

Christopher Strand

Senior Research Engineer

Mechanical Engineering

Bio

ACADEMIC APPOINTMENTS

- Sr Research Engineer, Mechanical Engineering

Publications

PUBLICATIONS

- **Applications of hydrazine for the study of NH₂ kinetics-II: Self-reaction of NH₂ radicals** *COMBUSTION AND FLAME*
Rault, T. M., Simha, P., Streicher, J. W., Strand, C. L., Hanson, R. K.
2026; 288
- **Applications of Hydrazine for the study of NH₂ kinetics-I: N₂H₄ pyrolysis reactions** *COMBUSTION AND FLAME*
Rault, T. M., Simha, P., Streicher, J. W., Strand, C. L., Hanson, R. K.
2026; 288
- **Multi-parameter, kHz rate spectrally resolved NO PLIF in a supersonic jet** *OPTICS LETTERS*
Barnes, S. C., Lee, J., Clees, S., Vandervort, J. A., Strand, C. L., Hanson, R. K.
2026; 51 (4): 957-960
- **Experimental Measurement of the Rate Coefficient for OCS + M, with M = Ar, He, N₂, CO₂ in a Shock Tube Using Laser Absorption Spectroscopy.** *The journal of physical chemistry. A*
Panda, A., Biswas, P. A., Simitz, L. V., Streicher, J. W., Strand, C. L., Hanson, R. K.
2026
- **Vibrational-state-resolved relaxation and chemistry of carbon monoxide and nitrogen mixtures from 2000-10 250 K probing carbon monoxide in the ground to twelfth excited vibrational levels (vol37, 096112 , 2025)** *PHYSICS OF FLUIDS*
Streicher, J. W., Merrell, D. P., Strand, C. L., Hanson, R. K., Aiken, T. T., Andrienko, D. A., Boyd, I. D.
2025; 37 (12)
- **Ring-amplified shock tube for variable-gain, multi-wavelength absorption spectroscopy** *OPTICS EXPRESS*
Strand, C. L., Merrell, D., Thoeny, A., Streicher, J. W., Hanson, R. K.
2025; 33 (20): 42653-42676
- **High temperature collisional broadening of the oxygen A-band for partners O₂, N₂, and Ar** *JOURNAL OF QUANTITATIVE SPECTROSCOPY & RADIATIVE TRANSFER*
Merrell, D. P., Thoeny, A., Strand, C. L., Hanson, R. K.
2026; 348
- **Vibrational-state-resolved relaxation and chemistry of carbon monoxide and nitrogen mixtures from 2000-10 250 K probing carbon monoxide in the ground to twelfth excited vibrational levels** *PHYSICS OF FLUIDS*
Streicher, J. W., Merrell, D. P., Strand, C. L., Hanson, R. K., Aiken, T. T., Andrienko, D. A., Boyd, I. D.
2025; 37 (9)
- **Laser-absorption sensor suite for crank-angle-resolved, *in situ* measurements in the exhaust of a high-performance internal combustion engine-I: temperature and H₂O** *APPLIED OPTICS*
Clees, S., Santos, J. P., Vandervort, J. A., Strand, C. L., Hanson, R. K., Ghoniim, A., French, B., Gilmour, A., Ferlet, X.

