



6th International Conference on Laser-Induced Breakdown Spectroscopy



September 13-17, 2010
Memphis, TN., USA

PROGRAM & ABSTRACTS

Organized by



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UNIVERSITY™**

“The views, opinions, and/or findings contained in this report are those of the author(s) and should not be construed as an official Department of the Army position, policy, or decision, unless so designated by other documentation.”

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WELCOME

Dear All:

On behalf of the International Scientific and Organizing Committees of the “*Laser Induced Breakdown Spectroscopy (LIBS) 2010*” symposium, we would like to welcome all to Memphis, TN, United States of America.

At the outset, we would like to thank you for attending “**LIBS 2010**” and we hope you will enjoy the conference’s technical and social programs. The symposium is organized by Mississippi State University with wonderful cooperation and support received from academic, government, industrial laboratories, and companies engaged in research and development of LIBS.

LIBS 2010 continues the tradition of previous LIBS conferences held in 2000 (Pisa, Italy), 2002 (Orlando, USA), 2004 (Malaga, Spain), 2006 (Montreal, Canada) and 2008 (Berlin, Germany), encompassing all aspects related to research, development, and applications of laser induced plasma spectroscopy.

LIBS 2010 will focus on scientific and commercial developments as well as applications of Laser Induced Breakdown Spectroscopy. It will bring together experts and young researchers in the field, specialists from analytical laboratories, and engineers from industry concerned with applications and instrumental development to examine recent progress and to define the needs. After introduction by invited speakers, new developments and results will be presented in oral and poster presentations. To facilitate scientific exchanges, posters will be displayed during the whole duration of the symposium. A technical exhibition will present new developments in LIBS hardware, instrumentation, and related products during the whole symposium. Participation of young researchers will be stimulated by a reduction in the registration fees and the awarding of special young researcher's awards. The contributions presented at LIBS 2010 will be published after peer review in a special issue of *Analytical and Bioanalytical Chemistry*.

A social program for accompanying persons and conference attendees will be offered including a welcome reception and cruise dinner on the Mississippi River.

Finally we gratefully acknowledge financial support from the U.S. Army Research Laboratory, the U.S. Army Research Office, the U.S. Department of Energy and all the sponsors, and thank the institutions and individuals (including member of organizing committee and the international scientific committee) who worked diligently to bring together the necessary conditions for a successful symposium.

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U. Panne
Vice-Chair

J. Almirall
Vice-Chair

A. Miziolek
Vice-Chair

M. Sabsabi
Vice-Chair

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General Information

Oral presentation instructions

Regular oral presentations are limited to a total of 20 minutes, including approximately 5 minutes for questions and discussion. All speakers are requested to meet with their session chair 15 minutes before the start of their session. The conference room will be equipped with laptop computer (with MS Windows, MS PowerPoint, CD reader, and a USB port) and laser pointers. Speakers are invited to download their presentation onto the conference room computer before the beginning of their session. Because of severe time constraints, it is not possible to use a speaker's own laptop computer.

Poster instructions

The poster session will be held in the Pre-Function area on Wednesday, September 15th from 14:05 to 17:05 and Thursday, September 16th from 14:05 to 16:45. Poster presentations are to be set up between 12:00 and 14:00 on same day. Four-foot (1.2-m) high by four-foot (1.2-m) wide poster boards will be provided. Push pins will be available for attaching the poster presentation to the backdrop. Your poster should have the name and local phone number of the presenting author displayed in case someone wishes to contact you while at the conference. The three best student papers will be selected for prizes. The winners will be announced at the river cruise dinner.

Internet facility

The hotel has a free, high-speed Internet facility. An Internet facility and computer will also be made available for attendees in the hotel business center.

Registration

Sunday: 12 September 2010 from 18:30 to 22:00, Location: Pre-Function Area

Monday- Thursday: 13-16 September 2010 from 7:00 to 10:00, Location: Pre-Function Area

Welcome reception

A welcome reception will be held in the Chelsea room and Pre-Function Area on Monday, September 13th from 19:00 to 21:30.

Exhibition

A technical exhibition will present new developments in LIBS instrumentation and related products. It will be held from September 13-17. The exhibition will be located in the Chelsea room, and will offer excellent visibility and discussion opportunities.

Banquet

There will be a river cruise dinner on Thursday, September 16th, 2010.

18:00 Start from Hotel

18:30 Boarding

21:30 Return to Port

Only full registration includes a dinner ticket. If you or your spouse wishes to participate, you must purchase a ticket before Wednesday, September 15th, 17:00 (5:00 PM).

Exhibitors/Sponsors



www.icet.msstate.edu



www.msstate.edu/dept/cas/



<http://www.engr.msstate.edu/>



www.research.msstate.edu

LIBS 2010 includes following exhibitor and vendors that bring together leading suppliers for the LIBS community.



www.oceanoptics.com



www.litronlasers.com



www.photon-machines.com



www.catalinasci.com



<http://www.appliedphotonics.co.uk>



<http://www.quantel-laser.com>



<http://www.appliedspectra.com/>



<http://www.avantes.com/>



<http://www.er-co.com/>



<http://www.rpmclasers.com/index.htm>



<http://www.newfolderconsulting.com/>



<http://www.ltb-berlin.de/>

Summary of Events

Time	Monday September 13	Time	Tuesday September 14	Wednesday September 15	Thursday September 16	Friday September 17
08:30-09:30	Short Course 1 Fundamentals A. Giacomo	08:30-8:55	Session 3 Security and Forensics Chair: D.Cremers IL: F. Delucia	Session 7 Instrumentation/ Commercialisation Chair: A.W. Miziolek IL: A. Whitehouse	Session 10 Analysis Chair: J. Laserna IL: R. Zheng	Session 13 Biomedical Chair: M.A. Harith IL: S. Rehse
09:30-09:45	Break					
09:45-10:45	Short Course 2 Instrumentations M. Sabsabi/ Bonner Denton	08:55-9:20	IL: M. Richardson	IL: S. Laville	IL: V. Lazic	IL: J. Almirall
		09:20-09:40	J. Gottfried	R. DeSaro	K. Lim	S. Yalcin
10:45-11:00	Break	09:40-10:00	A. Ford	M. Hohse	J. Jain	A. Eldakrouri
		10:00-10:20	Break	Break	Break	Break
11:00-12:00	Short Course 3 Applications Steve Buckley	10:20-10:45	Session 4 Industrial Chair: M. Martin IL: M. Sabsabi	Session 8 Aerosol and Environment Chair: K. Kagawa IL: F. Krug	Session 11 Analysis Chair: N. Melikechi IL: P. Mauchain	Session 14 Hyphenated Techniques Chair: S.Rehse IL: R. Wiens
12:00-13:50	Lunch	10:45-11:10	IL: A. Bauer	IL: N. McMillan	IL: R. Thareja	IL: J. Laserna
		11:10-11:30	G. Gallou	D. Hahn	S. Koch	Y. Ikeda
13:50-14:05	Opening and Welcome	11:30-11:50	Z. Lie	A. K. Rai	G. Kumar	W. Neu
		11:50-12:10	J. Pedarnig	W. Zhou	Z. Lin	P. C. Chu
14:05-14:30	Session 1 Security and Forensics Chair: R. Harmon IL: D. Cremers	14:00-14:25	Session 5 Applications Chair: F. J. Krug IL: R. Harmon	Poster Session 1 Chairmen: M. Sabsabi S. Rehse V. Lazic J. Laserna	Poster Session 2 Chairman: M. Sabsabi S. Rehse V. Lazic J. Laserna	Closing Remarks
14:55-15:15	R. Multari	14:50-15:10	M. Gaft			
15:15-15:35	V. Motto-Ros	15:10-15:30	A. Miziolek			
15:35-15:55	Break	15:30-15:50	Break	Break		
15:55-16:20	Session 2 Basics Chair: D. Hahn IL: C. Parigger	15:50-16:15	Session 6 Applications Chair: F. Delucia IL: K. Kagawa	Poster Session 1 (cont.)	Poster Session 2 (cont.)	
16:20-16:45	IL: P. Dagdigian	16:15-16:40	IL: M. Harith			
16:45-17:05	G. Clair	16:40-17:00	W. Hubert	Session 9 10 Yrs Celebration V. Palleschi, J.J. Laserna; A. Miziolek M. Sabsabi; U. Panne; J.P. Singh	Session 12 Panel Discussion Advanced Spectral Data Analysis Moderator: A. Miziolek	
17:05-17:25	I. Gornushkin	17:00-17:20	Z. Cui			
17:25-17:45	J. Lu	17:20-17:40	P. Yaroshchyk			
17:45-18:05	K. Morton					
19:00-21:30	Vendor Session and Welcome Cocktail	17:40-18:00	S. Choi	Banquet- Cruise Dinner		
		18:00-22:00 (Hotel)				

