Laser Applications to Chemical, Security and Environmental Analysis (LACSEA)

Topical Meeting and Tabletop Exhibit

Collocated with

Biomedical Optics (BIOMED)
Digital Holography and Three-Dimensional Imaging (DH)

March 17-20, 2008
Hilton St. Petersburg Bayfront
St. Petersburg, Florida, USA

Postdeadline Submissions Deadline: February 19, 2008 at 12:00 p.m. EST (17.00 GMT)
Hotel Reservation Deadline: February 12, 2008
Pre-Registration Deadline: February 21, 2008

Spring Optics and Photonics Congress

Join your colleagues March 16-20 in St. Petersburg, Florida!

Collocated Topical Meetings

Biomedical Optics (BIOMED)
Digital Holography and Three-Dimensional Imaging (DH)
Laser Applications of Chemical, Security and Environmental Analysis (LACSEA)

Dates and Location	Important Deadlines
March 16-20, 2008 Hilton St. Petersburg Bayfront St. Petersburg, Florida, USA	**Postdeadline Submissions Deadline:** February 19, 2008 at 12:00 p.m. EST (17.00 GMT) **Hotel Reservation Deadline:** February 12, 2008 **Pre-Registration Deadline:** February 21, 2008

To find out more about how to exhibit at one of these meetings, please contact Anne Jones at 202.416.1942 or email ajones@osa.org. Reserve your exhibit space today!

Exhibitors

Advanced Research Technology	Nanoplus
Biophotonics International	NovaWave
Boston Electronics	Ocean Optics
Coherent	Oxxius
Continuum	Photo-Sonics
Femtolasers	PicoQuant Gmbh
Hamamatsu	Spectra-Physics – A Division of Newport Corporation
ISSI	Swamp Optics
Lattice	Time-Bandwidth Products
MicronOptics	

Topics to be Discussed

BIOMED Topics

- Methods for Diffuse Optical Imaging and Tomography
- Methods for Optical Spectroscopy and Spectroscopic Imaging
- Optical Coherence Tomography
- Optical Microscopy Techniques
- Photonic Biomedical Nanotechnology
- Optics in Neuroscience
- Optics in Diagnostics and Clinical Translation

DH Topics

- Digital holography theory and systems
- Diffractive optics
- Optical data storage
- Phase unwrapping and phase retrieval
- Computer generated holograms
- Spatial light modulators for holography
- Incoherent digital holography
- Holographic optical elements
- 2D and 3D pattern recognition
- Optical correlators
- Three-dimensional imaging and

- Optics in Molecular and Small Animal Imaging
- Optical Therapeutics

LACSEA Topics

- Laser-analytical Systems
- New Optical and Photonic Sources
- Laser-analytical Optics
- Prediction and Theoretical Treatment of UV, VIS, NIR, MIR and THz Spectra
- Application of Laser-analytical Systems to chemical, biophysical and biochemical analysis, homeland security and environmental measurements in industry as well as basic research.

processing

- Three-dimensional display
- Stereo-matching and stereoscopic cameras
- 2D-3D content conversion
- Shape and deformation measurement
- Polarization analysis
- Holographic imaging and microscopy
- Holographic nanofabrication methods
- Holographic optical micro-manipulation

About Optics and Photonics Congresses

OSA created Optics and Photonics Congresses, clusters of new and established **topical meetings** in order to bring together leaders among communities within optics.

Corporate Sponsors

About Laser Applications to Chemical, Security and Environmental Analysis (LACSEA)

This interdisciplinary meeting will focus on recent advances in analytical laser spectroscopy, i.e. on the development of new laser-analytical principles but also on new components, systems and new applications.

Contemporary scientific topics will be highlighted in areas such as

- New laser, optical, and spectroscopic science for analytical sensing
- New fundamental spectro-analytical principles and techniques including:
  Nonlinear and ultra fast spectroscopy, analytical use of optical frequency combs and others
- New laser light sources, optical components and detectors for analytical systems from the VUV, UV, to the FIR and THz spectral range
- Improved data retrieval techniques in laser spectroscopic analysis
- New laser analytical instrumentation including:
  Optical and micro-optical laser-based systems for chemical analysis and monitoring
  Laser analytical lab-on-chip systems
  Distributed laser optical sensor networks
- Innovative analytical applications of optical methods

The meeting also highlights the latest developments in the application of laser-analytical methods in fields such as

- Combustion
- Atmospheric measurements and environmental issues
- Biochemical/biophysical and medical applications of laser techniques
- Security applications of laser-based analytical methods
- Other new analytical applications using light matter interactions

Meeting Topics To Be Considered:

- Laser-analytical Systems
- New Optical and Photonic Sources
- Laser-analytical Optics
- Prediction and Theoretical Treatment of UV, VIS, NIR, MIR and THz Spectra
- Application of Laser-analytical Systems to chemical, biophysical and biochemical analysis, homeland security and environmental measurements in industry as well as basic research.

LACSEA Program Committee

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Daniel B. Oh, *Southwest Sciences, Inc., USA*
C. Russell Philbrick, *Penn State Univ., USA*
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Albert A. Ruth, *Univ. College Cork, Ireland*
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Markus Sauer, *Bielefeld Univ., Germany*
Wolfgang Schade, *Technical Univ. Clausthal, Germany*
Markus Sigrist, *ETH Zürich, Switzerland*
Jagdish Singh, *Mississippi State Univ., USA*
Frank K. Tittel, *Rice Univ., USA*
Dwight Woolard, *US Army Res. Office, USA*

LACSEA Invited Speakers

LMA3, Spectroscopic Archives and Transmission Codes for the Atmosphere and Their Application to Laser Sensing; *Laurence S. Rothman; Harvard-Smithsonian Ctr. for Astrophysics, USA.*

LMB2, Shining Infrared Light on Isotope Ratio Measurements: From Earthbound to the Atmospheric; *Erik Kerstel; Univ. of Groningen, Netherlands.*

LMC1, Advances in Tunable Solid-State Lasers and Nonlinear Optics for Analytical Sensors; *Peter F. Moulton; Q-Peak Inc., USA.*

LTuA3, Fiber-Based Laser Systems for Spectroscopic Trace-Gas Detection; *Dahv A. V. Kliner, Jeffrey P. Koplow, Roger L. Farrow, Paul E. Schrader, Sean W. Moore, Thomas A. Reichardt, Alexandra A. Hoops, Thomas J. Kulp, Karla M. Armstrong, Ricky L. Sommers, Paul Schultz, Lew Goldberg, Jean-Philippe Fève; Sandia Natl. Labs, USA.*

LTuB4, Linking Molecular- and Atomic-Frequency Standards with Cavity Ring-Down Spectroscopy; *Joseph T. Hodges[1], Piotr Maslowski[2], David J. Robichaud[3], M. Okumura[3], Charles E. Miller[4], L. R. Brown[4]; [1]Natl. Inst. of Standards and Technology, USA, [2]Inst. Fizyki, Univ. Mekolaja Kopernika, Poland, [3]Div. of Chemistry and Chemical Engineering, Caltech, USA, [4]JPL, Caltech, USA.*

LTuC1, Application of Terahertz Spectroscopy in Security, Chemistry and Microscopy; *P. Y. Han[1], J. Chen[1], H. W. Zhao[1], B. Schulkin[1], Y. Q. Chen[1], G. Bastiaans[2], J. Warrender[3], Xi Cheng Zhang[1]; [1]Rensselaer Polytechnic Inst., USA, [2]Intelligent Optical System Inc., USA, [3]Army Benet Labs, USA.*

LWA1, Fs-CARS for High-Bandwidth, Collision-Free Temperature Measurements; *Sukesh Roy[1], Paul J. Kinnius[2], Robert P. Lucht[2], James R. Gord[3]; [1]Innovative Scientific Solutions Inc., USA, [2]Purdue Univ., USA, [3]AFRL, USA.*

LWB1, Micro-Invasive LIF Diagnostics in Engines; *Frank Zimmermann[1], Christopher Gessenhardt[1], René Reichle[2], Christof Pruss[2], Christof Schulz[1]; [1]Univ. of Duisburg-Essen, Germany, [2]ITO, Univ. of Stuttgart, Germany.*

LWC1, Designs and Applications of Hyperspectral Light Sources; *Scott T. Sanders; Univ. of Wisconsin at Madison, USA.*

LThA1, Applications of Raman and Surface-Enhanced Raman Spectroscopy (SERS) to Bacterial Identification; *Steven Christesen[1], Jason Guicheteau[1], Darren Emge[1], Leanne Argue[1], Ashish Tripathi[2], Rabih Jabbour[2]; [1]US Army Edgewood Chemical Biological Ctr., USA, [2]Science Applications Intl. Corp., USA.*

LThB1, Standoff Raman Hyperspectral Imaging Detection of Explosives; *Patrick J. Treado, Matthew P. Nelson, Robert Schweitzer, Charles Gardner, Rachel Wentworth; ChemImage Corp., USA.*

