Prasoon Diwakar

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Education

Ph.D in Mechanical Engineering — Aug 2009
University of Florida, Gainesville, FL
Advisor: Prof. D.W. Hahn, Department of Mechanical and Aerospace Engineering
Thesis title: "Laser-induced plasmas as an analytical source for quantitative analysis of gaseous and aerosol systems: Fundamentals of plasma-particle interactions"

M.S. in Mechanical Engineering — Aug 2006
University of Florida, Gainesville, FL

B.Tech in Mechanical Engineering — May 2003
Indian Institute of Technology, Kanpur, India

Professional Experience

National Research Council Post-Doctoral Associate — 2009 - present
National Institute for Occupational Safety and Health, Cincinnati
Advisor: Dr. P.S. Kulkarni
Research Topic: Development of novel direct reading instruments for real-time measurement of fine and ultra-fine aerosols using plasma spectroscopy techniques (LIBS/SIBS/MIPS).

Graduate Research Assistant — 2004 - 2009
Advisor: Dr. D.W. Hahn
Department of Mechanical and Aerospace Engineering, University of Florida
Research Topic: Study of plasma-particle interactions in Laser-induced plasmas; Study of soot formation using Laser-induced incandescence.

Visiting Scientist — March 2009
Advisor: Dr. K. Niemax
Institute of Analytical Sciences, Dortmund, Germany
Research Topic: Investigation of single particle atomization in ICP.

Research Associate — Fall 2003
Advisor: Dr. P. Panigrahi
Department of Mechanical Engineering, Indian Institute of Technology, Kanpur, India
Research Topic: Design and simulation of Heat Exchangers using Artificial Neural Networks.

Student Research Assistant — Summer 2002
Advisor: Dr. G. Zizak
CNR-TEMPE, Laboratorio di Combustione e Diagnostiche Laser, Milano, Italy
Research Topic: Two dimensional imaging of soot volume fraction in flames using two color emission technique and extinction methods.

Summer Internship Summer 2001
Research and Development, TVS-Suzuki Motors, Hosur, India
Research Topic: Optimization of suspension parameters of two-wheelers using stochastic linear control theory.

Research Interests

Specialization includes the areas of laser-based diagnostic methods, plasma spectroscopy, aerosol measurement and instrumentation and thermal sciences.

Specific areas of research interest include development of LIBS, fundamentals of plasma-particle interactions, aerosol systems, aerosol chemical composition measurement, real-time instrumentation, study and diagnostics of environmental pollutants and combustion diagnostics.

Experience in experimental techniques include Laser-Induced Breakdown Spectroscopy (LIBS), Spark Spectroscopy, Microwave-Induced Plasma Spectroscopy, Rayleigh Scattering, Thomson Scattering, Laser Induced Incandescence (LII), Laser Induced Fluorescence (LIF), Raman Spectroscopy, Single Particle analysis, Plasma-Particle Imaging, Inductively Coupled Plasma.

Refereed Publications

P.K. Diwakar, P. Kulkarni, M.E. Birch, 2011. New approach for near-real-time measurement of elemental composition of aerosols using laser induced breakdown spectroscopy. *Submitted.*

P.K. Diwakar, S. Groh, K. Niemax, D.W. Hahn, 2010. Study of analyte dissociation and diffusion in laser-induced plasmas: Implications for laser-induced breakdown spectroscopy. *Journal of Analytical Atomic Spectrometry*, 25:1921-1930.

S. Groh, **P.K. Diwakar**, C.C. Garcia, A. Murtazin, K. Niemax, D.W. Hahn, 2010. 100% efficient sub-nanoliter sample introduction in laser-induced breakdown spectroscopy and inductively coupled plasma spectrometry: Implications for ultralow sample volumes. *Analytical Chemistry*, 82: 2568-2573.

P.K. Diwakar, D.W. Hahn, 2008. Study of early laser-induced plasma dynamics: transient electron density gradients via Thomson scattering and the implications on LIBS measurements. *Spectrochimica Acta B*, 63:1038-1046.