Technical Program: LIBS 2010

Monday 13 September 2010	
Short Courses	
	Session Chairman: A.W. Miziolek, US Army Research Laboratory, RDRL-WML-A, Aberdeen Proving Ground, MD 21005-5069, USA
08:30-09:30	Short Course 1: Fundamentals A. Giacomo, Department of Chemistry, University of Bari, Via Orabona 4, 70126 Bari-ITALY
09:30-09:45	Break
09:45-10:45	Short Course 2: Instrumentations M. Sabsabi, National Research Council of Canada, Boucherville, Canada Bonner Benton, Department of Chemistry, University of Arizona, Tucson AZ 85721
10:45-11:00	Break
11:00-12:00	Short Course 3: Applications S.G. Buckley, Photon Machines, Inc., 15377 NE 90th St., Redmond WA 98052, USA
12:00-13:50	Lunch
13:50-14:05	Opening and Welcome
Session 1: Security and Forensics	
	Session Chairman: R. Harmon, ARL Army Research Office, USA
14:05-14:30	Invited Lecture: Development of LIBS Instruments to Address CBRNE Threats <u>David Cremers</u> , Applied Research Associates, Inc., Suite A-220 4300 San Mateo Blvd. NE, Albuquerque, NM 87110-1295 USA
14:30-14:55	Invited Lecture: Nuclear Materials Analysis using Laser-Induced Breakdown Spectroscopy <u>Madhavi Martin</u> , Steve Allman, Rodger C. Martin, Environmental Sciences Division, Oak Ridge National Laboratory, Oak Ridge, TN 37831
14:55-15:15	Chemometric Analysis of Laser-Induced Breakdown Spectroscopy (LIBS) Data to Differentiate Pathogen Species and Strains in Complex Matrices, Such as Blood Agar and Various Water Retentates <u>Rosalie Multari</u> , David A. Cremers, Melissa L. Bostian, JoAnne M. Dupre, John E. Gustafson, Applied Research Associates, Southwest Division, 4300 San Mateo Blvd. NE, Suite A-220, Albuquerque, NM 87110

15:15-15:35	<p>Identification of Glass Fragments Using Laser-Induced Breakdown Spectroscopy for Forensic Applications V. Motto-Ros¹, J. Bertrand¹, S. Lauper², D. Denis², Q. Ma¹, W. Lei¹, M. Boueri¹ and J. Yu¹ ¹ Université de Lyon, Université Lyon 1, CNRS, LASIM, 69622 Villeurbanne, France. ² Institut National de Police Scientifique, 31 avenue Franklin Roosevelt, 69134 Ecully, France</p>
15:35-15:55	Break
Session 2: Basics	
	Session Chairman: D. Hahn, University of Florida, Box 116300, Gainesville, FL 32611-6300, USA
15:55-16:20	<p>Invited Lecture: Stark Broadening of Hydrogen and Aluminum in Laser-Induced Breakdown Spectroscopy C. Parigger, The Univ. of Tennessee Space Inst., 411 B.H. Goethert Parkway, Tullahoma, TN 37388, USA</p>
16:20-16:45	<p>Invited Lecture: Kinetic Model of Atomic and Molecular Emissions in Laser-Induced Breakdown Spectroscopy of Organic Compounds P. Dagdigian, Department of Chemistry, Johns Hopkins University, 3400 N. Charles Street, Baltimore, MD 21218, USA</p>
16:45-17:05	<p>Modelling of Laser-Induced Plasmas Under LIBS Conditions in Nanosecond Regime G. Clair, D. L'Hermite, Commissariat à l'Energie Atomique et aux Energies Alternatives, CEA DEN-DANS/DPC/SCP/LRSI Bât. 467 PC 56, Gif-sur-Yvette 91191, FRANCE</p>
17:05-17:25	<p>Boltzmann Plot and Abel Inversion Methods for Plasma Diagnostics: Implications from Plasma Modeling I. Gornushkin, S. V. Shabanov, S. Merk, E. Tognoni, U. Panne, BAM, Federal Institute for Material Research, Richard-Willstaetter-Strasse 11, Berlin, 12489, GERMANY</p>
17:25-17:45	<p>Laser Induced Breakdown Spectroscopy for Directly Determining the Volatile Matter Content in Coal Jidong Lu, Meirong Dong, Shunchun Yao, Kai Chen, Jun Li, Junyan Li College of Electric Power, South China University of Technology, Wushan, Guangzhou, Guangdong, 510640 P. R. of China</p>
17:45-18:05	<p>Sparse Convolutional Bayesian Modeling of LIBS Spectra Kenneth Morton, Duke University, 129 Hudson Hall, Durham, NC 27708, USA</p>
19:00-21:30	Vendor Session and Welcome Cocktail Reception

Tuesday 14 September 2010	
Session 3: Security and Forensics	
	Session Chairman: D.A. Cremers, Applied Research Associates, Inc., Suite A-220, 4300 San Mateo Blvd. NE, Albuquerque, NM 87110-1295 USA
08:30-08:55	Invited Lecture: LIBS Characterization of Energetic Materials: Applications for the Army <u>F. Delucia</u> , Army Research Laboratories, AMSRD-ARL-WM-BD, Aberdeen Proving Ground, MD, USA
08:55-09:20	Invited Lecture: Fundamental Considerations for an Efficient Application of LIBS in Forensics and Security M. Richardson, Matthieu Baudelet, Michael E. Sigman University of Central Florida - CREOL, 4000 Central Florida Blvd, Bldg 53, Orlando, 32816-2700 Florida USA
09:20-09:40	Discrimination of Biological and Chemical Threat Simulants in Residue Mixtures on Multiple Substrates J. Gofffried, U.S. Army Research Laboratory, Aberdeen Proving Ground, MD 21005-5069
09:40-10:00	Chemometrics and Plasma Analysis for a Combined Enhanced LIBS/Raman System <u>Alan Ford</u> , Tom Blank, Robert Waterbury, Jeremy Rose, Troy McVay, Ken Pohl, Edwin Dottery, Alakai Defense Systems, 197 Replacement Ave, Suite 105, Fort Leonard Wood, MO 65473
10:00-10:20	Break
Session 4: Industrial	
	Session Chairman: M. Martin, Oak Ridge National Laboratory, Oak Ridge, TN 378931-6038 USA
10:20-10:45	Invited Lecture: Low-Cost Portable LIBS System for Liquid Analysis <u>M. Sabsabi</u> , Paul Bouchard, René Héon, François Doucet, Jean-François Gravel, National Research Council Canada - Industrial Materials Institute, 75 de Mortagne Blvd, Boucherville, Québec J4B 6Y4, CANADA
10:45-11:10	Invited Lecture: Spark-Induced Breakdown Spectroscopy - A Traditional Analytical Tool, Modernized <u>A. Bauer</u> , Applied Research Associates, 10720 Bradford Road, Suite 110, Littleton, CO 80127, USA
11:10-11:30	Quantitative Analysis by LIBS of Aerosols Emitted by Industrial Sources: Laboratory and <i>InSitu</i> Measurements <u>G. Gallou</u> , JB. Sirven, C. Dutouquet, O. Le Bihan, E. Frejafon, CEA, DEN, Department of Physical Chemistry, F-91191 Gif-sur-Yvette, France

11:30-11:50	<p>Highly Sensitive Analysis of Hydrogen in Metal Sample Using Selective Detection Method in TEA CO₂ Laser-Induced He Gas Plasma by Utilizing Effective Techniques to Suppress H Emission from H₂O</p> <p><u>Z. Lie</u>, Ali Khumaeni, Hideaki Niki, Kazuyoshi Kurihara, Ken-ichi Fukumoto, Kiichiro Kagawa, Program of Nuclear Power and Energy Safety Engineering, Graduate School of Engineering, University of Fukui, Fukui 910-8507, JAPAN</p>
11:50-12:10	<p>Quantitative Determination of Element Concentration in Industrial Oxide Materials by Laser-Induced Breakdown Spectroscopy</p> <p>B. Praher, R. Rössler, E. Arenholz, J. Heitz, <u>J. Pedarnig</u>, Johannes Kepler University Linz, Altenbergerstrasse 69, Linz, A4040, Austria, EUROPE</p>
12:10-14:00	Lunch Break
Session 5: Applications	
	Session Chairmen: F.J. Krug, Centro de Energia Nuclear na Agricultura, Universidade de São Paulo, Piracicaba, Brazil
14:00-14:25	<p>Invited Lecture: The Effects of LIBS Laser Wavelength on the Identification of Obsidian Artifact Provenance</p> <p>R. Harmon, Army Research Office, Research Triangle Park, NC, USA</p>
14:25-14:50	<p>Invited Lecture: Measurement of Atomic Data by Spectroscopic Characterization of Laser-Induced Plasmas</p> <p>C. Aragon, J. Manrique, J.A. Aguilera, Universidad Pública de Navarra, Departamento de Física, Campus de Arrosadía, E-31006 Pamplona, SPAIN</p>
14:50-15:10	<p>Laser Induced Breakdown Spectroscopy for Boron Minerals Online Sorting</p> <p>M. Gaft, L.Nagli, Y.Groisman, Tel Aviv University, Laser Distance Spectroscopy, 11 Granit St., Petah Tiqwa, 40514, ISRAELI</p>
15:10-15:30	<p>Progress and Challenges in Fielding LIBS Systems for Security and Protection</p> <p>A.Miziolek, US Army Research Laboratory, RDRL-WML-A, Aberdeen Proving Ground, MD 21005-5069, USA</p>
15:30-15:50	Break
Session 6: Applications	
	Session Chairman: F. Delucia, Army Research Laboratories, AMSRD-ARL-WM-BD, Aberdeen Proving Ground, MD, USA
15:50-16:15	<p>Invited Lecture: The Review on TEA CO₂ Laser-Induced Plasma and Its Application to Spectrochemical Analysis</p> <p>K. Kagawa, University of Fukui Bunkyo 3-9-1, Fukui 910-8507, JAPAN</p>
16:15-16:40	<p>Invited Lecture: Monitoring and Estimation of Heavy Elements in Industrial Wastewater During Remediation Adopting LIBS</p> <p>M. Abdelkreem, A. Elhassan, M. Abdelhamid, <u>M. Harith</u>, El-gama St. NILES- Cairo University, Giza 12221, EGYPT</p>