LThC1, Recent Progess in LIBS-Based Technologies for Security Applications; *Andrzej Miziolek, F. C. DeLucia, C. A. Munson, J. L. Gottfried; ARL, USA.*

Agenda of Sessions

	Grand Bay Ballroom North	Grand Bay Ballroom South	Harborview	Williams/Demens Room
Saturday, March 15, 2008				
4:00 p.m.– 6:00 p.m.	**Registration (in Main Lobby)**			
Sunday, March 16, 2008				
6:30 a.m.– 6:30 p.m.	**Registration (at Conference Registration Desk)**			
7:50 a.m.– 8:00 a.m.	BIOMED Opening Remarks			
8:00 a.m.– 10:00 a.m.	BSuA • Nanoparticle Probes for Molecular Imaging	BSuB • Optical Imaging of Breast Cancer		
10:00 a.m.– 10:30 a.m.	**Coffee Break (St. Petersburg Ballroom)**			
10:00 a.m.– 4:00 p.m.	**Exhibits Open (St. Petersburg Ballroom)**			
10:30 a.m.– 12:30 p.m.	BSuC • Methods for Diffuse Optical Imaging	BSuD • Optical Techniques in the Clinic		
12:30 p.m.– 1:30 p.m.	**Lunch Break**			
1:30 p.m.– 3:30 p.m.	BSuE • BIOMED Poster Session I (Foyer)			
3:30 p.m.– 4:00 p.m.	**Coffee Break (St. Petersburg Ballroom)**			
4:00 p.m.– 6:30 p.m.	BSuF • Plenary I: Workshop on Contrast for *in vivo* Imaging			
Monday, March 17, 2008				
7:00 a.m.– 6:00 p.m.	**Registration (at Conference Registration Desk)**			
7:30 a.m.– 10:00 a.m.	BMA • Plenary II: Strategies for Functional Imaging and Diagnostics			
7:50 a.m.– 8:00 a.m.			DH Opening Remarks	LACSEA Opening Remarks
8:00 a.m.– 10:00 a.m.			DMA • 3-D Imaging I	LMA • Atmospheric Spectroscopy and NIR Laser-Based Sensing
10:00 a.m.– 10:30 a.m.	**Coffee Break (St. Petersburg Ballroom)**			
10:00 a.m.– 4:00 p.m.	**Exhibits Open (St. Petersburg Ballroom)**			
10:30 a.m.– 12:30 p.m.	BMB • OCT and Ophthalmic Applications	BMC • Reconstruction Methods for Diffuse Optical Tomography	DMB • 3-D Imaging II	LMB • MIR Laser-Based Trace Gas Sensing
12:30 p.m.– 1:30 p.m.	**Lunch Break**			
1:30 p.m.– 3:30 p.m.	BMD • BIOMED Poster Session II (Foyer)		DMC • Digital/Electronic Holography	LMC • New Laser Materials and OPG/OPO/OPA Systems
3:30 p.m.– 4:00 p.m.	**Coffee Break (St. Petersburg Ballroom)**			
4:00 p.m.– 6:00 p.m.	BME • *In vivo* Imaging for Neuroscience	BMF • Advances in Microscopy		
4:00 p.m.– 6:00 p.m.	**JMA • Joint DH and LACSEA Poster Session (Foyer)**			
6:30 p.m.– 8:00 p.m.	**Conference Reception (St. Petersburg Ballroom)**			

Key to Shading	
DH Sessions	
LACSEA Sessions	
BIOMED Sessions	No Shading

	Grand Bay Ballroom North	Grand Bay Ballroom South	Harborview	Williams/Demens Room
Tuesday, March 18, 2008				
7:00 a.m.–6:00 p.m.	**Registration (at Conference Registration Desk)**			
7:30 a.m.–10:00 a.m.	BTuA • Plenary III: Imaging and Diagnostics in Tissue			
8:00 a.m.–10:00 a.m.			DTuA • Integral Photography and Imaging: 3-D Systems	LTuA • Tunable Laser Sources and Trace Gas Sensing
10:00 a.m.–10:30 a.m.	**Coffee Break (St. Petersburg Ballroom)**			
10:00 a.m.–4:00 p.m.	**Exhibits Open (St. Petersburg Ballroom)**			
10:30 a.m.–12:30 p.m.	BTuB • Methods in Microendoscopy	BTuC • Light for Therapeutics and Diagnostics	DTuB • Digital Holographic Microscopy	LTuB • Cavity Spectroscopy and Innovative Techniques
12:30 p.m.–1:30 p.m.	**Lunch Break**			
1:30 p.m.–3:30 p.m.	BTuD • Optical Cancer Diagnostics	BTuE • Functional Neural Imaging	DTuC • Digital Holography and Holographic Microscopy (until 3:15)	LTuC • THz and Novel Imaging Techniques
3:30 p.m.–4:00 p.m.	**Coffee Break (St. Petersburg Ballroom)**			
4:00 p.m.–6:00 p.m.	BTuF • BIOMED Poster Session III (Foyer)			LTuD • Postdeadline Papers
Wednesday, March 19, 2008				
7:00 a.m.–6:00 p.m.	**Registration (at Conference Registration Desk)**			
7:30 a.m.–10:00 a.m.	BWA • Plenary IV: Molecular Imaging and Therapeutics			
8:00 a.m.–10:00 a.m.			DWA • 3-D Displays and Systems	LWA • Coherent Anti-Stokes Raman Spectroscopy
10:00 a.m.–10:30 a.m.	**Coffee Break (St. Petersburg Ballroom)**			
10:00 a.m.–4:00 p.m.	**Exhibits Open (St. Petersburg Ballroom)**			
10:30 a.m.–12:30 p.m.	BWB • Optical Therapeutics	BWC • Techniques for Functional Neural Imaging	DWB • Holographic Interferometry, Modulators, Filters, and Materials	LWB • Combustion Imaging
12:30 p.m.–12:40 p.m.			DH Closing Remarks	
12:30 p.m.–1:30 p.m.	**Lunch Break**			
1:30 p.m.–3:30 p.m.	BWD • Methods for Spectroscopy and Microscopy	BWE • Molecular Imaging Using Fluorescence		LWC • New Spectroscopic Approaches for Combustion Diagnostics
3:30 p.m.–4:00 p.m.	**Coffee Break (St. Petersburg Ballroom)**			
4:00 p.m.–6:00 p.m.	BWF • Optical Coherence Tomography: Novel Techniques and Functional Imaging	BWG • Instrumentation and Techniques for Tissue Imaging		
6:00 p.m.–6:10 p.m.	BIOMED Closing Remarks			
Thursday, March 20, 2008				
7:30 a.m.–3:30 p.m.	**Registration (at Conference Registration Desk)**			
8:00 a.m.–10:00 a.m.				LThA • Biothreat Detection
10:00 a.m.–10:30 a.m.	**Coffee Break (Foyer)**			
10:30 a.m.–12:30 p.m.				LThB • Explosives Detection and Imaging
12:30 p.m.–1:30 p.m.	**Lunch Break**			
1:30 p.m.–3:30 p.m.				LThC • LIBS and Explosives Detection
3:30 p.m.–3:40 p.m.				LACSEA Closing Remarks

Laser Applications of Chemical, Security and Environmental Analysis (LACSEA) Abstracts

• Monday, March 17, 2008 •

Conference Registration
7:00 a.m.–6:00 p.m.
Registration Open

Williams/Demens Room
7:50 a.m.–8:00 a.m.
LACSEA Opening Remarks

LMA • Atmospheric Spectroscopy and NIR Laser-Based Sensing

Williams/Demens Room
8:00 a.m.–10:00 a.m.
LMA • Atmospheric Spectroscopy and NIR Laser-Based Sensing
Daniel B. Oh; Southwest Sciences, Inc., USA, Presider

LMA1 • 8:00 a.m.
Diode Laser-Based Sensor for High Precision Measurements of Ambient CO_2, *David M. Sonnenfroh, Krishnan Parameswaran, Mark Allen; Physical Sciences Inc., USA.* We report on the development of a high precision sensor for monitoring ambient CO_2. Our TDL ICOS absorption spectrometer operates at 2 μm and achieves a precision of 1:3000 for the CO_2 mixing ratio.

LMA2 • 8:20 a.m.
Calibration Free Measurement of Atmospheric Methane Background via Tunable Diode Laser Absorption Spectroscopy at 1.6 μm, *Christian Lauer, Dieter Weber, Steven Wagner, Volker Ebert; Inst. of Physical Chemistry, Univ. of Heidelberg, Germany.* At measurements of the atmospheric methane background with in an open path herriott cell, we achieved an optical resolution of 2.3 • 10^{-5} OD_e (3σ), respectively 9 ppb CH_4 (3σ) resolution of concentration.

