

PROFESSOR RONALD K. (PRINCIPAL INVESTIGATOR)

EDUCATION AND TRAINING

Oregon State University	Mechanical Engineering	B.S.	(1961)
Arizona State University	Mechanical Engineering	M.Sc.	(1965)
Stanford University	Aeronautics and Astronautics	Ph.D.	(1968)

RESEARCH AND PROFESSIONAL EXPERIENCE

1994-present Clarence J. and Patricia R. Woodard Professor of Mechanical Engineering
1994-2009 Professor (by courtesy), Dept. of Aeronautics & Astronautics
1993-2004 Chair, Dept. of Mechanical Engineering
1984-present Professor, Dept. of Mechanical Engineering

SELECTED AWARDS (SINCE 2000)

2023. Julius Springer Award for Applied Physics
2023 AIAA SciTech Outstanding Paper Award
2022 Inaugural Distinguished Fellow, The International Shock Wave Institute
2021 Measurement Science and Technology's Outstanding Paper Award
2021 Dedicated Issue of Combustion and Flame
2020 The 100th Beacon Lecture, Tsinghua University
2019 The Pratt and Whitney Distinguished Lecture Award
2018 Distinguished Paper, 37th International Combustion Symposium
2018 Inaugural Fellow, The Combustion Institute
2016 Hue-Shen Tsien Professorship, China Academy of Science, Inst. of Mechanics
2016 Energy Systems Award, AIAA
2015 Milton Van Dyke Award, American Physical Society
2015 Tsien Professorship, China Academy of Sciences
2015 David Goodwin Memorial Lecture, Caltech, inaugural speaker
2014 Honorary Prof. Appt. at Xi'an Jiaotong U. & Northwestern Polytechnic U.
2013 Outstanding Paper of 2013, J. of Measurement Science and Technology
2013 Arch T. Colwell Award (co-winner), SAE
2012 Top 20 Most Published Author (Past 50 years), Applied Optics
2011 Best Paper Award, AIAA Propellants and Combustion
2011 Crocco Lecture, Princeton University; Fowler Lecture, Texas A&M
2011 R. I. Soloukhin Award, ICDERS
2010 Humboldt Senior Scientist Award
2010 Hottel Memorial Lecture, 33rd International Combustion Symposium
2008 Egerton Gold Medal, The Combustion Institute
2005 Propellants and Combustion Award, AIAA
2004 Fellow, American Society of Mechanical Engineers (ASME)
2002 Elected to National Academy of Engineering (NAE)
2002 Silver Medal, The Combustion Institute
2000 Best Paper of 2000, Journal of Measurement Science and Technology

RELEVANT PUBLICATIONS (FROM OVER 1300 TOTAL)

1. Goldenstein, C. S., Spearrin, R. M., Jeffries, J. B., and Hanson, R. K., "Infrared laser-absorption sensing for combustion gases," *Progress in Energy and Combustion Science*, vol. 60, 2017, pp. 132–176.
2. Schultz, I. A., Goldenstein, C. S., Strand, C. L., Jeffries, J. B., Hanson, R. K., and Goynes, C. P., "Hypersonic scramjet testing via TDLAS measurements of temperature and column density in a reflected shock tunnel," *52nd Aerospace Sciences Meeting*, 2014.
3. Hanson, R. K., "Applications of quantitative laser sensors to kinetics, propulsion and practical energy systems," *Proceedings of the Combustion Institute*, vol. 33, 2011, pp. 1–40.
4. Rieker, G. B., Jeffries, J. B., Hanson, R. K., Mathur, T., Gruber, M. R., and Carter, C. D., "Diode laser-based detection of combustor instabilities with application to a scramjet engine," *Proceedings of the Combustion Institute*, vol. 32 I, 2009, pp. 831–838.
5. Ben-Yakar, A., and Hanson, R. K., "Cavity Flame-Holders for Ignition and Flame Stabilization in Scramjets: An Overview," *Journal of Propulsion and Power*, vol. 17, Jul. 2001, pp. 869–877.

SYNERGISTIC ACTIVITIES

1. Fundamental Chemical Kinetics

Many definitive contributions to the chemical kinetics literature of key combustion and high-temperature air reactions have been made since the 1970s. These contributions are catalogued in the Stanford Fundamental Kinetics Database Utilizing Shock Tube Measurements.

2. Fundamental Spectroscopy and Laser Diagnostics Applied to Shock Tubes

From 1970 to the present, many contributions to fundamental databases for spectroscopic properties of gases, especially at high temperatures. By combining rapid-tuning lasers with shock tube methods for heating, unique measurements have been made of spectral parameters over a wide temperature range. Since the early 1970s, pioneered the use of lasers for sensitive and accurate species detection in shock tubes; these methods are now used in all leading shock tube laboratories in the world.

3. Board Membership

Conference Chairs: 30th International Combustion Symposium, International Symposia on Shock Waves, Gordon Conference on Combustion Diagnostics; Editorial Boards: Shock Waves – An International Journal, Journal of Quantitative Spectroscopy and Radiative Transfer, Progress in Energy and Combustion Science (1996-2002); International Symposia on Shock Waves (1987 – 2002); 15th Intl. Symposium on Shock Waves (1985).

4. Election to National Academies/Societies

Member of National Academy of Engineering, Fellow of the AIAA, ASME and the Optical Society of America, and Distinguished Fellow of the International Shock Wave Institute. Multiple gold medals from AIAA, ICDERS, and the Combustion Institute.

5. Graduate Education

Professor Hanson has graduated over 115 Ph.D. candidates and supervised over 20 postdoctoral scholars and research associates. He is currently supervising 22 M.S. and Ph.D. graduate students. As faculty at Stanford has successfully managed over 100 research contracts and grants, with a total value well over \$50 million. He and his students have authored over 1300 publications.

<http://hanson.stanford.edu/>