16:40-17:00	Elemental Misinterpretation in Automated Analysis of LIBS Spectra G. Ankerhold, <u>Waldemar Hübner</u> , RheinAhrCampus, University of Applied Sciences Koblenz, Suedallee 2, Remagen, Rhineland-Palatinate, 53424, GERMANY
17:00-17:20	Double Pulse Laser-Induced Breakdown Spectroscopy with Femtosecond Laser Pulses Jianmei Fan, Guanxin Yao, Xuehan Ji, Xianfeng Zheng, Xianyi Zhang, <u>Zhifeng Cui</u> , Anhui Normal University, Beijing East Road, Wuhu Anhui 241000, P R CHINA
17:20-17:40	Quantitative Geochemical Analysis and Measurement of Physical Properties of Mineral Ores using LIBS <u>P. Yaroshchuk</u> , S. Spencer, David Death, CSIRO, Lucas Heights Research Laboratories, 2234, Lucas Heights, AUSTRALIA
17:40-18:00	Double-Pulse LIBS for Signal Enhancement Applicable to Harsh Environments <u>S. Choi</u> , Jong H. Yoo, Seok-Hwan Lee, Jack J. Yoh, 302-213, Extreme Energy Laboratory, School of Mechanical and Aerospace Engineering, Seoul National University, Deahak-dong, Gwanak-gu, Seoul, SOUTH KOREA

Wednesday 15 September 2010	
Session 7: Instrumentation/Commercialization	
	Session Chairman: A. W. Miziolek, US Army Research Laboratory, RDRL-WML-A, Aberdeen Proving Ground, MD 21005-5069, USA
08:30-08:55	Invited Lecture: Field Applications of Stand-Off and Fiber-Optic LIBS- APL's Experience Over the Last 12 Years A.Whitehouse, Applied Photonics, Ltd., Unit 8, Carleton Business Park, Skipton Yorkshire, BD23 2DE, UNITED KINGDOM
08:55-09:20	Invited Lecture: Investigation of Resonance-Enhanced Laser-Induced Breakdown Spectroscopy for Analysis of Aluminum Alloys Stéphane Laville ¹ , Christian Goueguel ² , François Vidal ² , Mohamad Sabsabi ¹ and Mohamed Chaker ¹ , ¹ National Research Council of Canada, Industrial Materials Institute, 75 de Mortagne Blvd., Boucherville, Québec, Canada J4B 6Y4 ² INRS Énergie, Matériaux et Télécommunications, 1650 Lionel-Boulet Blvd, Varennes, Québec, Canada J3X 1S2.
09:20-09:40	Evaluation of the LIBSCAN LIBS Analyzer for Coal Property Measurements <u>Robert De Saro</u> , Joseph Craparo, Arel Weisberg, Samuel K. K. Lam Energy Research Co., 571-A Arthur Kill Rd., Staten Island, NY 10309
09:40-10:00	Diode Pumped Solid State Lasers: Portable Lasers with the Performance of Double Pulse LIBS M. Hohse, Bundesanstalt für Materialforschung und -prüfung (BAM) Fachgruppe I.4 "Prozessanalytik", Richard-Willstätter-Straße 11, 12489 Berlin GERMANY
10:00-10:30	Break
Session 8: Aerosol and Environment	
	Session Chair: K. Kagawa, Program of Nuclear Power and Energy Safety Engineering, Graduate School of Engineering, University of Fukui, Fukui 910-8507, Japan
10:20-10:45	Invited Lecture: Effect of Laser Focusing and Fluence on the Analysis of Pellets of Plant Materials by Laser Induced Breakdown Spectrometry F. Krug, Centro de Energia Nuclear na Agricultura, Universidade de Sao Paulo, Ave. Centenario 303, Piracicaba-SP, 13416-000, BRAZIL
10:45-11:10	Invited Lecture: Geosciences LIBS Applications of New Mexico State University <u>N. McMillan</u> , Kristen Yetter, Matthew Dawkins, New Mexico State University, Department of Geological Sciences, Box 30001, MSC 3AB, Las Cruces, NM 88003 USA

11:10-11:30	<p>The Role of Plasma-Particle Interactions in LIBS <u>D. Hahn</u>, Philip Jackson, Michael Asgill, Prasoon Diwakar Knox, Department of Mechanical & Aerospace Engineering, University of Florida, P.O. Box 116300, Gainesville, FL 32611-6300 USA</p>
11:30-11:50	<p>Variation of Heavy Metals in Water, Soil and Plants Using LIBS A.K. Rai, Professor of Physics, University of Allahabad, Allahabad 211002 INDIA</p>
11:50-12:10	<p>Laser Ablation Fast Pulse Discharge Plasma Spectroscopy Analysis of Trace Pb in Soil <u>W. Zhou</u>, , Kexue Li, The Institute of Information& Optics, Zhejiang Normal University, Jinhua, Zhejiang, 321004, CHINA</p>
12:10-14:00	Lunch Break
14:00-15:35	<p>Poster Session 1 Session Chairmen: M. Sabsabi, S. Rehse, V. Lazic, J. Laserna</p>
15:30-15:50	Break
15:50-17:00	Poster Session 1 (cont.)
Session 9: 10 Years Celebration	
17:05-19:00	<p>Session Chairmen: V. Palleschi, J.J. Laserna, A. Miziolek, M. Sabsabi, U. Panne, J.P. Singh</p>

Thursday 17 September 2010	
Session 10: Analysis	
	Session Chairman: J. Laserna, University of Malaga, Department of Analytical Chemistry, Malaga, 29071, SPAIN
08:30-08:55	Invited Lecture: Joint Analysis of Seawater by Laser Induced Breakdown Spectroscopy and Raman Spectroscopy Jinjia Guo, Ying Li, Kai Cheng, Shilei Zhong, Yuan Lu, <u>Ronger Zheng</u> Optics & Optoelectronics Lab., College of Information Science & Engineering, Ocean University of China, 238 Songling Road, Qingdao 266100, CHINA
08:55-09:20	Invited Lecture: LIBS on Water Droplets: Analysis of Aerosols and of Solid Samples Covered by the Droplets <u>V. Lazic</u> , L. A. Álvarez Trujillo, L. M. Tobaría, L. Caballin, A. González, J. J. Laserna Via Enrico Fermi 45, Frascati 00044, ITALY
09:20-09:40	Far-UV LIBS for Biological and Organic Samples <u>K. Lim</u> , Jason Eichenholz, Matthieu Baudalet, Martin Richardson, Townes Laser Institute – CREOL / University of Central Florida, The College of Optics and Photonics, 4000 Central Florida Boulevard, Orlando, FL 32816 USA
09:40-10:00	Comparison of LIBS and LA-ICP-MS Analytical Techniques for Geochemical Analysis J. Jain ¹ , Harvey Eastman ¹ , and Jagdish P Singh ² ¹ URS-Research & Engineering Services, National Energy Technology Laboratory (NETL), Pittsburgh, PA 15236, USA ² Institute for Clean Energy Technology, Mississippi State University, Starkville, MS 39759, USA
10:00-10:20	Break
Session 11: Analysis	
	Session Chairman: N. Melikechi, Center for Research and Education in Optical Sciences and Applications (CREOSA) Department of Physics and Pre- Engineering Delaware State University Delaware, PA, USA
10:20-10:45	Invited Lecture: LIBS Microprobe for Elemental Mapping in Solids at the Micron Scale <u>Patrick Mauchien</u> , Kevin Béranger, Nadège Caron, Lionel Gosmain, Jean Luc Lacour, Anne Terlain, DEN/DANS, CEA Saclay, 91191 GIF SUR YVETTE, France
10:45-11:10	Invited Lecture: Time Resolved Spectroscopic Investigations of Plastics Used for Casing of Hazardous Materials <u>Raj K Thareja</u> , D. Yadav Indian Institute of Technology Kanpur, Kanpur 208016 (UP), India

