



# Combustion

Science & Engineering, Inc.

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## **RICHARD G. JOKLIK, Ph.D.**

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### **EDUCATION:**

Ph.D., Mechanical Engineering, University of California, 1985.

M.S., Mechanical Engineering, University of California, 1982.

B.S., Mechanical Engineering, Massachusetts Institute of Technology, 1979.

### **PROFESSIONAL EXPERIENCE:**

#### **Director of Combustion Research & Development and Principal Engineer, Combustion Science and Engineering, Inc., Columbia, MD, 2001 to present.**

Responsible for the design and execution of experimental and analytical projects in fire and combustion research. Expertise includes optical and laser based measurement techniques for gas analysis and temperature (absorption and emission spectroscopy, laser induced fluorescence, and FTIR), and fluid flow measurement (flow visualization and hot-wire anemometry). Recent projects include investigation of NO<sub>x</sub> remediation in gas-turbine exhaust and experimental validation of CFD models. Recent analytical work has been focused on chemical kinetic modeling of pollutant formation and control (NO<sub>x</sub> and CH<sub>2</sub>O) in combustion systems. Other duties include the development of measurement techniques (sensors) for process performance verification and quality control, and providing both in-house and third party commercial product development/patent support.

#### **Consulting Engineer, 1996-2001**

Environmental monitoring technology assessment, research and development, testing design and analysis. Managed particulate matter continuous emissions monitoring projects and development of proposals for Kilkelly Environmental Associates. Developing and implementing Predictive Emissions Monitoring Systems (PEMS) for NO<sub>x</sub> and CO from gas turbines with Midwest Research Institute (2000-2001).

#### **Engineer, Energy and Environmental Research Corp., Durham, NC, 1993-1996.**

Project manager and principle investigator for an EPA contract to field test continuous emission monitoring systems for particulate matter and metals. Project manager and principle investigator for an EPA contract to survey and assess continuous emission measurement technologies for hazardous waste incineration. Project manager for an EPA contract to develop performance specifications and data quality objectives for multi-metals, particulate mater, and mercury continuous emissions monitors. Managed identification of data needs for regulation of waste incineration and development of associated test programs.

**Engineer, National Institute of Standards and Technology, Gaithersburg, MD, 1987-1992.**

Conducted research in reacting flows and diagnostics development, prepared reports, publications, and proposals for new research. Developed a laser induced fluorescence (LIF) temperature measurement technique for use in gas turbine combustors based on thermally-assisted OH fluorescence. Investigated flame dynamics of an acoustically-forced jet diffusion flame using laser absorption tomography. Investigated SiO<sub>2</sub> particulate formation in an opposed flow diffusion flame using Resonant Enhanced Multi-Photon Ionization (REMPI) spectroscopy.

**Engineer, Aerodyne Products Corp., Billerica, MA, 1986-1987.**

Developed a Raleigh scattering temperature measurement probe under contract to NASA for use in rocket combustors. Prepared reports, developed and prepared proposals.

**Research Assistant, Mechanical Engineering Department, University of California, Berkeley, CA, 1979-1986.**

Designed and assembled a low-pressure flame facility and laser diagnostics lab. Used laser absorption and emissions spectroscopy to measure CH concentrations over a wide range of flame conditions, compared results to detailed chemical kinetic modeling calculations. Used laser induced fluorescence to study CH collisional transfer rates under flame conditions. Developed and demonstrated a laser based technique for making high speed, non-intrusive temperature measurements in flames.

**PROFESSIONAL STANDING:**

Member, The American Society of Mechanical Engineers

Member, The Combustion Institute

Member, American Institute of Aeronautics and Astronautics

Member, Optical Society of America

**SELECTED PUBLICATIONS:**

Gokulakrishnan, P., Ramotowski, M.J., Gaines, G., Fuller, C., Joklik, R., Eskin, M.S., and Roby, R.J., "Experimental Study of NO<sub>x</sub> Formation in Lean, Premixed, Prevaporized Combustion of Fuel Oils at Elevated Pressures", paper GT2007-27552, presented at the ASME Turbo Expo 2007: Power for Land, Sea and Air, Montreal, Canada, May 2007.

R.G. Joklik and H.S. Rauenzahn, "Evaluation of Particulate Matter and Total Mercury Continuous Emissions Monitors for Compliance Monitoring at Hazardous Waste Combustion Facilities," *Proceedings of the Air and Waste Management Association 89th Annual Meeting*, June 23-28, 1996, Nashville, TN.

R.G. Joklik, "OH Vibrational Thermally-Assisted LIF Temperature Measurements in Flames," *Combustion Science and Technology*, 87, pp. 109-125 (1992).

- R.G. Joklik, J.J. Horvath, and H.G. Semerjian, "Temperature Measurements in Flames Using Thermally Assisted LIF of Ga," *Applied Optics* 30, pp. 1497-1504 (1991).
- M.R. Zachariah and R.G. Joklik, "Multiphoton Ionization Spectroscopy Measurements of Si Atoms in a Ceramic Particle Forming Flow," *Journal of Applied Physics*, 68,311 (1990).
- R.G. Joklik and J.W. Daily, "LIF Study of CH A-X (0,0) Collision Dynamics in a Low Pressure Oxy-Acetylene Flame," *Combustion and Flame*, 69,211 (1987).
- R.G. Joklik, J.W. Daily, and W.J. Pitz, "Measurements of CH Radical Concentrations in an Acetylene/Oxygen Flame and Comparisons to Modeling Calculations," *21st Symposium (International) on Combustion*, pp. 895-904 (1986).