LMA3 • 8:40 a.m. **Invited**
Spectroscopic Archives and Transmission Codes for the Atmosphere and Their Application to Laser Sensing, *Laurence S. Rothman; Harvard-Smithsonian Ctr. for Astrophysics, USA.* The HITRAN molecular spectroscopic database, and its high-temperature analog, HITEMP, are described. These databases provide the molecular absorption spectroscopic parameters in the gas phase that are required for simulation of high-resolution applications.

LMA4 • 9:20 a.m.
Laser Sounder for Global Measurement of CO_2 Concentrations in the Troposphere from Space, *James B. Abshire[1], Haris Riris[1], Graham Allan[2], Xiaoli Sun[1], S. Randy Kawa[1], Jianping Mao[3], Mark Stephen[1], Emily Wilson[1], Michael A. Krainak[1]; [1]NASA Goddard Space Flight Ctr., USA, [2]Sigma Space Inc., USA, [3]RSIS Inc., USA.* We report progress in assessing the feasibility of a new satellite-based laser-sounding instrument to measure CO_2 concentrations in the lower troposphere from space.

LMA5 • 9:40 a.m.
Trace Ethylene Detection by Means of QEPAS in Near-Infrared Spectral Region, *Anatoliy A. Kosterev[1], Frank K. Tittel[1], Stephane Schilt[2]; [1]Rice Univ., USA, [2]IR Microsystems SA, Switzerland.* Quartz enhanced photoacoustic spectroscopy (QEPAS) was applied to detection of trace ethylene (C_2H_4) in nitrogen at atmospheric pressure. An absorption peak at 6177.15 cm^{-1} was accessed using a fiber coupled DFB diode laser.

St. Petersburg Ballroom
10:00 a.m.–10:30 a.m.
Coffee Break

St. Petersburg Ballroom
10:00 a.m.–4:00 p.m.
Exhibits Open

LMB • MIR Laser-Based Trace Gas Sensing

Williams/Demens Room
10:30 a.m.–12:30 p.m.
LMB • MIR Laser-Based Trace Gas Sensing
Volker Ebert; Univ. of Heidelberg, Germany, Presider

LMB1 • 10:30 a.m.
2.7-μm DFB Diode Laser Spectrometer for Sensitive Spatially Resolved H_2O Vapor Detection, *Karl Wunderle, Steven Wagner, Volker Ebert; Inst. of Physical Chemistry, Univ. of Heidelberg, Germany.* A new 2.7-μm laser spectrometer was designed and characterized with regard to static/dynamic tuning properties and used for first spatially resolved measurements on heterogeneous distributed H_2O vapor concentration fields.

LMB2 • 10:50 a.m. **Invited**
Shining Infrared Light on Isotope Ratio Measurements: From Earthbound to the Atmospheric, *Erik Kerstel; Univ. of Groningen, Netherlands.* We discuss the use of infrared laser-based spectrometers for measuring isotope ratios in small molecules of environmental interest, in applications ranging from laboratory-based studies in biomedicine to airborne water vapor studies in the upper troposphere.

LMB3 • 11:30 a.m.
Faraday Modulation Spectroscopy of Nitric Oxide at 5.33 μm with an External Cavity Quantum Cascade Laser, *Gerard Wysocki, Rafal Lewicki, Jim Doty, Robert F. Curl, Frank K. Tittel; Rice Univ., USA.* The selection of the specific molecular transition is of great importance to achieve best sensitivity with Faraday rotation spectroscopy. Application of broadly-tunable external-cavity quantum cascade laser allowed targeting the optimum NO-Q(3/2) transition at 1875.8 cm^{-1}.

LMB4 • 11:50 a.m.
Quantum Cascade Laser-Based Sensor Platform for Ammonia Detection in Exhaled Human Breath, *Yury A. Bakhirkin[1], Anatoliy A. Kosterev[1], Gerard Wysocki[1], Frank K. Tittel[1], Terence H. Risby[2], John D. Bruno[3]; [1]Rice Univ., USA, [2]Johns Hopkins Univ., USA, [3]Maxion Technologies Inc., USA.* An ammonia sensor for clinical breath analysis based on a CW mid-infrared quantum cascade laser and quartz-enhanced photoacoustic spectroscopy with a detection sensitivity of 20 ppbv (1σ) with a 0.3 s time resolution is reported.

LMB5 • 12:10 p.m.
Ethane Spectroscopy for Breath Analysis Using a Mid-Infrared Interband Cascade Laser, *Krishnan R. Parameswaran[1], Philip A. Mulhall[1], David I. Rosen[1], Mark G. Allen[1], Terence H. Risby[2]; [1]Physical Sciences Inc., USA, [2]Johns Hopkins Univ., USA.* Online measurements of ethane in breath will enable non-invasive monitoring of oxidative stress status. We present a simple, compact system using off-axis ICOS for breath measurements of a smoker.

12:30 p.m.–1:30 p.m.
Lunch Break

LMC • New Laser Materials and OPG/OPO/OPA Systems

Williams/Demens Room
1:30 p.m.–3:30 p.m.
LMC • New Laser Materials and OPG/OPO/OPA Systems
Dennis K. Killinger; Univ. of South Florida, USA, Presider

LMC1 • 1:30 p.m. **Invited**
Advances in Tunable Solid-State Lasers and Nonlinear Optics for Analytical Sensors, *Peter F. Moulton; Q-Peak Inc., USA.* We discuss several classes of tunable solid state lasers, based on Yb-doped crystals, Tm-doped fibers and Cr:ZnSe crystals, and patterned semiconductor nonlinear materials, all of which show promise for applications to analytic sensors.

LMC2 • 2:10 p.m.
Long-Term Frequency-Stable Operation of a Single Frequency CW OPO without Active Locking, *Angus J. Henderson, Ryan Stafford, Paul Hoffman; Aculight Corp., USA.* Frequency stability of <400MHz without discontinuous jumps over a period of 30 hours has been demonstrated in a high-power, fiber laser-pumped, single frequency CW OPO operating at 3 microns wavelength without active frequency locking.

LMC3 • 2:30 p.m.
Development of a Compact, Narrow-Linewidth, Tunable Ultraviolet Laser Source for Detection of Hg^0, *Alexandra A. Hoops, Thomas A. Reichardt, Paul Schulz, Roger L. Farrow, Ray P. Bambha, Randal L. Schmitt, Dahv A. V. Kliner; Sandia Natl. Labs, USA.* A portable laser for real-time, stand-off detection of Hg^0 emissions from coal-fired power plants is developed and characterized. The pulse energy of the 254-nm laser is 1.8 μJ, which will enable sub-ppb detection of Hg^0.

LMC4 • 2:50 p.m.
Development of an Injection-Seeded Optical Parametric Generator System with Pulsed Dye Amplification for High-Resolution Laser Spectroscopy, *Aizaz H. Bhuiyan, Daniel R. Richardson, Joseph W. Reneker, Sameer V. Naik, Robert P. Lucht; Purdue Univ., USA.* We discuss the development and describe the characteristics of a laser system composed of an injection-seeded optical parametric generator coupled with pulsed dye amplifiers.

LMC5 • 3:10 p.m.
Mid-Infrared OPO for High Resolution Measurements of Trace Gases in the Mars Atmosphere, *Anthony W. Yu[1], Kenji Numata[1], Haris Riris[1], James B. Abshire[1], Graham R. Allan[2], Xiaoli Sun[1], Michael A. Krainak[1]; [1]NASA Goddard Space Flight Ctr., USA, [2]Sigma Space Corp., USA.* We will present a lidar instrument operating in the mid-infrared to measure trace gases in the Martian atmosphere. The lidar instrument is based on a tunable OPO pumped by a master oscillator fiber amplifier.

St. Petersburg Ballroom
3:30 p.m.–4:00 p.m.
Coffee Break

JMA • Joint DH and LACSEA Poster Session

Foyer
4:00 p.m.–6:00 p.m.
JMA • Joint DH and LACSEA Poster Session

Posters JMA1–JMA16 are listed in the DH abstract section of the program.

JMA17
Tomographic Imaging Based on Hyperspectral Absorption Spectroscopy, *Lin Ma; Clemson Univ., USA.* An inversion method is developed to exploit the increased spectral information content enabled by recent advancement in laser technologies. This method should lay the groundwork for the expanded use of hyperspectral lasers in imaging measurements.

JMA18
Moved to LTuA4

JMA19
Oxygen Spectroscopy Laser Sounding Instrument for Remote Sensing of Atmospheric Pressure, *Mark A. Stephen[1], Jian-ping Mao[2], James B. Abshire[1], Xiaoli Sun[1], S. Randy Kawa[1], Michael A. Krainak[1]; [1]NASA Goddard Space Flight Ctr., USA, [2]RSIS Inc., USA.* We report on progress of a laser sounding instrument using the pressure broadening of spectroscopic absorption lines of the diatomic oxygen A-band to deduce atmospheric pressure and a pulsed, frequency-doubled, fiber laser transmitter.