11:10-11:30	<p>Preliminary Studies on Laser Induced Break-Down Spectroscopy Applied to Historic Iron Alloys <u>S. Koch</u>, Walter Neu, W. Jahn, C. Jöhnk, U. Teubner , University of Applied Sciences, Fachhochschule Emden/Leer /Constantiaplatz, 426723 Emden / Room: T219, Emden, Lower Saxony, 26723, GERMANY</p>
11:30-11:50	<p>Stoichiometric Analysis of Nitrogen Compounds from LIBS Data of Non-Gated and Gated Spectrometers S. Sreedhar, S. Venugopal Rao, M. Ashwin Kumar, P. Prem Kiran, Surya .P. Tewari, <u>G. Kumar</u>, Advanced Centre of Research in High Energy Materials University of Hyderabad, Hyderabad 500046, INDIA</p>
11:50-12:10	<p>The Applied Research on Laser-induced Breakdown Spectroscopy at South Central University for Nationalities <u>Z. Lin</u>, Linmei Liu, Liang Chang, Fenglou Sun, Shunsheng Gong, Laboratory for Applied Laser Spectroscopy, College of Electrics and Information Engineering, South-central University for Nationalities, Wuhan, (430074), CHINA</p>
12:10-14:00	Lunch – ISC Meeting
14:00-15:30	<p>Poster Session 2 Session Chairmen: M. Sabsabi, S. Rehse, V. Lazic, J. Laserna</p>
15:30-15:50	Break
15:50-16:40	Poster Session 2 (cont.)
16:40-18:00	<p>Session 12: Panel Discussion- Advanced Spectral Data Analysis Moderator: A. Miziolek, Panelists: F. Doucet, R. Multari, S. Rehse, M. Sigman, P. Torrione</p>
18:00-22:00	Conference Banquet – Cruise Dinner Start (Hotel)

Friday 17 September 2010	
Session 13: Biomedical	
	Session Chairman: M.A. Harith, National Institute of Laser Enhanced Science, Cairo University, Giza, EGYPT
08:30-08:55	Invited Lecture: Toward the Use of LIBS for the Clinical Diagnosis of Disease-Causing Pathogens Steven J. Rehse ¹ , Qassem Mohaidat ¹ , Sunil Palchaudhuri ² , Hossein Salimnia ³ ¹ Wayne State University, Department of Physics & Astronomy ² Wayne State University, Department of Immunology & Microbiology ³ Detroit Medical Center University Laboratories
08:55-09:20	Invited Lecture: LIBS Strategies for Quantitative Analysis J. Almirall, International Forensic Research Institute, Florida International University, Modesto A. Maidique Campus Miami, FL, 33199, USA
09:20-09:40	Identification and Detection of Phosphorylated Proteins by Laser Induced Breakdown Spectroscopy <u>S. Yalcin</u> , N. Aras, Department of Chemistry, Faculty of Science, Izmir Institute of Technology, Urla/ Izmir / 35430 TURKEY
09:40-10:00	Laser Induced Plasma Spectroscopy (LIPS) for Diagnosing Breast Cancer A.Eldakrouri, College of Applied Medical Science, King Saud University, K.S.U, P.O. Box 10219 Zip code:11433,Riyadh SAUDIA ARABIA
10:00-10:20	Break
Session 14: Hyphenated Techniques	
	Session Chair: S. Rehse, , Department of Physics & Astronomy, Wayne State University, Detroit, MI 48201 USA
10:20-10:45	Invited Lecture: Proposed Remote Raman-LIBS Geochemical Exploration on the Surface of Venus <u>R. Wiens</u> , S. Clegg, S. Sharma, S. Maurice, M.D. Dyar, Los Alamos National Laboratory, Mail Stop D455, P.O. Box 1663, Los Alamos, NM 87545, USA
10:45-11:10	Invited Lecture: LIBS and Raman Spectroscopy of Explosives. Complementarity and Data Fusion Experiments on an Integrated Sensing Platform Javier Laserna, Department of Analytical Chemistry, University of Malaga, Malaga, Spain
11:10-11:30	Enhancement of Lifetime and Emission Intensity of LIBS by Locally Intensified Pulse Microwave <u>Y. Ikeda</u> , Masashi Kaneko, Ahsa Moon, Imagineering, Inc. #351 4-1-1 Fukada-cho, Nada, Kobe, JAPAN

11:30-11:50	Resonance Fluorescence Spectroscopy on Laser-Induced Plasmas – a Versatile Tool in Trace Analysis <u>W. Neu</u> , Hochschule Emden/Leer –University of Applied Sciences, Institute of Laser Technology, Constantiaplatz 4, Emden 26723, GERMANY
11:50-12:10	Laser-Excited Atomic Fluorescence of Desorbed Plume <u>P.C. Chu</u> , Wing Lam Yip, Nai Ho Cheung, Department of Physics, Hong Kong Baptist University, Kowloon Tong, HONG KONG
12:10-12:20	Closing Remarks

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M. Abdelkreem, A. Elhassan, M. Abdelhamid, M. A. Harith
Higher Technological Institute (HTI), 10th of Ramadan, Villa 30 , 7th Districts , 6th of October, 11234, Egypt
- P_2 Dynamics of C₂ Formation in Laser Produced Carbon Plasma in a Helium Environment**
Khaled Al-Shboul, M. Polek, D. Campos, S. S. Harilal, A. Hassanein
School of Nuclear Engineering and Center for Materials Under Extreme Environment, Purdue University, 400 Central Drive, West Lafayette, Indiana 47907
- P_3 Application of a High-Resolution Spectroscopy System to the Determination of Stark Broadening Parameters by LIBS**
José Antonio Aguilera, P.Vega, C.Aragón,
Universidad Pública de Navarra, Campus de Arrosadía, Pamplona, Navarra E-31006, Spain
- P_4 Follow Up of Treatment of Magnetite Nanoparticles Cellular Uptake in Colon Cancer Cell via Laser-Induced Breakdown Spectroscopy**
Ola Sayed Ahmed, Hisham Imam, Mona B. Mohamed, Abdel-Rahman Zekri, Tarek Eltiab, Hisham Shokeir, Mahmoud H Abdel-kader, Hussein M Khaled
National Cancer institute, Cairo University, El-kaser Elainee St., Cairo 12221, Egypt
- P_5 Diagnostics of Lead Plasmas Produced by Laser Ablation**
A. Alonso-Medina,
Departamento de Física Aplicada, EUIT Industrial Universidad Politécnica de Madrid (UPM), Ronda de Valencia 3, 28012 Madrid, Spain
- P_6 LIBS Characterization of ITER-Like Tiles Superficial Layers**
R.Fantoni, S. Almaviva, L.Caneve, F.Colao, G. Maddaluno
U.T. Fusione, Lab. Tecnologie Nucleari della Fusione, ENEA, CR Frascati,
Via Enrico Fermi 45, 00044 Frascati (RM) Italy
- P_7 The Use of a “Bullseye” Focal Distribution in a Dual-Pulse Arrangement for Efficient Interaction with Ejected Nanoparticles for Analytical LIBS**
Troy Anderson, John Bruce III, Dennis Alexander,
Electrical Engineering Department, University of Nebraska-Lincoln, Lincoln NE 68588-0511
- P_8 Quantitative Analysis of Slurry Sample by Laser Induced Breakdown Spectroscopy**
Krishna K. Ayyalasomayajula, Vivek Dikshit, Fang Yu Yueh, Jagdish P. Singh
Institute for Clean Energy Technology (ICET), Mississippi State University, Starkville MS 39759 USA

- P_9 Application of Laser induced Breakdown Spectroscopy for Carbon Quantification in Soil Samples**
Krishna K. Ayyalasomayajula, Vivek Dikshit, T. Miller, Fang Yu Yueh, Jagdish P. Singh, Fengxiang X. Han, Jinesh C Jain
Institute for Clean Energy Technology (ICET), Mississippi State University, Starkville MS 39759 USA
- P_10 Surface Analysis in the Submicron Range**
S. P. Banerjee, Zhijiang Chen, Yogesh Godwal, Ilya Utkin, Robert Fedosejevs
Dept. of Electrical & Computer Engineering, University of Alberta, Edmonton, AB, Canada.
- P_11 Spark-Induced Breakdown Spectroscopy for Elemental Analysis of Soil and the Development of a Fieldable Soil Carbon Monitor**
Morgan S. Schmidt, Keith Miller, Sagam Welch, Amy J. Ray Bauer,
University of Denver, Department of Chemistry, 2190 East Iliff Avenue, Room 204, Denver CO 80208
- P_12 Identification of Bacteria in Food Using UV LIBS**
Coutnee' Bell, Shreekumar Pillai, Cleon Barnett,
Department of Physical Sciences, Alabama State University, 915 S. Jackson St., Montgomery, AL 36101
- P_13 Diagnostics of Plasmas Produced by Laser Ablation of Fresh Vegetables**
Sid Ahmed Beldjilali, L. Mercadier, E. Mothe, W. L. Yip, J. Hermann,
Laboratoire Lasers, Plasmas et Procédés Photoniques, LP3 UMR 6182 CNRS -
Université Aix-Marseille II, Campus de Luminy, Case 917, F-13288 Marseille Cedex 9, France
- P_14 Organic Detection Using Chemcam, The First Interplanetary LIBS**
Jennifer Blank, A. M. Ollila, D. A. Cremers, C. P. McKay, H. E. Newsom, S. Maurice, S. M. Clegg, R. C. Wiens, and the ChemCam team
Carl Sagan Center for the Study of Life in the Universe, SETI Institute, 515 N. Whisman Rd, Mountain View CA 94043
- P_15 A Powerful Analytical Device Combining LIBS and Raman Spectroscopy**
Martijn Boerkamp, Léon van Dooren, Maria Sovago, Marijn Sandtke,
TNO Science & Industry, Stieltjesweg 1, Delft, Netherlands 2628 CK
- P_16 Low-Cost Portable LIBS System for Liquid Analysis**
Paul Bouchard, Mohamad Sabsabi, René Héon, François Doucet, Jean-François Gravel
Materials and Processes Diagnostics, Modelling and Diagnostics
Industrial Materials Institute, National Research Council Canada, 75, de Mortagne, Boucherville, Québec, Canada, J4B 6Y4
- P_17 Line-Core and Line-Wing Features in the Temperature-Dependent MgHe Photoabsorption Spectra**
L. Reggami, M. Bouledroua,
Laboratoire de Physique des Rayonnements, Physics, Department,
Badji Mokhtar University – Annaba, B.P. 12, Annaba 23000 , Algeria
- P_18 Spatial Distribution of LIBS Plasma Emission Using a Dual Pulse Arrangement**
John Bruce III, Troy Anderson, Dennis Alexander
University of Nebraska-Lincoln, 209N SEC, Lincoln, NE 68588