P.K. Diwakar, P. B. Jackson, D. W. Hahn, 2007. Investigation of multi-component aerosol particles and the effect on quantitative laser-induced breakdown spectroscopy: consideration of localized matrix effects. *Spectrochimica Acta B*, 62, 1466-1474.

C. A. Henry, **P.K. Diwakar**, D.W. Hahn, 2007. Investigation of helium addition for laser-induced plasma spectroscopy of pure gas phase systems: analyte interactions and signal enhancement. *Spectrochimica Acta B*, 62, 1390-1398.

B.C. Windom **P.K. Diwakar**, D.W. Hahn, 2006. Dual-pulse LIBS for analysis of gaseous and aerosol systems: plasma-analyte interactions, *Spectrochimica Acta B*, 61, 788-796.

G.D. Yoder **P.K. Diwakar**, D.W. Hahn, 2005. Assessment of soot particle vaporization effects

during laser-induced incandescence using time-resolved light scattering. *Applied Optics*, 44, 4211-4219.

Manuscript in Preparation

P.K. Diwakar, P.Kulkarni. Spark spectroscopy for near-real-time elemental analysis of aerosols.

P.K. Diwakar, P.Kulkarni. Matrix effects due to easily ionizable elements on analyte response in LIBS plasma: implications to portable and low-energy LIBS plasma instruments.

P.K. Diwakar, P.B. Jackson, D.W.Hahn. Investigation of breakdown process in different gas media by temporal spectroscopic imaging of the plasma.

Conference Proceedings/Presentations

P.K. Diwakar, D.W. Hahn, K. Niemax, S. Groh, 2011. Role of Analyte Diffusion in Laser-Induced Plasmas. *FACSS 2011*, Oct 2011, Reno, USA.

P.K. Diwakar, P. Kulkarni, 2011. Near Real-time Elemental Analysis of Aerosols Using Spark-induced Breakdown Spectroscopy. *30th Annual AAAR Conference*, Oct 2011, Orlando, USA.

P.K. Diwakar, P. Kulkarni, P. Efthimion, 2011. Corona-Assisted Microwave Plasma Spectroscopy (CAMPS) for Aerosol Analysis. *3rd North American Symposium on LIBS*, Jul 2011, Clearwater, USA.

P.K. Diwakar, P. Kulkarni, 2011. Spark-Induced Breakdown Spectroscopy for Near Real-Time Elemental Analysis of Aerosols. *3rd North American Symposium on LIBS*, Jul 2011, Clearwater, USA.

P.K. Diwakar, P. Kulkarni, M.E. Birch, 2010. Semi-continuous Measurement of Elemental Composition of Aerosol Particles Using Laser Induced Breakdown Spectroscopy. *29th Annual AAAR Conference*, Oct 2010, Portland, USA.

P.K. Diwakar, P. Kulkarni, M.E. Birch, 2010. Matrix Effects in Laser-Induced Breakdown Spectroscopy. *29th Annual AAAR Conference*, Oct 2010, Portland, USA.

P.K. Diwakar, P. Kulkarni, M.E. Birch, 2010. Novel Approach for Analysis of Fine and Ultra-fine Aerosol Particles Using Laser Induced Breakdown Spectroscopy. *6th International Conference on Laser-Induced Breakdown Spectroscopy*, Sep 2010, Memphis, USA.

P.K. Diwakar, P. Kulkarni, M.E. Birch, 2010. Matrix Effect in Substrate Based Laser-induced Breakdown Spectroscopy. *6th International Conference on Laser-Induced Breakdown Spectroscopy*, Sep 2010, Memphis, USA.

P.K. Diwakar, S. Groh, C.C. Garcia, K. Niemax, D.W. Hahn, 2010. Investigation of Plasma-Particle Interactions in LIBS by Introduction of Single Droplet (Picolitre Volume) in the Plasma. *2nd North American Symposium on LIBS*, Jul 2009, New Orleans, USA.

M. Hola, K. Novotny, J. Kaiser, D. W. Hahn, **P.K. Diwakar**, J. Kalvoda, Hana Novakova, V. Kanicky 2009. Elemental Distribution in Fish Scales Using LIBS and LA-ICP-MS Methods.