JMA20
Advances in Eye-Safe Atmospheric Volume Imaging Lidar, *Scott M. Spuler, Bruce Morley, Shane D. Mayor; Natl. Ctr. for Atmospheric Res., USA.* A multi-dimensional lidar, well suited for urban surveillance and aerosol plume monitoring, has been developed and is operational. The paper discusses research and development efforts to extend the instrument capabilities toward quantitative measurements of aerosol.

JMA21
Multiple Wavelength Mid-Infrared DFG Source Using Engineered QPM Zn:$LiNbO_3$ Waveguide, *Masaki Asobe[1], Osamu Tadanaga[1], Tsutomi Yanagawa[1], Takeshi Umeki[1], Yoshiki Nishida[2]; [1]NTT Photonics Labs, NTT Corp., Japan, [2]NTT Electronics Corp., Japan.* We report recent progress on a mid-IR DFG source. A novel design enables us to generate unequally spaced multiple wavelengths. A Zn:$LiNbO_3$ waveguide made with direct bonded technology enables stable high power output operation.

JMA22
Laser-Induced Breakdown Spectroscopy for Measurement of Fuel/Oxygen Mixing in Combustion, *Matthew Dackman, James W. L. Lewis, Ying-Ling Chen, Christian G. Parigger; Univ. of Tennessee Space Inst., USA.* We present time-resolved laser-induced breakdown spectroscopy (LIBS) measurements of C:O and equivalence ratios in atmospheric and higher pressure methane/oxygen flames. Near-UV and visible transitions for carbon and oxygen lines are compared.

JMA23
Laser Ignition and Laser Induced Breakdown Spectroscopy in Engines Using Hollow Core Fiber Delivery, *Sachin Joshi[1], Azer P. Yalin[1], Cosmin Dumitrescu[2], Semih Olcmen[2], Paul Puzinauskas[2]; [1]Colorado State Univ., USA, [2]Univ. of Alabama, USA.* We describe the use of hollow core optical fibers to deliver laser sparks. The sparks are used to ignite engines and to enable air-to-fuel measurements by laser induced breakdown spectroscopy.

JMA24
Atmospheric Transmission and LIDAR Modeling of LIBS and Raman Remote Sensing of Distant Compounds, *Denis Plutov, Dennis K. Killinger; Univ. of South Florida, USA.* Long range stand-off Raman and LIBS lidar signal simulations have been carried out using the HITRAN atmospheric transmission database, modified Hitran-PC program and a modified lidar equation.

JMA25
Michelson Interferometry Applied on Corrosion Processes Monitoring, *D. Mayorga-Cruz, Oscar Sarmiento-Martinez, J. Uruchurtu-Chavarín; Univ. Autónoma del Estado de Morelos, Mexico.* In this work metal corrosion monitoring by Michelson interferometry and electrochemical polarization curves is presented. Recent advances obtained by interferometrical methods, performed as a complementary technique to those of conventional electrochemistry are highlighted here.

JMA26
Optical Waveguide Lightmode Spectroscopy (OWLS) Immunosensors for Environmental Monitoring, *Andras Szèkács[1], Inna Levkovets[1], Nóra Adányi[2], István Szendro[3]; [1]Plant Protection Inst., Hungarian Acad. of Sciences, Hungary, [2]Central Food Res. Inst., Hungary, [3]MicroVacuum Ltd., Hungary.* OWLS immunosensors were developed for detection of trifluralin, zearalenone and vitellogenin. By covalent immobilization, each component of the antibody-antigen complex was immobilized on the sensor surface, allowing non-competitive or competitive detection of the analytes.

JMA27
Laser-Induced Breakdown Spectroscopy with 10.6-Micron Laser Radiation, *Christian G. Parigger[1], James O. Hornkohl[1], László Nemes[2]; [1]Univ. of Tennessee Space Inst., USA, [2]Chemical Res. Ctr. of the Hungarian Acad. of Sciences, Hungary.* Transient laser plasma is generated using 10.6-micron radiation from a CO_2 laser. Selected atomic and molecular emission spectra are recorded and discussed including atomic carbon, hydrogen and molecular CN and C_2 Swan bands.

JMA28
Destruction of Bacterial-Spore-Laden Aqueous Aerosols in Shock-Heated Flows, *Petros Lappas[1], Daniel R. Haylett[1], Jason M. Porter[1], David F. Davidson[1], Jay B. Jeffries[1], Ronald K. Hanson[1], Leslie A. Hokoma[2], Kristien E. Mortelmans[2]; [1]Stanford Univ., USA, [2]SRI Intl., USA.* Interaction between shock-waves and aqueous aerosol laden with BT spores is studied in a novel shock tube facility. Wavelength-multiplexed laser extinction provides a real-time aerosol monitor. Viability of shock-heated spores is determined by plating techniques.

JMA29
Tuning Fork Based Resonant Detection Schemes for Electro-Magnetic Radiation, *Andreas Pohlkötter[1], Ulrike Willer[1,2], Christoph Bauer[2], Tobias Schossig[2], Mario Mordmüller[2], Wolfgang Schade[1,2]; [1]Inst. für Physik und Physikalische Technologien, Technische Univ. Clausthal, Germany, [2]Laser Application Ctr., Technische Univ. Clausthal, Germany.* QEPAS utilizes resonant excitation of a tuning fork by focusing a modulated laser beam between its prongs. By focusing onto one prong, a new compact detector for THz, MIR and VIS-radiation can be set up.

JMA30
Laser-Induced Breakdown Spectroscopy and Related Stand-off Detection Technologies, *Santiago Palanco, Martin Richardson; Univ. of Central Florida, USA.* The state of-the-art of laser-induced breakdown spectroscopy is presented highlighting current problems for the analysis/detection of organic compounds at remote locations as well as possible workarounds and hyphenation with other analytical techniques.

JMA31
Paper Withdrawn

JMA32
Application of Laser Induced Fluorescence Spectroscopy (LIFS) for Bio Oil Analysis and Monitoring, *Markandey M. Tripathi[1], Fang-Yu Yueh[1], Jagdish P. Singh[1], El Barbary Hassan[2], Philip Steele[2], Leonard Ingram[2]; [1]Inst. for Clean Energy Technology, Mississippi State Univ., USA, [2]Dept. of Forest Products, Mississippi State Univ., USA.* Interest in Bio-oils as a renewable energy source is growing at rapid pace. In the present work, we have explored the feasibility of applying Laser Induced Fluorescence (LIF) for bio oil analysis and monitoring.

JMA33
Complications to Optical Measurements Using a Laser with an Unstable Resonator: A Case Study on Laser-Induced Incandescence of Soot, *Hope A. Michelsen, Mark A. Dansson, Matthew Boisselle, Mark A. Linne; Sandia Natl. Labs, USA.* Temporal behavior of pulses from a Nd:YAG with an unstable resonator can vary radially across the beam. Pulses are earlier and longer at the beam center. This behavior has a dramatic effect on time-sensitive experiments.

JMA34
Laser- and UV-LED-Induced Fluorescence Detection of Drinking Water and Water-Dissolved Organics, *Anna V. Sharikova, Dennis K. Killinger; Univ. of South Florida, USA.* We have developed a deep-UV laser-induced fluorescence system for fluorescence detection of water-dissolved organic species. Deep-UV LEDs also were used as the excitation source. These systems have been employed for real-time monitoring of drinking water.

JMA35
Tissue Scaffolding Diagnostics with Femtosecond Laser Radiation, *Christian G. Parigger[1], Robert Splinter[2,3], Pavlina J. Pike[4]; [1]Univ. of Tennessee Space Inst., USA, [2]Univ. of North Carolina at Charlotte, USA, [3]Spectranetics Corp., USA, [4]Middle Tennessee State Univ., USA.* Elastic and dimensional properties of selected synthetic tissue materials are investigated using short, pulsed laser radiation. Materials constants are inferred for nondestructive diagnostics based on mechanical and optical characteristics.

JMA36
Measurements of Gas Species and the $^{13}CO_2/^{12}CO_2$ Isotope Ratio in a Wood-Based Combustion Emission by Laser Absorption Spectroscopy, *Julien Cousin, Weidong Chen, Marc Fourmentin, Eric Fertein; Lab de Physicochimie de l'Atmosphère, Univ. du Littoral Côte d'Opale, France.* We report on the application of a field-deployable instrument based on Telecoms-grade laser to simultaneous measurements of multiple species (H_2O, CO, CO_2, CH_4, C_2H_2) and the $^{13}CO_2/^{12}CO_2$ isotope ratio in a wood-based combustion.

JMA37
Moved to LMA4

JMA38
Study of Biodiesel Combustion Using Laser Spectroscopy, *Kemal Efe Eseller[1], Fang-Yu Yueh[1], Jagdish P. Singh[1], Kalyan Srinivasan[2]; [1]Inst. for Clean Energy Technology, Mississippi State Univ., USA, [2]Dept. of Mechanical Engineering, Mississippi State Univ., USA.* Laser Induced Incandescence has been used to provide non-intrusive quantitative measurement of soot of biodiesel combustion. In this work we also evaluated Laser Induced Breakdown Spectroscopy to measure the equivalence ratio of a biodiesel flame.