- P_19 Double-Pulsed Time-Resolved Plasma Characterization of Liquid Residues in Soil by LIBS**
A. Fernández-Bravo, P. Lucena, J.J. Laserna,
University of Malaga, Central research facilities - Laser laboratory, Analytical Chemistry Department, Bulevard Louis Pasteur, nº 33, 29071 Malaga (Spain)
- P_20 Time-Resolved Studies of Organic Materials by LIBS**
A. Fernández-Bravo, P. Lucena, J.J. Laserna,
University of Malaga, Central research facilities - Laser laboratory, Analytical Chemistry Department, Bulevard Louis Pasteur, nº 33, 29071 Malaga (Spain)
- P_21 A Study on Heavy Metals in Asian Dust Particles Using Aerosol Focusing-Laser Induced Breakdown Spectroscopy (AF-LIBS)**
Jihyun Kwak, Gibaek Kim, Kihong Park
Gwangju Institute of Science and Technology, 261 Cheomdan-gwagiro (Oryong-dong) Buk-gu, 500-712, Gwangju, Republic of Korea
- P_22 Pulsed Laser Ablation: Monitoring the Mass Removal by Acoustic Measurement**
Yue Cai, Nai Ho Cheung
Hong Kong Baptist University, SCT913, Science Tower, Kowloon Tong, HONG KONG
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D.K. Chauhan, D. K. Tripathi, Nilesh K. Rai, A. K. Rai,
Palaeobotany & Morphology Lab, Department of Botany, University of Allahabad, Allahabad, India
- P_24 Optimization of Laser-Induced Breakdown Spectroscopy for Rapid Geochemical Analysis**
Jonathan M. Tucker, M. Darby Dyar, Martha W. Schaefer, Samuel M. Clegg, Roger C. Wiens
Mount Holyoke College, Department of Astronomy, 50 College St., South Hadley, MA 01075
- P_25 Spatial and Temporal Variations of the Electron Temperatures and Densities Within EUV-Emitting Li Plasmas**
Ryan Coons, S. S. Harilal, M. Polek, A. Hassanein
Purdue University School of Nuclear Engineering, 400 Central Drive, West Lafayette, IN 47907-2017
- P_26 Time Evolution of the Electron Density in the Life Cycle of Laser Produced Plasmas**
Matthew Crank, S.S. Harilal, A. Hassanein
CMUXE, Purdue University, 500 Central Dr., Room 308, West Lafayette, IN 47906
- P_27 Investigation on the Role of Air in the Dynamical Evolution and Thermodynamic State of a Laser-Induced Aluminium Plasma by Spatial- and Time-Resolved Spectroscopy**
G. Cristoforetti, G. Lorenzetti, S. Legnaioli, V. Palleschi
National Institute of Optics – CNR, Research Area of National Research Council, Via G. Moruzzi, 1 – 56124 Pisa (ITALY)

- P_28 Analysis of Metals in Solutions of Low Volumes Using LIBS**
Erica Cahoon, Jose Almirall,
Department of Chemistry and Biochemistry and International Forensic Research Institute,
Florida International University, 11200 SW 8th St., Miami, FL 33199
- P_29 Real Time and *In Situ* Geochemical Logging Using LIBS**
David Death, S. Spencer, Pavel Yaroshchy,
CSIRO Process Science & Engineering, Minerals Down Under National Research
Flagship, Lucas Heights Science & Technology Centr, New Illawarra Road, Lucas
Heights, NSW 2234.
- P_30 Novel Approach for Analysis of Fine and Ultra-fine Aerosol Particles Using Laser
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T.Parameswaran, R.Lacelle, Z. Hanville, M.Amyot-Bourgeois and P.Hughes
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- P_32 Portable LIBS for Identification of Materials Involved in Nuclear Safeguard
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Optical Diagnostics of Materials, National Research Council Canada, Mortagne blv.,
Boucherville, QC, J4B 6Y4
- P_33 Validation of an Analytical Procedure for Pharmaceutical Solid Dosage Forms by
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National Research Council Canada (IMI), Boucherville (QC), Canada
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Institute for Clean Energy Technology, Mississippi State University, Starkville, MS 39759
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Vivek Dikshit, Krishna K. Ayyalasomayajula, Virendra N Rai, Fang Yu Yueh,
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Institute for Clean Energy Technology (ICET), Mississippi State University, Starkville, MS
39759, USA
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Vivek Dikshit, Kemal E. Eseller, Fang-Yu Yueh, Jagdish P. Singh, Jinesh C Jain,
Institute for Clean Energy Technology (ICET), Mississippi State University, Starkville, MS
39759, USA
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Institute for Clean Energy Technology (ICET), Mississippi State University, Starkville, MS
39759, USA

- P_38 Design and Construction of Q-Switched Nd: YAG Laser System for LIBS Measurements**
Khaled. Elsayed, Hisham Imam, Amro Harfoosh, Yasser Elbaz, Moayed Aziz, Mohy Mansour
Physics Department, Faculty of Science, Cairo University, Giza, Egypt
National Institute of Laser Enhanced Sciences, Cairo University, Giza, Egypt
Mechanical Power Engineering Department, Faculty of Engineering, Cairo
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Andrew J. Effenberger, Jr., Jill R. Scott,
Idaho National Laboratory (INL), 1765 W. Yellowstone HWY, Idaho Falls, ID 83415-2208, USA
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Lucille J. East, Richard R. Hark, Keith Hilferding, Tatiana Trejos, Jose Almira
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- P_41 High Sensitivity Detection of Heavy Metals in Water Using Pre-concentration and Microchip Laser Induced Breakdown Spectroscopy**
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University of Alberta, W3-030 ECERF, Edmonton, Alberta T6G-2V4
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W. Aslam Farooq,
Department of Physics and Astronomy, College of Science, King Saud University,
P. O. Box 2455, Riyadh 11451
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Laser Research Group, Physics Department and Center of Excellence in
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31261, Saudi Arabia.
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National Institute of Laser Enhanced Sciences (NILES), Cairo University, Egypt
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Ona Balachninaite, Aurimas Baskevicius, Valdas Sirutkaitis
Laser Research Center, Vilnius University, Sauletekio al. 10, LT-10223 Vilnius, Lithuania

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Steven T Griffin
ES-206 Engr. Sci. Bldg., Department of Electrical and Computer Engineering, University of Memphis, Memphis, TN 381562
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Industrial Materials Institute, National Research Council of Canada, 75 de Mortagne, Boucherville, Quebec, Canada, J4B 6Y4
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Physical Chemistry and Spectroscopy Group, Los Alamos National Laboratory, PO Box 1663, MS J565, Los Alamos, NM 87545
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Remah El-Rashedy, H. Imam, Khaled Elsayed, Mohy Saad,
Laser Technology Center, Cairo University, El-Gamaa Street, Giza 12211, Egypt
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Hatem Salah, Remah El-Rashedy, H. Imam, Khaled Elsayed, Mohy Saad,
Laser Technology Center, Cairo University, El-Gamaa Street, Giza 12211, Egypt
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Yuji Ikeda, Masashi Kaneko, Ahsa Moon
Imagineering, Inc., R&D Division, Welv Rokko 2nd, Bldg, 351 4-1-1 Fukada, Nada, Kobe 657-0038, Japan

