

Nils

Dr. Hansen

Combustion Chemistry

Sandia National Laboratories, California
P.O. Box 969
Livermore, CA 94551-0969

Phone: 925-294-6272

E-mail: nhansen@sandia.gov



Dr. Nils Hansen

SHORT BIO:

since April 2004

Aug. 2012- Dec. 2012 and
Dec. 2008- Jan. 2009:

August 2003 –
March 2004

January 2001 –
July 2003

Staff

Combustion Research Facility, Sandia National Laboratories, Livermore, CA, USA

Flame Chemistry and Diagnostics Laboratory

Visiting Scientist

Universität Bielefeld, Germany

Flame-Sampling Molecular-Beam Mass Spectrometry of partially premixed and diffusion flames

Host: Prof. Dr. K. Kohse-Höinghaus

Staff Scientist (Laborleiter)

BASF AG, Ludwigshafen, Germany

Physical Properties of Melamine-Urea-Formaldehyde Resins

Postdoctoral Fellow

University of California at Santa Barbara, CA, USA

Snapshots in Chemistry: Product Imaging of Molecular Reactions

Host: Prof. A. M. Wodtke

RESEARCH INTERESTS

Since joining Sandia's Combustion Research Facility in 2004 as the principal investigator in the "Flame Chemistry and Diagnostics Laboratory", Dr. Hansen has devoted his scientific career towards a molecular-level understanding of combustion chemistry. Employing Lawrence Berkeley Lab's Advanced Light Source, he is studying the combustion chemistry of premixed laminar flames fueled by hydrocarbons and oxygenated fuels. Dr. Hansen's work has focused on the formation of the so-called first-aromatic ring. With this part of the soot-formation being now

well understood, Dr. Hansen is currently expanding his lab's capabilities to study the chemistry of larger polycyclic aromatic hydrocarbons and on the chemical composition of soot particles. Another research project focuses on the low-temperature, high-pressure combustion processes in jet-stirred reactors.

EDUCATION

January 2001	Promotion to Dr. rer. nat. Christian-Albrechts-Universität Kiel, Germany
September 1995 – December 2000	Ph. D. Thesis Department of Physical Chemistry, Universität Kiel, Germany <i>Set-up of a Molecular Beam-Fourier Transform-Microwave Spectrometer and Analysis of High Resolution Spectra of Free Radicals</i> Advisor: Prof. F. Temps
September 1999 – December 1999	Visiting Scientist Brookhaven National Laboratory, Upton, NY, USA <i>Frequency-Modulation Transient Absorption Spectroscopy</i> Host: Dr. T. J. Sears
September 1995	Diploma Degree in Chemistry Thesis: ^{33}S Nuclear Quadrupole Coupling and Internal Rotation Effects in the Microwave Spectrum of Methylthiocyanate Advisor: Prof. H. Mäder
1990 – 1995	Study of Chemistry at the Christian-Albrechts-Universität Kiel, Germany

AWARDS, HONORS AND MEMBERSHIPS

since December 2013	Member of the Editorial Board for "The Proceedings of The Combustion Institute"
July 2010	O.W. Adams Award for "Exemplary Contributions to the Programs of the Combustion Research Facility" – Sandia National Laboratories
March 2001 – February 2003	Feodor-Lynen-Fellowship of the Alexander von Humboldt-Foundation
1996 – 1998	Doctoral Fellowship of the "Stiftung Stipendium-Fonds des Verbandes der Chemischen Industrie e. V."

SELECTED PUBLICATIONS & PATENTS

The Predictive Capability of an Automatically Generated Combustion Chemistry Mechanism: Chemical Structures of Premixed iso-Butanol Flames

N. Hansen, S. S. Merchant, M. R. Harper, W. H. Green
Combust. Flame, **2013**, 160(11), 2343-2351

Near-Threshold Photoionization Mass Spectra of Combustion-Generated High-Molecular-Weight Soot Precursors

S. A. Skeen, H. A. Michelsen, K. R. Wilson, D. M. Popolan, A. Violi, N. Hansen
J. Aerosol Sci., **2013**, 58(1), 86-102

Studies of Laminar Opposed-Flow Diffusion Flames of Acetylene at Low Pressures with Photoionization Mass Spectrometry

S. A. Skeen, B. Yang, H. A. Michelsen, J. A. Miller, A. Violi, N. Hansen
Proc. Combust. Inst., **2013**, 34(1), 1067-1075

Exploring Formation Pathways of Aromatic Compounds in Laboratory-Based Model Flames of Aliphatic Fuels

N. Hansen, J. A. Miller, S. J. Klippenstein, P. R. Westmoreland, K. Kohse-Höinghaus
Combust. Expl. Shock Waves, **2012**, 48(5), 508-515

Fuel-Structure Dependence of Benzene Formation Processes in Premixed Flames Fueled by C_6H_{12} Isomers

N. Hansen, T. Kasper, B. Yang, T. A. Cool, W. Li, P. R. Westmoreland, P. Oßwald, K. Kohse-Höinghaus
Proc. Combust. Inst., **2011**, 33(1), 585-592

Biofuel Combustion Chemistry: From Ethanol to Biodiesel

K. Kohse-Höinghaus, P. Oßwald, T. A. Cool, T. Kasper, N. Hansen, F. Qi, C. K. Westbrook, P. R. Westmoreland
Angew. Chem. Int. Ed., **2010**, 49(21), 3572-3597

Recent Contributions of Flame-Sampling Molecular-Beam Mass Spectrometry to a Fundamental Understanding of Combustion Chemistry

N. Hansen, T. A. Cool, P. R. Westmoreland, K. Kohse-Höinghaus
Prog. Energy Combust. Sci., **2009**, 35(2), 168-191

Identification and Chemistry of C_4H_3 and C_4H_5 Isomers in Fuel-Rich Flames

N. Hansen, S. J. Klippenstein, C. A. Taatjes, J. A. Miller, J. Wang, T. A. Cool, B. Yang, R. Yang, L. Wei, C. Huang, J. Wang, F. Qi, M. E. Law, P. R. Westmoreland
J. Phys. Chem. A, **2006**, 110(10), 3670-3678

Photofragment Translational Spectroscopy of ClN_3 : Determination of the primary and secondary Dissociation Pathways

N. Hansen, A. M. Wodtke, J. C. Robinson, N. E. Sveum, S. J. Goncher, D. M. Neumark
J. Chem. Phys. **2005**, 123(10), 104305-1 – 104305-11

Velocity Map Ion Imaging of Chlorine Azide Photolysis: Evidence for Photolytic Production of cyclic-N₃

N. Hansen, A. M. Wodtke

J. Phys. Chem. A **2003**, 107(49), 10608-10614

The Rotational Spectrum of Dichlorocarbene C³⁵Cl₂ observed by Molecular Beam-Fourier Transform Microwave Spectroscopy

N. Hansen, H. Mäder, F. Temps

Phys. Chem. Chem. Phys. **2001**, 3(1), 50-55

Analysis of Internal Rotations in Ethyl Nitrite using Molecular Beam Fourier Transform Microwave Spectroscopy

N. Hansen, F. Temps, H. Mäder, N. W. Larsen

Phys. Chem. Chem. Phys. **1999**, 1(14), 3219-3233