JMA39
Paper Withdrawn

JMA40
Methane Measurements with Interband Cascade Lasers, *Chris Hovde[1], Daniel B. Oh[1], Mark A. Zondlo[1], Chul Soo Kim[2], Mijin Kim[2], William Bewley[2], Chadwick L. Canedy[2], Igor Vurgaftman[2], Jerry R. Meyer[2], S. Gregory Jones[2], Titania A. R. Schmidt[2], Kenneth M. Suzuki[2]; [1]Southwest Sciences, USA, [2]NRL, USA.* An inter-band cascade (IC) laser is evaluated for applications to methane isotope ratio measurements. The laser tunes over spectral features of both carbon isotopes with high output power, single mode operation and good sensitivity.

JMA41
Insensitivity of Electronic-Resonance-Enhanced Coherent Anti-Stokes Raman Scattering (ERE-CARS) to Electronic Quenching, *Anil K. Patnaik[1], Sukesh Roy[1], Robert P. Lucht[2], James R. Gord[3]; [1]Innovative Scientfic Solutions Inc., USA, [2]Purdue Univ., USA, [3]AFRL, USA.* The insensitivity of ERE-CARS signal to collisional quenching is investigated. It is observed that the strong laser pulse helps in keeping both the excited-state population and the ground-state coherence reasonably high, even with significant quenching.

JMA42
Time-Resolved Laser Raman Diagnostics and Multiscalar Measurements in Turbulent Combustion at Elevated Pressures: Toward Combustion Code Validation, *Jun Kojima[1], Quang-Viet Nguyen[2]; [1]Ohio Aerospace Inst., USA, [2]NASA Glenn Res. Ctr., USA.* The paper reports the first quantitative single-shot multiscalar data measured in a turbulent high-pressure, lean direct injection type research burner operating on CH_4-air using pulsed-laser linear Raman diagnostics.

JMA43
Detection of Benzene Vapor at the ppb-Level Using a Difference-Frequency Generation-Based Laser Instrument Operating in the 3-µm Region, *Julien Cousin[1], Weidong Chen[1], Damien Bigour[1], Samir Kassi[2], Daniele Romanini[2]; [1]Lab de Physicochimie de l'Atmosphère, Univ. du Littoral Côte d'Opale, France, [2]Lab de Spectromérie Physique, Univ. J. Fourier de Grenoble, France.* Concentration measurements of benzene vapor have been performed with a minimum detectable concentration of 155 ppb (3σ) by using a compact laser instrument based on difference frequency generation in the 3-3.6 µm spectral region.

JMA44
Nonlinear Magneto-Optical Rotation for Sensitive Measurement of Magnetic Fields, *Chris Hovde[1], Victor M. Acosta[2], Eric Corsini[2], James M. Higbie[2], Micah P. Ledbetter[2], Dmitry Budker[2]; [1]Southwest Sciences, USA, [2]Univ. of California, USA.* Using nonlinear atomic spectroscopy with diode lasers, scalar magnetic fields can be measured with high precision. With either nulling coils or modulation coils, the precise scalar measurement can be used to determine vector fields.

JMA45

Time Resolved Spectroscopy Measurements of Graphite Ablation with Nd:YAG Laser Radiation, *Christian G. Parigger[1], James O. Hornkohl[1], Laszlo Nemes[2]; [1]Univ. of Tennessee Space Inst., USA, [2]Chemical Res. Ctr. of the Hungarian Acad. of Sciences, Hungary.* Graphite ablation experiments are reported using unfocused 532-nm frequency-doubled and 355-nm frequency-tripled Nd:YAG laser radiation. Time resolved emission spectra of C_2 Swan bands and C_3 Swings bands features near 400-nm are recorded and investigated.

St. Petersburg Ballroom

6:30 p.m.–8:00 p.m.

Conference Reception

NOTES

• Tuesday, March 18, 2008 •

Conference Registration
7:00 a.m.–6:00 p.m.
Registration Open

LTuA • Tunable Laser Sources and Trace Gas Sensing

Williams/Demens Room
8:00 a.m.–10:00 a.m.
LTuA • Tunable Laser Sources and Trace Gas Sensing
Frank K. Tittel; Rice Univ., USA, Presider

LTuA1 • 8:00 a.m.
Widely Tunable Quantum-Dash DFB Laser Diodes for Multi-Species Gas Analysis, *Wolfgang Zeller, Johannes Koeth, Michael Legge, Marc Fischer, Jochen Seufert, Ralph Werner; nanoplus GmbH, Germany.* Applying the concept of binary superimposed gratings, widely tunable singlemode laser diodes suitable for multi-species gas detection in the 1.8 µm range could be manufactured on InAs/InGaAs quantum dash-in-a-well material.

LTuA2 • 8:20 a.m.
Airborne Formaldehyde Measurements during TexAQS 2006 Using a Difference Frequency Laser Based Absorption Spectrometer, *Dirk Richter[1], Petter Weibring[1], James G. Walega[1], Alan Fried[1], Michael K. Trainer[2], Thomas B. Ryerson[2]; [1]Natl. Ctr. for Atmospheric Res., USA, [2]Natl. Oceanic and Atmospheric Administration, USA.* We present the airborne application of a difference frequency laser based absorption spectrometer, discuss important instrument functions and requirements, present examples of airborne measurements and its preliminary interpretation toward understanding the pollution over Houston, Texas.

LTuA3 • 8:40 a.m. **Invited**
Fiber-Based Laser Systems for Spectroscopic Trace-Gas Detection, *Dahv A. V. Kliner, Jeffrey P. Koplow, Roger L. Farrow, Paul E. Schrader, Sean W. Moore, Thomas A. Reichardt, Alexandra A. Hoops, Thomas J. Kulp, Karla M. Armstrong, Ricky L. Sommers, Paul Schultz, Lew Goldberg, Jean-Philippe Fève; Sandia Natl. Labs, USA.* Advantages and limitations of fiber-based laser systems for trace-gas detection will be reviewed. We will present example applications of *in situ* and remote sensors operating at wavelengths from the mid-IR through the deep-UV.

LTuA4 • 9:20 a.m.
New Advances in Generation of High Repetition Rate Burst Mode Laser Output, *Naibo Jiang[1,2], Walter R. Lempert[1,2]; [1]Dept. of Mechanical Engineering, Ohio State Univ., USA, [2]Dept. of Chemistry, Ohio State Univ., USA.* We demonstrate the ability to generate bursts of high energy pulses from a custom Nd:YAG laser system. Output energy as high as 400 mJ/pulse for a twenty pulse sequence at 20 kHz is reported.

LTuA5 • 9:40 a.m.
Fiber-Laser-Based NICE-OHMS for Ultra-Sensitive Trace Species Detection, *Aleksandra Foltynowicz, Florian M. Schmidt, Weiguang Ma, Ove Axner; Umea Univ., Sweden.* A compact NICE-OHMS spectrometer based on a narrowband fiber laser has been used for detection of C_2H_2 down to an integrated absorption of 5×10^{-11} cm^{-1} in Doppler-broadened and 3×10^{-10} cm^{-1} in Doppler-free mode of operation.

St. Petersburg Ballroom
10:00 a.m.–10:30 a.m.
Coffee Break

St. Petersburg Ballroom
10:00 a.m.–4:00 p.m.
Exhibits Open

LTuB • Cavity Spectroscopy and Innovative Techniques

Williams/Demens Room
10:30 a.m.–12:30 p.m.
LTuB • Cavity Spectroscopy and Innovative Techniques
J. Houston Miller; George Washington Univ., USA, Presider

LTuB1 • 10:30 a.m.
Sputtering Measurements by Cavity Ring-Down Spectroscopy and Application to Electric Propulsion and Plasma Engineering, *Azer P. Yalin, Lei Tao, Naoji Yamamoto; Colorado State Univ., USA.* We describe the use of cavity ring-down spectroscopy for measurement of number densities of sputtered particles. Applications for thruster characterization in electric propulsion and process monitoring in plasma engineering are discussed.

LTuB2 • 10:50 a.m.
A New Field Instrument for NO_3 Detection Using Incoherent Broadband Cavity Enhanced Spectroscopy, *Ravi M. Varma, Albert A. Ruth, Dean Venables, Uwe Heitmann; Univ. College Cork, Ireland.* A new field instrument has been developed for monitoring atmospheric NO_3. This instrument has been compared with other techniques in a simulation chamber. Instrument description, comparison as well as preliminary field measurements will be presented.

LTuB3 • 11:10 a.m.
A Modified Raman Spectrometer to Measure Dissolved Gases in the Deep-Ocean, *Manfred Fink, Philip L. Varghese, Tamara Pease; Univ. of Texas at Austin, USA.* A novel Raman spectrometer will be presented which can record species such as $^{13}CO_2$, $^{12}CO_2$ at depths up to 5000 meters absolutely, with high spectral resolutions (0.1 cm^{-1}), high precision isotope ratios (1%) within minutes.