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K. Ishibashi, S. Ohno, S. Kameda, K. Wada, H. Senshu, M. Kobayashi, T. Arai, K. Goto, N. Namiki, T. Matsui, Y. Cho, S. Sugita,
Planetary Exploration Research Center, Chiba Institute of Technology, Narashino, Chiba, Japan
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Amina Ismaël, Bruno Bousquet, Grégoire Travailé, Lionel Canioni,
CPMOH University of Bordeaux, Bât A4 351 cours de la libération Talence 33405, France
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Chenyu Jiang, Jinjiang Cui, Yangbo Bai, Fan Wang, Huiming Tan, Guizhong Zhang, Xiaodong Wu,
Suzhou Institute of Biomedical Engineering and Technology, No. 14, Longshan Road, Suzhou City, Jiangsu Providence, P.R. China
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X. Jiang, J.T. Costello, P. Hayden, E.T. Kennedy
School of Physical Sciences and National Centre for Plasma Science and Technology (NCPST), Dublin City University, Glasnevin, Dublin 9, Ireland
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Sarah C. Jantzi, José R. Almirall,
International Forensic Research Institute, Florida International University, Miami, FL
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Ali Khumaeni, Zener Sukra Lie, Hideaki Niki, Yong Inn Lee, Kazuyoshi Kurihara, Kiichiro Kagawa,
Program of Nuclear Power and Energy Safety Engineering, Graduate School of Engineering, University of Fukui, Fukui 910-8507, Japan
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Juniata College, 1700 Moore Street, Huntingdon, PA 16652
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Christian Bohling, Andreas John, Lothar Cordts
Secopta GmbH, Ostendstr. 25, D-12459 Berlin, Germany
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University of Malaga, Department of Analytical Chemistry, Malaga 29071 SPAIN

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J. Lasue, R.C. Wiens, O. Forni, S.M. Clegg,
Lunar and Planetary Institute, 3600 Bay Area Blvd, Houston, TX 77058, USA
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V.N. Lednev, S.M Pershin,
Wave Research Center of Prohorov General Physics Institute, Russian Academy of Sciences, Moscow, Russia
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Department of Chemistry, Mokpo National University, Jeonnam 534-729, Korea
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Khan Lim, Yuan Liu, Matthieu Baudelet, Evgueni Slobodtchikov, Peter Moulton, Andrzej Miziolek, Martin Richardson
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Christopher G. Brown, Reuvani Kamtaprasad, Matthieu Baudelet, Michael E. Sigman, Martin Richardson,
Townes Laser Institute – CREOL / University of Central Florida, 4000 Central Florida Boulevard, Orlando, FL 32816
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Yuan Liu, Matthieu Baudelet, Paul Dagdigian, Martin Richardson
Townes Laser Institute – CREOL / University of Central Florida, 4000 Central Florida Boulevard, Orlando, FL 32816

Poster Session II, 16 September 2010

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Z. W. Li, P. Yuan, H. Z. Qiao, Y. X. Guo, S. Zhang
College of Physics and Electronic Engineering, Northwest Normal University, 967 Anning East Road, Lanzhou , Gansu, P.R.China, 730070

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Yuan Liu, Matthieu Baudalet, Martin Richardson,
Townes Laser Institute – CREOL / University of Central Florida, 4000 Central Florida
Boulevard, Orlando, FL 32816
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Siu Lung Lui, Alexander Koujelev,
Spacecraft Technologies, Canadian Space Agency, 6767, route de l'Aéroport, Longueuil
(Québec) J3Y 8Y9
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Yiwen Ma, Zhenhui Du, Jinyi Li, Fanli Meng, Kexin Xu
College of Precision Instrument and Optoelectronics Engineering, Tianjin University,
Tianjin, 300072, China
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Yuri Markushin, P. Sivakumar, L. Taleh, H. Burton, N. Melikechi,
Delaware State University, 1200 North Dupont Highway, Dover, DE, 19901
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Anna – Maria Matiaske, Christoph Scholz, Oliver Ehlert, Igor Gornushkin, Ulrich Panne
BAM Federal Institute of Materials Research and Testing, Division I.4 Process Analytical
Technology, Richard-Willstaetter-Str. 11, 12489 Berlin, Germany
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Laurent Mercadier, J. Hermann, C. Grisolia, A. Semerok,
LP3 – CNRS/University of Marseille, 163, Avenue de Luminy, C. 917, Marseille ,
Bouches-du-Rhone, 13288 France
- P_81 Improved Analysis of Agricultural Samples by LIBS**
Sven Merk, R. Gebbers, I. B. Gornushkin, U. Panne
BAM Bundesanstalt für Materialforschung und –prüfung, Fachgruppe I.4 Prozessanalytik,
Richard-Willstätter-Straße 11, D-12489 Berlin
- P_82 Investigation of LIBS Under Low Pressure for Application to Planetary Exploration**
A. Mezzacappa, L.-M. Nortier, S. Clegg, R.C. Wiens, N. Melikechi
Delaware State University, 1200 N DuPont Highway, Dover, DE 19901
- P_83 Hyphenated Spectroscopic Data Fusion as a Tool for Threat Assessment and Decision Making**
Javier Moros, P. Lucena, J.J. Laserna,
University of Malaga, Research Central Services. Laser Laboratory, Analytical Chemistry
Department, Faculty of Sciences, Boulevard Louis Pasteur, 33 29071 Malaga,
- P_84 Time- and Space-Resolved Laser Plasma Diagnostics for Stark Broadening Measurements in Laser Plasma**
Emilien Mothe, M. Cvejić, S. Jovičević, L. Mercadier, S. Beldjilali, N. Konjević, J.
Hermann, Laboratoire LP3 – CNRS/University of Marseille, 163, Avenue de Luminy – C.
917, Bouches-du-Rhone 13288 Marseille, France

- P_85 Detection of Nuclear-Related Chemicals and Other Threat Materials Using LIBS**
Rosalie Multari, D. A. Cremers, M. L. Bostian, C. R. Jones, L.
Applied Research Associates, Inc., 4300 San Mateo Blvd. NE Suite A-220, Albuquerque,
NM 87120 USA
- P_86 Multi-Plasma Laser-Induced Breakdown Spectroscopy (Multi-Plasma LIBS): New Developments and Further Evaluations**
Galan G. Moore, Douglas H. Jennings,
Corning Incorporated, SP-FR-01-8, Corning, NY 14831
- P_87 Laser Induced Breakdown Spectroscopy for Liquid Samples**
Akshaya Kumar, Prakash C. Sharma,
Department of Physics, EN-501 L.H.Foster Hall, Tuskegee University, Tuskegee, AL
36088, USA
- P_88 Preliminary Studies on Laser Induced Breakdown Spectroscopy Applied to Historic Iron Alloys**
Walter Neu, W. Jahn, C. Jöhnk, S. Koch, M. Sohn, U. Teubner
Fachhochschule Emden/Leer - University of Applied Sciences, Faculty of Technology,
Institute for Laser Technology, Constantiaplatz 4, 26723 Emden, Germany
- P_89 Spatial Clustering of LIBS Data from Heterogeneous Concrete Samples**
Ernst Niederleithinger, J. Grandemenge, G. Wilsch,
BAM VIII.2, Unter den Eichen 87, 12205 Berlin, Germany
- P_90 Double Pulse LIBS Enhancement for Ionized and Not Ionized Elements with Different Excited State Energies**
L. Nagli, M. Gaft,
Laser Distance Spectrometry, 11 Granit St., Petach Tikva, 49514, Israel
- P_91 Spectral Change Caused by Silicate Rock Vapor Deposition: Implication for Short-Range LIBS for Planetary Exploration Under Vacuum Conditions.**
Sohsuke Ohno, K. Ishibashi, T. Arai, S. Kameda, K. Wada, H. Senshu, M. Kobayashi, K.
Goto, N. Namiki, T. Matsui, Y. Cho, S. Sugita
Planetary Exploration Research Center, Chiba Institute of technology (PERC/Chitech),
Narashino, Chiba, 275-0016, Japan.
- P_92 Mars ChemCam Calibrations: Tests of Correction for Variable Stand-Off Distances**
Anna Ollila, R. C. Wiens, J. Lasue, H. E. Newsom, S. M. Clegg,
University of New Mexico, 9 Sais Dr., Los Lunas, NM 87031
- P_93 Depth Profile Analysis by Laser Induced Breakdown Spectroscopy: Parametric Study**
Travis Owens, Jhanis Gonzalez, Osman Sorkhabi, Xianglei Mao, Grigoropoulos, P
Costas, Richard E Russo,
Lawrence Berkeley National Lab, UC Berkeley, 1 Cyclotron Road, Mail Stop 70R0108B,
Berkeley, CA 94720-8168
- P_94 *InSitu* LIBS and XRF Analysis of the 'Legionary' Mark Antony Denarii**
A. Foresta, S. Legnaioli, G. Lorenzetti, V. Palleschi, A. Elhassan, M.A. Harith, M. Ferretti,
F. Catalli,
Applied Laser Spectroscopy Laboratory, Istituto per i Processi Chimico-Fisici, Area della
Ricerca di Pisa, Via G.Moruzzi, 1 (PISA), 56124 ITALY