2nd North American Symposium on LIBS, Jul 2009, New Orleans, USA.

J. Kaiser, M. Hola, K. Novotny, D.W. Hahn, **P.K. Diwakar**, R. Malina, M. Galiova, V. Kanicky, M. Liska 2009. LIBS and LA-ICP-MS Complementary Study of Uroliths. *2nd North American Symposium on LIBS*, Jul 2009, New Orleans, USA.

J. Kaiser, K. Novotny, M. Hola, V. Kanicky,K. Viktor, P. Martinec, D.W. Hahn, **P.K. Diwakar**, L. Mancini, G. Tromba, N. Sodini, 2009. LIBS, LA-ICPMS and synchrotron hard X-ray micro-radiography and micro-tomography complementary study of elemental distributions in biominerals. *European Winter Conference on Plasma Spectrochemitry*, Feb 2009, Graz, Austria.

P.K. Diwakar, S. Groh, C.C. Garcia, K. Niemax, D.W. Hahn, 2008. Temporal investigation of aerosol particles and early plasma dynamics on single isolated analyte droplets. *5th International Conference on Laser-Induced Breakdown Spectroscopy*, Sep 2008, Berlin, Germany.

D.W. Hahn, **P.K. Diwakar**, P.B. Jackson, 2008. The Role of Plasma-Particle Interactions in LIBS. *5th International Conference on Laser-Induced Breakdown Spectroscopy*, Sep 2008, Berlin, Germany.

D.W. Hahn, **P.K. Diwakar**, P.B. Jackson, 2008. Laser-induced breakdown spectroscopy (LIBS) for aerosol analysis. *Conference on Lasers and Electro-Optics (CLEO)*, May 2008, San Jose, USA.

P.K. Diwakar, D.W. Hahn, 2006. Investigation of multi-component aerosol particles and the effect on quantitative analysis: consideration of thermal matrix effects *4th International Conference on Laser-Induced Breakdown Spectroscopy*, Sep 2006, Montreal, Canada.

B.C. Windom, **P.K. Diwakar**, D.W. Hahn, 2006. Double Pulse LIBS for Analysis of Gaseous and Aerosol Systems: Plasma-Analyte Interactions. *4th International Conference on Laser-Induced Breakdown Spectroscopy*, Sep 2006, Montreal, Canada.

S. De Iullis, **P.K. Diwakar**, F. Cignoli, G. Zizak, 2002. Quantitative two-dimensional imaging of soot volume fraction in flames. *29th International Symposium of Combustion*, Jul 2002, Sapporo, Japan.

Patents

CDC employee invention report titled *"Method for focused collection of aerosol particles for chemical analysis by spectroscopic techniques"* filed dated Nov 10, 2010. Patent application pending.

Awards

Research Associateship Award by National Academy of Sciences for postdoc at NIOSH Cincinnati. 2009.

Poster prize for student poster presentation at 2nd NASLIBS conference, New Orleans. Jul 2009.

Nominated for Elsevier/Spectrochimica Acta Atomic Spectroscopy Best Paper Award. 2008.

Nominated for Elsevier/Spectrochimica Acta Atomic Spectroscopy Best Paper Award. 2007.

Second prize for poster presentation at 9th Environmental Engineering Society Poster Symposia, University of Florida. April 2007.

Elsevier prize for best student poster presentation at 4th International Conference on LIBS, Montreal, Canada. Sep 2006.

IIT-Kanpur certificate of merit for academic excellence in Mechanical Engineering.Aug 1999.

Professional and Service Activities

Member of Optical Society of America, American Chemical Society, Society for Applied Spectroscopy, American Association for Aerosol Research, Combustion Institute.

Reviewer of Journal of Analytical Atomic Spectrometry, Physical Chemistry Chemical Physics, Analyst, Optics Letters, Optics Express, Applied Spectroscopy, NIOSH manuscripts.

President of Florida chapter of charity organization Asha for Education, 2006-2008.

References

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