LTuB4 • 11:30 a.m. **Invited**
Linking Molecular- and Atomic-Frequency Standards with Cavity Ring-Down Spectroscopy, *Joseph T. Hodges[1], Piotr Maslowski[2], David J. Robichaud[3], M. Okumura[3], Charles E. Miller[4], L. R. Brown[4]; [1]Natl. Inst. of Standards and Technology, USA, [2]Inst. Fizyki, Univ. Mekolaja Kopernika, Poland, [3]Div. of Chemistry and Chemical Engineering, Caltech, USA, [4]JPL, Caltech, USA.* We report a new method for measuring absorption transition frequencies using frequency-stabilized cavity ring-down spectroscopy. We determined absolute frequencies of O_2 *A*-band transitions using saturation spectroscopy of ^{39}K and demonstrated combined uncertainties < 1 MHz.

LTuB5 • 12:10 p.m.
Evanescent-Wave Cavity Ring-Down Spectroscopy for Enhanced Detection of Surface Binding under Flow Injection Analysis Conditions, *Lineke van der Sneppen, Freek Ariese, Cees Gooijer, Wim Ubachs; Vrije Univ., Netherlands.* The feasibility of liquid-phase evanescent-wave cavity ring-down spectroscopy (EW-CRDS) for surface-binding studies under flow-injection analysis (FIA) conditions is demonstrated. EW-CRDS is highly surface-specific, and only molecules at or near the surface are probed.

12:30 p.m.–1:30 p.m.
Lunch Break

LTuC • THz and Novel Imaging Techniques

Williams/Demens Room
1:30 p.m.–3:30 p.m.
LTuC • THz and Novel Imaging Techniques
James Gord; AFRL, USA, Presider

LTuC1 • 1:30 p.m. **Invited**
Application of Terahertz Spectroscopy in Security, Chemistry and Microscopy, *P. Y. Han[1], J. Chen[1], H. W. Zhao[1], B. Schulkin[1], Y. Q. Chen[1], G. Bastiaans[2], J. Warrender[3], Xi Cheng Zhang[1]; [1]Rensselaer Polytechnic Inst., USA, [2]Intelligent Optical System Inc., USA, [3]Army Benet Labs, USA.* Recent progress in the application of terahertz spectroscopy is highlighted, including fingerprint spectroscopy of hidden explosives, dynamics monitoring of chemical reactions and nanometer resolution near field microscope imaging employing terahertz emission waves.

LTuC2 • 2:10 p.m.
Improving Image Contrast in Rocket Sprays Using Time-Gated Ballistic Imaging, *Terrence Meyer[1], Z. Schaefer[1], J. Schmidt[1], S. Roy[2], J. Gord[2]; [1]Iowa State Univ., USA, [2]AFRL, USA.* Time-gated ballistic imaging is employed for imaging the near-field, optically dense region of atmospheric-pressure rocket sprays, enhancing image contrast and revealing information on spray geometry and break-up processes.

LTuC3 • 2:30 p.m.
Spatial Resolution Simulations for Time-Gating and Spatial Filtering in Ballistic Imaging, *David Sedarsky[1], E. Berrocal[1], M. Linne[1,2]; [1]Lund Univ., Sweden, [2]Sandia Natl. Labs, USA.* Photon discrimination by means of spatial filtering and time-gating are commonly applied in ballistic imaging of optically dense media. This work models effects of these methods in the context of contrast at the image plane

LTuC4 • 2:50 p.m.
Laser Spectroscopy for Assessing Structural Properties of Turbid Solids: Toward Optical Porosimetry, *Tomas Svensson[1], Stefan Andersson-Engels[1], Jonas Johansson[2], Staffan Folestad[2]; [1]Lund Univ., Sweden, [2]Astra Zeneca R&D, Sweden.* We present significant advances in high-resolution spectroscopy for characterization of turbid and porous materials. In particular, we focus on its use for structural analysis of pharmaceutical materials, and the implementation of optical porosimetry.

LTuC5 • 3:10 p.m.

Wood Characterization by Diffuse Time-Resolved Optical Spectroscopy, *Cosimo D'Andrea[1], Andrea Farina[1], Daniela Comelli[1], Antonio Pifferi[1], Paola Taroni[1], Gianluca Valentini[1], Rinaldo Cubeddu[1], Luca Zoia[2], Marco Orlandi[2], Alwin Kienle[3]; [1]Politecnico di Milano, Italy, [2]Dept. di Scienze dell'Ambiente e del Territorio, Univ. Milano-Bicocca, Italy, [3]Inst. für Lasertechnologien in der Medizin und Meßtechnik, Germany.* Time-resolved optical spectroscopy technique in the visible/NIR region (700-1080 nm) is employed to characterize wood samples previously degraded and subsequently consolidated by isoeugenol treatment. Preliminary measurements of absorption spectrum of lignin and cellulose are shown.

St. Petersburg Ballroom
3:30 p.m.–4:00 p.m.
Coffee Break

NOTES

• Wednesday, March 19, 2008 •

Conference Registration
7:00 a.m.–6:00 p.m.
Registration Open

LWA • Coherent Anti-Stokes Raman Spectroscopy

Williams/Demens Room
8:00 a.m.–10:00 a.m.
LWA • Coherent Anti-Stokes Raman Spectroscopy
Thomas Settersten; Sandia Natl. Labs, USA, Presider

LWA1 • 8:00 a.m. **Invited**
Fs-CARS for High-Bandwidth, Collision-Free Temperature Measurements, *Sukesh Roy[1], Paul J. Kinnius[2], Robert P. Lucht[2], James R. Gord[3]; [1]Innovative Scientific Solutions Inc., USA, [2]Purdue Univ., USA, [3]AFRL, USA.* Fs-laser-based time-resolved CARS spectroscopy of nitrogen is used to measure temperature at 1 kHz. The first few ps of the time-resolved CARS signal are free of collisions for pressures up to 20 bar.

LWA2 • 8:40 a.m.
Theory of Single-Pulse Femtosecond Coherent Anti-Stokes Raman Scattering Using a Chirped Probe Beam, *Paul J. Kinnius[1], Robert P. Lucht[1], Sukesh Roy[2], James R. Gord[3]; [1]Purdue Univ., USA, [2]Innovative Scientific Solutions Inc., USA, [3]AFRL, USA.* The theory of single-pulse, chirped-probe, femtosecond (fs) coherent anti-Stokes Raman scattering (CARS) for gas-phase temperature and species measurements is developed. The time-dependent density matrix equations are solved numerically for the fs CARS process.

LWA3 • 9:00 a.m.
Measurements of Nitric Oxide Using Single-Shot, Midband Electronic-Resonance-Enhanced Coherent Anti-Stokes Raman Scattering (ERE-CARS) Vibrational Spectroscopy, *Ning Chai[1], Sameer V. Naik[1], Robert P. Lucht[1], Normand M. Laurendeau[1], Sukesh Roy[2], James R. Gord[3]; [1]Purdue Univ., USA, [2]Innovative Scientific Solutions Inc., USA, [3]AFRL, USA.* Development of a single-laser-shot technique for acquiring electronic-resonance-enhanced (ERE) coherent anti-Stokes Raman scattering (CARS) spectra of nitric oxide (NO) is reported. Single-shot vibrational spectra are measured in an atmospheric pressure, room-temperature jet of NO.

LWA4 • 9:20 a.m.
Effects of Collisions on Time-Delayed Picosecond Coherent Anti-Stokes Raman Scattering (ps-CARS) Spectroscopy, *James R. Gord[1], Paul Hsu[2], Sukesh Roy[2]; [1]AFRL, USA, [2]Innovative Scientific Solutions Inc., USA.* The effects of collisions on the temperatures measured using time-delayed ps-CARS are investigated. In ps-CARS the probe beam is delayed wrt the pump and Stokes beams to suppress the nonresonant background.

LWA5 • 9:40 a.m.
Three-Laser Dual-Pump Vibrational and Pure Rotational CARS for Temperature and Multi-Species Measurements, *Thomas Seeger, Markus C. Weikl, Alfred Leipertz; Univ. Erlangen-Nürnberg, Germany.* The further development of a dual-pump vibrational CARS setup into a dual-pump dual-broadband CARS setup by using only one detection system is presented. Measurements were taken in a partially premixed propane flame.

St. Petersburg Ballroom
10:00 a.m.–10:30 a.m.
Coffee Break

St. Petersburg Ballroom
10:00 a.m.–4:00 p.m.
Exhibits Open

LWB • Combustion Imaging

Williams/Demens Room
10:30 a.m.–12:30 p.m.
LWB • Combustion Imaging
Terrence Meyer; Iowa State Univ., USA, Presider

LWB1 • 10:30 a.m. **Invited**
Micro-Invasive LIF Diagnostics in Engines, *Frank Zimmermann[1], Christopher Gessenhardt[1], René Reichle[2], Christof Pruss[2], Christof Schulz[1]; [1]Univ. of Duisburg-Essen, Germany, [2]ITO, Univ. of Stuttgart, Germany.* Laser-based diagnostics are well established in engine research. The requirement of large-scale optical accesses makes the application expensive. Miniaturized specific endoscopes combining refractive and diffractive optics show a huge potential to overcome these restrictions.