- P_95 A New Procedure for Estimating the Temperature of a Laser-Generated Plasma**
F. Bredice, H. O. Di Rocco, H. Sobral, M. Villagrán-Muniz, V. Palleschi
Applied Laser Spectroscopy Laboratory, Istituto per i Processi Chimico-Fisici, Area della Ricerca di Pisa, Via G.Moruzzi, 1 (PISA), 56124 ITALY
- P_96 Laser-Induced Breakdown Spectroscopy of Alumina and Aluminum Particles**
Christian Parigger, James Hornkohl, A. B. Donaldson, Walter Gill
The Center for Laser Applications, The University of Tennessee Space Institute, 411 B.H. Goethert Parkway, Tullahoma, TN 37388, USA
- P_97 Determination of Elemental Depth Profile of Multilayer Coatings by LIBS and X-ray Microanalysis**
Peeter Paris, M. Aints, M. Kiisk, M. Laan, V. Sammelseg, J. Kozlova, C. Ruset
Institute of Physics, University of Tartu, Riia 142, Tartu 51010, Estonia
- P_98 Quantitative Analysis of Lead in Contaminated Soils Using the Laser Induced Breakdown Spectroscopy (LIBS)**
Jihyun Kwak, Gibaek Kim, Kihong Park,
Gwangju Institute of Science and Technology, 261 Cheomdan-gwagiro(Oryong-dong) Buk-gu, 500-712, Gwangju, Republic of Korea
- P_99 Detection of Heavy Metals in Agricultural Products Using the Laser Induced Breakdown Spectroscopy (LIBS)**
Gibaek Kim, Jihyun Kwak, Kihong Park,
School of Environmental Science and Engineering, Gwangju Institute of Science and Technology, Gwangju, Republic of Korea
- P_100 Development of a Compact and Low Cost LIBS Analyzer and Its Application for Determination of Chromium and Nickel in Steel Using Multivariate Calibration**
Celio Pasquini, Fabiano Barbieri Gonzaga,
Institute of Chemistry - State University of Campinas – UNICAMP, POB 6154, 13083-970, Campinas, SP, Brazil
- P_101 Two-Dimensional Mapping of the Electron Density in Laser-Produced Plasmas**
M. Polek, K. F. Al-Shboul, D. Campos, S. S. Harilal, A. Hassanein,
Center for Materials under Extreme Environment, School of Nuclear Engineering, Purdue University – CMUXE, 200 Harrison Apt. #2, W. Lafayette, IN 47906
- P_102 Local Thermal Equilibrium Considerations in Laser-Induced Plasmas**
J.S. Cowpe, J.S. Astin, D. Moser, D.K. Ross, J.J. Smith, R.D. Pilkington
Materials and Physics Research Centre, University of Salford, UK M5 4WT
- P_103 Determination of Trace Glycemic Elements in P. corylifolia by LIBS: an Ethnopharmaceutical Approach**
Prashant Kumar Rai, Nilesh K. Rai, A.K. Rai, Preeti Dhar, Geeta Watal,
Alternative Therapeutics Unit, Drug Discovery & Development Division, Medicinal Research Lab, Department of Chemistry, University of Allahabad, Allahabad, INDIA
- P_104 Signal Processing Analysis of Factors Affecting LIBS-Based Obsidian Artifact Source Identification**
Jeremiah J. Remus, Russell Harmon, Jhanis Gonzalez, Diane Wong, Jennifer Gottfried, Dirk Baron,
Clarkson University, Box 5720, 8 Clarkson Avenue, Potsdam, NY 13699

- P_105 Mobile Computing Platform for Real-Time Detection with Laser-Induced Breakdown Spectroscopy**
Jeremiah Remus, Andrew D. Sheldon,
Clarkson University, Box 5720, 8 Clarkson Avenue, Potsdam, NY 13699
- P_106 Laser-Induced Breakdown Spectroscopy Analysis of Obsidian Artifact Homogeneity**
Jenniffer M. Estrada, Jeremiah J. Remus, Russell Harmon, Dirk Baron,
Clarkson University, Box 5720, 8 Clarkson Avenue, Potsdam, NY 13699
- P_107 Double Pulse Laser-Induced Breakdown Spectroscopy on Liquids: Plasma Diagnostics and Analytical Figures of Merit**
Kheir Eddine Rifai, Stéphane Laville, Mohamad Sabsabi, François vidal, Mohamed Chaker, I.N.R.S. - Énergie & Matériaux, 1650 Lionel-Boulet Boulevard (J3X 1S2),
Varenes, Québec, Canada
- P_108 Laser Induced Breakdown Spectroscopy with Nanosecond, Picosecond, and Femtosecond Pulses: Studies on RDX and HMX**
S. Sreedhar, G. Manoj Kumar, M. Ashwin Kumar, P. Prem Kiran, Surya P. Tewari,
Soma Venugopal Rao,
Advanced Centre of Research in High Energy Materials, University of Hyderabad,
Hyderabad 500046 (A.P), India
- P_109 Sub-micron Far- and Near-Field Femtosecond Laser Induced Breakdown Spectroscopy and Laser Induced Plasma Properties**
Vassilia Zorba, Jhanis Gonza'lez, Travis Owens, Dayana Oropeza, Osman Sorkhabi,
Xianglei Mao, Richard E. Russo,
Lawrence Berkeley National Laboratory, Berkeley, CA 94720
- P_110 Detection of Antidiabetic Elements of Ficus bengalensis Using LIBS**
Rakesh Kumar Singh, Deepak Kumar Yadav, Sanjukta Chatterji, Surekha Shukla,
Nilesh Kumar Rai, A.K. Rai, Geeta Watal,
Medicinal Research Laboratory, Department of Chemistry, University of Allahabad,
Allahabad - 211 002 (U.P.) India
- P_111 Study of White Gallstones Using Laser Induced Breakdown Spectroscopy and Fourier Transform Infrared Spectroscopy**
Vivek Kr. Singh, A.K. Rai,
School of Physics, Shri Mata Vaishno Devi University, Kakryal, Reasi-182320, J&K, India
- P_112 A Self-Calibration Method Based on LIBS for Quantifying Minor Elements**
Lanxiang Sun, Haibin Yu, Yong Xin, Zhibo Cong,
Key Laboratory of Industrial Informatics, Shenyang Institute of Automation,
Chinese Academy of Sciences, Shenyang 110016, China
- P_113 Detection of Trace Elements Relevant to Quality of Buffalo Semen via LIBS**
Z. Abdel-Salam¹, Sh. Desouky², M. A. Harith¹
¹National Institute of Laser Enhanced Sciences (NILES), Cairo University,
²Applied Laser Spectroscopy (ALS) Laboratory, 1 Gamaa Street, Giza 11316, Egypt

- P_114 Effect of Laser Focusing and Fluence on the Analysis of Pellets of Plant Materials by Laser Induced Breakdown Spectrometry**
Gabriel Gustinelli Arantes de Carvalho, Lidiane Cristina Nunes, Marcos da Silva Gomes, Francisco José Krug, Dario Santos Júnior, Universidade Federal de Sao Paulo – UNIFESP, Rua Prof. Artur Riedel 275, Cep 09972-270, Diadema- SP
- P_115 Role of FS Laser Induced Nanoparticles in Copper-Based-Alloys FS-NS Double-Pulse LIBS Calibration Curves**
A. De Bonis, R. Teghil, A. De Giacomo, G. Sileo, G.P. Parisi, A. Santagata
CNR-IMIP, U.O.S. di Potenza, Zona Industriale di Tito Scalo, 85050 Tito Scalo (PZ) - Italy
- P_116 Analysis of Cotton Using LIBS and LA-ICP-AES**
Emily R. Schenk, B.S., Jose R. Almirall,
Florida International University and the International Forensic Research Institute,
11200 SW 8th St., Miami, FL, USA 33199
- P_117 A Methodological Approach Towards the Optimal Set Up of the Laser-Induced Breakdown Spectroscopy Parameters**
Tiziano Schillaci, M. F. Alberghina, R. Barraco, M. Brai, V. Palleschi, L. Tranchina
Università degli Studi di Palermo, Dipartimento di Fisica e Tecnologie Relative, Viale delle Scienze - Edificio 18, 90128 Palermo (Italy)
- P_118 LIBS for *In Situ* Space Exploration: Analysis of Frozen Solutions**
Susanne Schröder, S. G. Pavlov, I. Rauschenbach, E. K. Jessberger, H.-W. Hübers,
Institut für Planetenforschung, Deutsches Zentrum für Luft- und Raumfahrt e.V.,
Rutherfordstr. 2, 12489 Berlin, Germany
- P_119 Airborne Nanoparticles Monitoring by Laser-Induced Breakdown Spectroscopy**
P. Dewalle, J.B. Sirven, A. Roynette, F. Gensdarmes,
CEA, DEN, Department of Physical Chemistry, Bât. 467 – PC 56, Gif-sur-Yvette, F-91191, France
- P_120 Low-Pressure Applications of LIBS for Hazard and Material Identification**
Jaime A. Stearns, Eunsook S. Hwang, Sarah E. McElman, Adam O. Barden, James A. Dodd, Space Vehicles Directorate, Air Force Research Laboratory/RVBYB, 29 Randolph Rd. Hanscom AFB, MA 01731-3010
- P_121 Laser Induced Breakdown Spectroscopy for the Chemical Analysis of Deep Ocean Vents: Laboratory Simulation of *In Situ* Metal Ion Detection**
F. Sonnichsen, A. Chave, B. Beardsley, W. Beardsley, G. Ritchie,
Woods Hole Oceanographic Inst., Woods Hole, MA 02543
- P_122 Experimental Study of Self-Absorption Phenomenon in LIBS**
D. X. Sun, M. G. Su, C. Z. Dong,
College of Physics and Electronics Engineering, Northwest Normal University,
Lanzhou 730070, China
- P_123 Applications of Thomson Scattering to Investigate Evolution of Laser Induced Breakdown in Air**
Grégoire Travaillé, A. Mendys, K. Dzierzega, B. Pokrzywka, B. Bousquet, L. Canioni,
S. Pellerin
CPMOH, Université Bordeaux 1, 351 cours de la Libération, Talence 33405, France

