**

Workshop on properties of gases and liquid precursors, organized by, Semicon West, San  
Francisco, CA, (R. Berg, J. Hurly, J. Martinez de Pinillos)