LWB2 • 11:10 a.m.
Cinematographic Laser Combustion Diagnostics, *Christof Kittler[1], Benjamin Böehm[1], Isaac Boxx[2], Wolfgang Meier[2], Andreas M. Dreizler[1]; [1]Technischeu Univ. Darmstadt, Germany, [2]DLR Stuttgart, Germany.* Cinematographic PIV and OH PLIF operated at repetition rates up to 5 kHz are applied simultaneously to identify flow structures that entail extinction in a turbulent opposed jet flame.

LWB3 • 11:30 a.m.
Interference-Free Laser-Induced Fluorescence Imaging of Atomic Hydrogen in Flames, *Waruna D. Kulatilaka, Brian D. Patterson, Jonathan H. Frank, Thomas B. Settersten; Sandia Natl. Labs, USA.* We investigate two-photon laser-induced fluorescence imaging of atomic hydrogen in premixed flames using picosecond- and nanosecond-duration laser pulses. Picosecond excitation produces significantly larger signals for interference-free detection in $CH_4/O_2/N_2$ and H_2/O_2 flames.

LWB4 • 11:50 a.m.
High-Speed UV Particle Image Velocimetry, *Claudia M. Fajardo, Volker Sick; Univ. of Michigan, USA.* Turbulence studies in engines require velocity data at rates that resolve relevant time scales. An ultra-violet particle image velocimetry technique was devised and applied to a fired engine to capture velocity maps at 6 kHz.

LWB5 • 12:10 p.m.
Thermometry of Surfaces: Application of a High Speed Camera as a Detector for Laser-Induced Phosphorescence, *Thilo Kissel, Jan Brübach, Andreas Dreizler; Inst. for Energy and Powerplant Technology, Darmstadt Univ. of Technology, Germany.* This study demonstrates the use of CMOS high speed camera systems for two-dimensional surface phosphor thermometry. Using Mg_4FGeO_6 : Mn, a temperature map of a generic system was determined.

12:30 p.m.–1:30 p.m.
Lunch Break

LWC • New Spectroscopic Approaches for Combustion Diagnostics

Williams/Demens Room
1:30 p.m.–3:30 p.m.
LWC • New Spectroscopic Approaches for Combustion Diagnostics
Andreas M. Dreizler; TU Darmstadt, Germany, Presider

LWC1 • 1:30 p.m. Invited
Designs and Applications of Hyperspectral Light Sources, *Scott T. Sanders; Univ. of Wisconsin at Madison, USA.* A time-division multiplexed source that cycles through 19 wavelengths every 15µs will be described. Sensing results using this and similar sources will follow, including gas thermometry at 100kHz with a precision of 4K at 2000K.

LWC2 • 2:10 p.m.
Mid-Infrared Gas Sensing for Combustion Applications, *Jay B. Jeffries, Adam E. Klingbeil, Ethan A. Barbour, Aamir Farooq, Ronald K. Hanson; Stanford Univ., USA.* Progress is reported in the use of room-temperature, wavelength-tunable, solid-state mid-infrared laser sensors for combustion and propulsion applications. Diverse uses range from combustion chemistry studies in shock-heated flows to pulse-detonation engines.

LWC3 • 2:30 p.m.
Detection of HCl in a Premixed $H_2/O_2/Ar$ flame Seeded with $CHCl_3$ Using mid-IR Polarization Spectroscopy, *Zhongshan Li[1], Zhiwei Sun[1], Bo Li[1], Marcus Aldén[1], Mikael Försth[2]; [1]Lund Univ., Sweden, [2]SP Technical Res. Inst. of Sweden, Sweden.* Mid-infrared polarization spectroscopy was applied to detect HCl at trace level in an atmospheric pressure premixed $H_2/O_2/Ar$ flame with chloroform seeding. Detection sensitivity and potential interference from water lines was investigated.

LWC4 • 2:50 p.m.
Ultra High Sensitivity Detection of NO Photo-Fragments by Radar REMPI, *Richard B. Miles, Zhili Zhang, Sohail Zaidi, Mikhail Shneider; Princeton Univ., USA.* A new standoff diagnostic technique, Radar REMPI, is used to measure trace concentrations of NO for the detection of explosive material vapors by photo-fragmentation. Avalanche enhancement can increase the signal by orders of magnitude.

LWC5 • 3:10 p.m.
Development of a Picosecond-LIDAR System for Combustion Diagnostics, *Billy Kaldvee, Andreas Ehn, Joakim Bood, Marcus Aldén; Lund Univ., Sweden.* A picosecond-LIDAR system aiming at diagnostics in large-scale combustion devices is developed and characterized. This LIDAR system, using 30 ps Nd:YAG-pulses, has been demonstrated for single-ended measurements on gaseous acetone.

St. Petersburg Ballroom
3:30 p.m.–4:00 p.m.
Coffee Break

• Thursday, March 20, 2008 •

Conference Registration
7:30 a.m.–3:30 p.m.
Registration Open

LThA • Biothreat Detection

Williams/Demens Room
8:00 a.m.–10:00 a.m.
LThA • Biothreat Detection
René Beigang; Kaiserslautern Technical Univ., Germany, Presider

LThA1 • 8:00 a.m. **Invited**
Applications of Raman and Surface-Enhanced Raman Spectroscopy (SERS) to Bacterial Identification, *Steven Christesen[1], Jason Guicheteau[1], Darren Emge[1], Leanne Argue[1], Ashish Tripathi[2], Rabih Jabbour[2]; [1]US Army Edgewood Chemical Biological Ctr., USA, [2]Science Applications Intl. Corp., USA.* Principal component analysis (PCA) of the normal Raman and surface-enhanced Raman (SER) spectra provides species level identification of bacteria. SERS provides improved discrimination over normal Raman.

LThA2 • 8:40 a.m.
Cytometric Measurement of Fluorogenically Stained Hydrosols as a Rapid Biothreat Confirmer, *Robert W. Crocker, Scott E. Bisson, Thomas A. Reichardt, Thomas J. Kulp; Sandia Natl. Labs, USA.* We present an orthogonal detection method to be used as a secondary confirmation of alarms generated by a single-particle laser-induced fluorescence-based (LIF) sensor. This method measures the protein content of collected particles using fluorescamine stain.

LThA3 • 9:00 a.m.
Phage-Based Opto-Fluidic Ring Resonator for Label-Free Biomolecule Detection, *Hongying Zhu, Ian M. White, Jonathan D. Suter, Xudong Fan; Univ. of Missouri at Columbia, USA.* Opto-fluidic ring resonators (OFRR) integrate microfluidics with state-of-the-art photonics sensing technology. Here we developed a label-free OFRR biosensor with bacteriophage as a biorecognition probe for streptavidin detection. A detection limit of 0.17 nM was achieved.

LThA4 • 9:20 a.m.
Classification and Selective Collection of Individual Aerosol Particles Using Laser-Induced Fluorescence, *Vasanthi Sivaprakasam[1], John Tucker[1], Wells Jacobson[1], Jay Eversole[1], Timothy Pletcher[2], Joseph Mcginn[2], David Keller[2]; [1]NRL, USA, [2]Sarnoff Corp., USA.* Spectral measurements of aerosol particles excited by two wavelengths provide information that can trigger selective separation and collection of specific (bioaerosol) particles onto a substrate by means of electrostatic charging for subsequent analysis and identification.

LThA5 • 9:40 a.m.
UV Absorption and Fluorescence Lifetime Measurements of DPA-Tb for Bacterial Spore Detection, *Anali Makoui, Dennis K. Killinger; Univ. of South Florida, USA.* Using a pulsed 266nm laser and a CW lamp (200nm-2062nm), the fluorescence lifetimes and absorbance spectra of terbium doped dipicolinate in different solvents have been measured as a function of their concentrations.

Foyer
10:00 a.m.–10:30 a.m.
Coffee Break

LThB • Explosives Detection and Imaging

Williams/Demens Room
10:30 a.m.–12:30 p.m.
LThB • Explosives Detection and Imaging
Jay D. Eversole; NRL, USA, Presider

LThB1 • 10:30 a.m. **Invited**
Standoff Raman Hyperspectral Imaging Detection of Explosives, *Patrick J. Treado, Matthew P. Nelson, Robert Schweitzer, Charles Gardner, Rachel Wentworth; ChemImage Corp., USA.* Optical standoff detection of hazardous materials has been developed that combines hyperspectral IR imaging, Raman imaging and laser induced breakdown spectroscopy. Sensor characteristics will be presented.