- P_124 A Preliminary Study of Rock Sample Analysis Using Laser Induced Breakdown Spectroscopy**
Markandey Tripathi, Krishna K. Ayyalasomayajula, Vivek Dikshit, Kemal E. Eseller, T. Miller, Fang Yu Yueh,
Jagdish P. Singh, Nouredine Melikechi, Institute for Clean Energy Technology (ICET),
Mississippi State University, Starkville, MS 39759, USA
- P_125 Temperature and Electron Density Calculations of Chemically Generated Tin Hydride Plasmas by Laser-Induced Breakdown Spectroscopy**
Semira Ünal, Şerife Yalçın,
Department of Chemistry, Izmir Institute of Technology, Gulbahce Urla 35430 Izmir,
TURKEY
- P_126 Improved PLS Model for Coal Analysis with Laser-Induced Breakdown Spectroscopy**
Jie Feng, Zhe Wang, Zheng Li, Weidou Ni,
Tsinghua University, Room 404, South Wing, Shunde Building, Beijing, China, 100084
- P_127 Standoff CheckPoint Explosive Detection System (CPEDS) Incorporating Enhanced LIBS and Raman Technology**
Robert Waterbury, Jeremy Rose, Frank Vilardi, Darius Vunck, Thomas Blank, Alan Ford,
Troy McVay, Ken Pohl, Edwin Dottery
Alakai Defense Systems, 7935 114th N #1100, Largo, FL 33773
- P_128 Temporally and Spatially Resolved Filament Induced Breakdown Spectroscopy of Carbon Based Samples**
Matthew Weidman, Matthieu Baudelet, Paul Dagdigian, Martin Richardson
Townes Laser Institute – CREOL / University of Central Florida
The College of Optics and Photonics, 4000 Central Florida Boulevard, Orlando, FL 32816
- P_129 Sample Introduction Techniques in Liquids Analysis by Laser Induced Breakdown Spectroscopy**
Ş. Yalçın, D. Arıca, S. Ünal, N. Aras,
Department of Chemistry, Faculty of Science, Izmir Institute of Technology,
Urla/ Izmir / TURKEY 35430
- P_130 Expansion Dynamics of Plasmas Produced by Double Pulse Nanosecond Laser Ablation**
W. L. Yip, S. Beldjilali, E. Mothe, L. Mercadier, J. Hermann
Laboratoire Lasers, Plasmas et Procédés Photoniques, LP3 UMR 6182 CNRS -
Université Aix-Marseille II, Campus de Luminy, Case 917, F-13288 Marseille Cedex 9
- P_131 Characterizing Plasma from Copper and Zinc Emissions Using LIBS of Brass**
A. B. Gojani, C. H. Kim, J. H. Yoo, J. J. Yoh
School of Mechanical and Aerospace Engineering, Seoul National University, Seoul 151-
744, Korea
- P_132 Temporal and Spatial Dynamics of Laser-Induced Aluminum Plasma in an Argon Atmosphere and Its Interplay with the Ambient Gas**
Q. L. Ma, V. Motto-Ros, W. Q. Lei, M. Boueri, X. S. Bai, L. J. Zheng, H. P. Zeng, Jin Yu
LASIM, Lyon 1 University, Bat. Kastler, Campus de la Doua, Villeurbanne, 69622, France

- P_133 Trace Element Determination in Milk Powders Using Comparative Measurements with ICP and LIBS for the Validation of the CF-LIBS Procedure**
W. Q. Lei, V. Motto-Ros, Q. L. Ma, M. Boueri, Jin Yu, J. Haddad, A. Stankova, Nicole Gilon-Delepine,
LASIM, Lyon 1 University, Bat. Kastler, Campus de la Doua, Villeurbanne, 69622, France
- P_134 Experimental Investigation on Laser-Induced Breakdown Spectroscopy Using Guided Conversion for Quantitative Analysis in Aqueous Solution**
Yuan Lu, Kai Cheng, Shilei Zhong, Ying Li, Zhennan Wang, Huaming Hou, Ronger Zheng,
College of Information Science & Engineering, Ocean University of China,
238 Songling Road, Qingdao 266100, P R CHINA
- P_135 Ultrasonic Nebulizer Assisted LIBS: A New Approach for Trace Analysis of Aqueous Samples**
Shilei Zhong, Yuan Lu, Kai Cheng, Junshan Xiu, Ronger Zheng
College of Information Science & Engineering, Ocean University of China,
238 Songling Road, Qingdao 266100, P R CHINA
- P_136 Capability Assessment of Sub-Micron LIBS**
V. Zorba, D. Oropeza, T. Owens, J.J. Gonzalez, X. Mao, R.E. Russo
Lawrence Berkeley National Laboratory, Environmental Energy, Technologies Division,
Laser Spectroscopy and Applied Materials Group, 1 Cyclotron Road, MS 70R108B,
Berkeley, CA 94720
- P_137 Experimental Study on the Spectral Characteristics of Laser-Induced Air Plasma**
Lin Zhaoxiang, Jinquan Wu, Jie Li, Shunsheng Gong,
Laboratory for Applied Laser Spectroscopy, College of Electrics and Information
Engineering, South-central University for Nationalities, Wuhan, (430074), P.R.C
- P_138 LIBS of Emphyema and Mucocele Associated Gallbladder Stones**
A. K. Pathak, N.K. Rai, A. K. Rai, Pradeep K. Rai, Pramod K. Rai
Laser Spectroscopy Research Laboratory, Department of Physics, Allahabad University,
Allahabad-211002, India
- P_139 Feasibility of Laser Induced Breakdown Spectroscopy for Trace Determination in Snow**
Nilesh K. Rai, A.K.Rai, I. M. L. Das, P. K. Satyawali, P. K. Srivastava
Laser Spectroscopy Research Laboratory, Department of Physics, University of
Allahabad, Allahabad-211002, INDIA
- P_140 Chemometric Analysis of LIBS Data for Differentiation of Nitro Compounds**
Shikha Rai, A. K. Rai, I. M. L. Das, K.C. Tripathi
Laser Spectroscopy Research Laboratory, Department of Physics, Allahabad University,
Allahabad-211002, India
- P_141 Electron Properties Experimental Determination of a Nascent Nanosecond Aluminum Plasma**
V. Morel, A. Bultel, B. G. Chéron
UMR CNRS 6614 CORIA, University of Rouen, 76801 Saint-Etienne du Rouvray, France

- P_142 Aluminum Nanosecond Laser-Induced Plasma: A Collisional-Radiative Model**
V. Morel, A. Bultel, B. G. Chéron
UMR CNRS 6614 CORIA, University of Rouen, 76801 Saint-Etienne du Rouvray, France
- P_143 Implementation of LIBS for the Determination of Silicon in Cynodon dactylon Pers.**
D. K. Tripathi, D. K. Chauhan, Nilesh K. Rai, A. K. Rai,
Department of Botany, University of Allahabad, Allahabad
- P_144 Investigation of Polarization Effects for Nanosecond Laser-induced Breakdown Spectroscopy.**
M.E. Asgill, H.Y. Moon, N. Omenetto, D.W. Hahn
Department of Mechanical & Aerospace Engineering, University of Florida Gainesville, FL
- P_145 Numerical Modeling of the Plasma-Particle Interactions of Aerosol Vaporization in a Laser-Induced Plasma**
P.B. Jackson, D.W. Hahn
Department of Mechanical & Aerospace Engineering, Plasma-Analyte Interaction Working Group (PAIWG), University of Florida, Gainesville
- P_146 Matrix Effect in Substrate Based Laser-induced Breakdown Spectroscopy**
Prasoon Diwakar, Pramod Kulkarni, Eileen Birch
Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, Cincinnati OH, USA
- P_147 Determination Of Vital Nutrients In Olives Processed In Mediterreanean Region Using LIBS**
M. A Gonda, M. Mbraki, Z.Seddigi, M. A. Dastageer
Laser Research Group, Physics Department and Center of Excellence in Nanotechnology (CENT), King Fahd University of Petroleum & Minerals