LThB2 • 11:10 a.m.
Detection of Chemicals at a Standoff >10 m Distance Based on Single-Beam Coherent Anti-Stokes Raman Scattering, *Haowen Li[1], D. Ahmasi Harris[2], Bingwei Xu[2], Paul J. Wrzesinski[2], Vadim V. Lozovoy[2], Marcos Dantus[2]; [1]BioPhotonic Solutions Inc., USA, [2]Dept. of Chemistry, Michigan State Univ., USA.* We report the standoff detection of chemicals using a single-beam coherent anti-Stokes Raman scattering (CARS) technique. Characteristic Raman lines for several chemicals were successfully obtained from a 12 m standoff distance.

LThB3 • 11:30 a.m.
A New Photonic Sensor Device for TATP Detection, *Christoph Bauer[1], Ulrike Willer[1,2], Andreas Pohlkötter[2], Ashwini Kumar Sharma[2], Wolfgang Schade[1,2]; [1]Laser Application Ctr., Technische Univ. Clausthal, Germany, [2]Inst. für Physik und Physikalische Technologien, Technische Univ. Clausthal, Germany.* Tunable QCLs are used for chemical sensing. Different laser types are combined with a novel photon momentum detector which allows a low cost fiber coupled setup for security and environmental applications.

LThB4 • 11:50 a.m.
Developing a Laser-Based Ionization Approach for Detecting Explosives with Ion Mobility Spectrometry, *Jeffrey M. Headrick[1], Thomas A. Reichardt[1], Ray P. Bambha[1], Jude A. Kelley[2], Kent B. Pfeifer[1], Francis A. Bouchier[1]; [1]Sandia Natl. Labs, USA, [2]Chemistry Dept., College of the Holy Cross, USA.* Rotationally resolved resonance-enhanced multiphoton ionization (REMPI) spectra of the NO photofragment from nitrobenzene have been observed for the $A\ ^2\Sigma^+$ - $X\ ^2\Pi$ (1, 0) transition. These spectra were collected in an atmospheric-pressure nitrogen bath.

LThB5 • 12:10 p.m.
Remote Sensing of Explosive Related Gases Using cw CO_2 DIAL Lidar, *Avishekh Pal[1], Dennis K. Killinger[1], Michael Sigman[2]; [1]Univ. of South Florida, USA, [2]Univ. of Central Florida, USA.* A cw CO_2 Laser differential absorption lidar system has been developed to test remote sensing of few specialized gases related to explosives. The concentration of several gases including SF_6 and TATP were measured.

12:30 p.m.–1:30 p.m.
Lunch Break

LThC • LIBS and Explosives Detection

Williams/Demens Room
1:30 p.m.–3:30 p.m.
LThC • LIBS and Explosives Detection
Wolfgang Schade; Technische Univ. Clausthal, Germany, Presider

LThC1 • 1:30 p.m. **Invited**
Recent Progess in LIBS-Based Technologies for Security Applications, *Andrzej Miziolek, F. C. DeLucia, C. A. Munson, J. L. Gottfried; ARL, USA.* Laser Induced Breakdown Spectroscopy (LIBS) is an emerging technology that has great potential for a wide variety of civilian and military applications. Recent history and progress of LIBS will be presented.

LThC2 • 2:10 p.m.
Molecular and Atomic Emission in Femtosecond and Nanosecond LIBS of Explosives on Surfaces, *James B. Spicer, Caroline McEnnis; Johns Hopkins Univ., USA.* Laser-induced breakdown spectroscopy (LIBS) is sensitive to explosives on substrates. LIBS results show that species fragmentation is highest for nanosecond irradiation of explosives on metal substrates while molecular fragment emission is enhanced under femtosecond excitation.

LThC3 • 2:30 p.m.
Fiber Coupled LIBS Sensor for Security Applications, *Wolfgang Schippers[1], Christian Bohling[2], Konrad Hohmann[1], Gerhard Holl[3], Wolfgang Schade[1]; [1]Laser Application Ctr., Technische Univ. Clausthal, Germany, [2]SECOPTA GmbH, Germany, [3]Wehrwissenschaftliches Inst. für Werk- Explosiv- und Betriebsstoffe, Germany.* A compact fiber coupled laser induced breakdown spectroscopy (LIBS) sensor is presented. The detection of hazardous materials, e.g. explosives and land mines are promising applications of such a system.

LThC4 • 2:50 p.m.
Enhancement of 266 nm Laser Induced LIBS Emission Using a Simultaneous 10.6-µm CO_2 Laser Pulse, *Robert D. Waterbury[1], Avishekh Pal[2], Dennis K. Killinger[2], Jeremy Rose[1], Edwin L. Dottery[1]; [1]Alakai Consulting & Engineering Inc., USA, [2]Univ. of South Florida, USA.* A Deep-UV Eye-Safe LIBS system has been constructed for standoff detection. A Q-Switched Nd:YAG Laser operating at 266nm was used for plasma generation. A simultaneous CO_2 laser was used to enhance the LIBS signal.

LThC5 • 3:10 p.m.
Thermodynamic Properties of a Nd:YAG-CO2 Double Pulse Laser-Induced Plasma and Its Applications under Stand-Off Conditions, *Matthew Weidman, Santiago Palanco, Martin Richardson; Univ. of Central Florida, USA.* The effects of CO_2 plasma reheating are presented under low-irradiance conditions typical of stand-off laser-induced breakdown spectroscopy. The mechanisms and possible applications of the technique for enhancing stand-off measurements are discussed.

Williams/Demens Room
3:30 p.m.–3:40 p.m.
LACSEA Closing Remarks

Key to Authors and Presiders
(**Bold** denotes Presider or Presenting Author)

Laser Applications to Chemical, Security and Environmental Analysis (LACSEA) Postdeadline Paper Abstracts

•Monday, March 17, 2008•

JMA • Joint DH and LACSEA Poster Session

Foyer
4:00 p.m.–6:00 p.m.
JMA • Joint DH and LACSEA Poster Session

PDPJMA9
Photonic-Crystal-Fiber Raman Spectroscopy for Real-Time, Gas-Composition Analysis, *Michael P. Buric[1,2], Kevin P. Chen[1,2], Joel Falk[1,2], Steven D. Woodruff[1]; [1]Natl. Energy Technology Lab, USA, [2]Dept. of Electrical and Computer Engineering, Univ. of Pittsburgh, USA.* Raman spectroscopy in a hollow-core, photonic crystal fiber is reported. The fiber is used as the sample cell and the Stokes light collector. Raman signals were observed for major species in air and natural gas.

PDPJMA10
Simultaneous Detection of Exhaled NO and CO_2 with a cw Quantum Cascade Laser-Based Spectrometer, *Simona M. Cristescu, Stefan T. Persijn, Frans J. M. Harren; Radboud Univ., Netherlands.* We report on recent progress on continuous-wave quantum cascade laser (QCL)-based spectrometer using wavelength modulation for detection of nitric oxide (NO) and carbon dioxide in breath. Comparison is made with a standard chemiluminescence instrument.

PDPJMA11
High Precision Analysis of NO and CO from Human Breath and Blood Samples via MIR Laser Spectroscopy, *Thomas Fritsch, Kathrin Heinrich, Marcus Sowa, Peter Hering, Manfred Mürtz; Univ. of Düsseldorf, Germany.* Cavity Leak-Out Spectroscopy is a potent method to detect NO and CO from breath and blood which doesn't need to fear the comparison to gold standard techniques. Applications of this technique are discussed.

PDPJMA12
Laser Assisted Microwave Plasma Spectroscopy (LAMPS) Applied to Commercial Applications, Environmental Analysis and Homeland Security, *Phillip Efthimion[1], Robert Kearton[2]; [1]Envimetrics, USA, [2]Ocean Optics, USA.* Presentation describes the application of microwaves to a laser generated plasma for elemental analysis. The process called LAMPS (laser assisted microwave plasma spectroscopy) prolongs and grows the plasma leading to greatly increased sensitivities.

PDPJMA13
Quantitative Trace Gas Sensing with Mid-Infrared Difference Frequency Generation Lasers, *James J. Scherer, Joshua B. Paul, Hans-Jürg Jost; NovaWave Technologies Inc., USA.* Difference frequency generation lasers offer immediate access to the O-H, N-H and CH stretch region between 3-4 micron that is particularly suited for sensing of key greenhouse and other atmospheric trace gases.

PDPJMA14
Design of a Confocal Raman Microscope, *J. Houston Miller[1], Toni K. Laurila[2], Clemens F. Kaminski[2]; [1]George Washington Univ., USA, [2]Cambridge Univ., UK.* This report concerns the design and construction of an open-frame, inverted, combined wide-field and Raman microscope using readily available optical mounting hardware. Demonstration of the collection of solution spectra and Raman images are presented.

PDPJMA15
Information Content of Spectral Depolarization in Scattering Measurements, *Lin Ma, Weiwei Cai, Yan Zhao; Clemson Univ., USA.* A method is developed to analyze the information content of spectral depolarization in scattering measurements. Applications of this method to the detection of airborne biological agents and energetic nanoparticles will be discussed.

Key to Authors
(**Bold** Denotes Presenting Author)