2025; 64 (19): 5499-5508

- **Laser-absorption sensor suite for crank-angle-resolved, *in-situ* measurements in the exhaust of a high-performance internal combustion engine-II: CO, CO₂, and unburned hydrocarbons** *APPLIED OPTICS*
Vandervort, J. A., Clees, S., Santos, J. P., Strand, C. L., Hanson, R. K., Ghoniem, A., French, B., Gilmour, A., Ferlet, X.
2025; 64 (19): 5509-5518
- **Temperature and Enthalpy Characterization of NASA Arcjet Using Oxygen and Nitrogen Absorption** *JOURNAL OF THERMOPHYSICS AND HEAT TRANSFER*
Finch, P. M., Granowitz, Z. N., Strand, C. L., Hanson, R. K., MacDonald, M. E., Hui, F. C. L., Gokcen, T.
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- **Simultaneous spatially resolved temperature, pressure, and velocity measurements in high-enthalpy gas environments using spectrally resolved laser-induced fluorescence of potassium vapor (vol 131, 4, 2025)** *APPLIED PHYSICS B-LASERS AND OPTICS*
Vandervort, J. A., Barnes, S. C., Clees, S., Strand, C. L., Hanson, R. K.
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- **A laser-absorption diagnostic for O₂ concentration and temperature using a portable, tunable UV laser system** *APPLIED PHYSICS B-LASERS AND OPTICS*
Barnes, S. C., Clees, S., Vandervort, J. A., Rault, T. M., Streicher, J. W., Strand, C. L., Hanson, R. K.
2025; 131 (4)
- **Simultaneous spatially resolved temperature, pressure, and velocity measurements in high-enthalpy gas environments using spectrally resolved laser-induced fluorescence of potassium vapor** *APPLIED PHYSICS B-LASERS AND OPTICS*
Vandervort, J. A., Barnes, S. C., Clees, S., Strand, C. L., Hanson, R. K.
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- **A shock tube study of chaperon efficiencies for the NH₃+M-NH₂+H + M reaction during ammonia pyrolysis** *PROCEEDINGS OF THE COMBUSTION INSTITUTE*
Simha, P., Rault, T. M., Clees, S., Streicher, J. W., Strand, C. L., Hanson, R. K.
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- **Second-generation *in-situ* TDLAS sensor for supersonic gas measurements in a shock tube**
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AMER INST AERONAUTICS & ASTRONAUTICS.2025
- **Simultaneous point measurements of temperature, pressure, and velocity using spectrally resolved laser-induced fluorescence of atomic potassium vapor in air**
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- **Shock Tube ARAS Measurements of N(²D) and N(²P) in 5100K to 6400K Nitrogen-Argon Mixtures**
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- **A Rapidly Tunable Laser System for Measurements of NH₂ at 597 nm Behind Reflected Shock Waves.** *Sensors (Basel, Switzerland)*
Clees, S., Barnes, S. C., Rault, T. M., Strand, C. L., Hanson, R. K.
2024; 24 (24)
- **Measurement of hydrogen and nitrogen via collision-induced infrared absorption** *INTERNATIONAL JOURNAL OF HYDROGEN ENERGY*
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- **Collisional broadening and pressure shift coefficients for the potassium D1 and D2 transitions in oxygen and carbon dioxide at high temperatures** *JOURNAL OF QUANTITATIVE SPECTROSCOPY & RADIATIVE TRANSFER*
Vandervort, J. A., Kotsarinis, K., Barnes, S. C., Strand, C. L., Hanson, R. K.

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- **A Rapidly Tunable Laser System for Measurements of NH_2 at 597 nm Behind Reflected Shock Waves** *SENSORS*
Clees, S., Barnes, S. C., Rault, T. M., Strand, C. L., Hanson, R. K.
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- **Shock-Layer Measurements in T5 Shock Tunnel Hypersonic Flows Around a Cylinder Model** *AIAA JOURNAL*
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- **Experimental temperature- and pressure-dependent absorbance cross sections and a pseudo-line-list model for methyl formate near 5.7 . 7 μm** *JOURNAL OF QUANTITATIVE SPECTROSCOPY & RADIATIVE TRANSFER*
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- **A laser diagnostic for lineshape-based gas temperature and pressure measurements targeting a single atomic potassium absorption transition** *APPLIED PHYSICS B-LASERS AND OPTICS*
Vandervort, J. A., Schwartz, T., Barnes, S. C., Strand, C. L., Hanson, R. K.
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- **Development of a vapor-based method for seeding alkali metals in shock tube facilities** *SHOCK WAVES*
Vandervort, J. A., Barnes, S. C., Strand, C. L., Hanson, R. K.
2024; 34 (1): 61-67
- **Fiber-coupled optical probe for laser absorption diagnostics in shock tube experiments with high concentrations of non-monatomic species** *PROCEEDINGS OF THE COMBUSTION INSTITUTE*
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- **Simulations of Non-Equilibrium Air Chemistry Compared To Hypersonic Wind Tunnel Experiments**
Gross, T. J., Torres, E., Schwartzentruber, T. E., Finch, P. M., Girard, J. J., Schwartz, T., Granowitz, Z. N., Strand, C. L., Hanson, R. K., Yu, W. M., Austin, J. M., Hornung, H. G., AIAA
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- **Shock-Tube Measurements of Atomic Nitrogen Collisional Excitation in 8000-12000 K Partially Ionized Nitrogen-Argon Mixtures.** *The journal of physical chemistry. A*
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- **Investigating Arcjet Mixing and Enthalpy Loss Using Atomic Oxygen Laser Absorption Spectroscopy** *AIAA JOURNAL*
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Su, W., Boulet, C., Almodovar, C. A., Ding, Y., Strand, C. L., Hanson, R. K.
2022; 278
- **Measurements of Reflected Shock Tunnel Freestream Nitric Oxide Temperatures and Partial Pressure** *AIAA JOURNAL*
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2021; 32 (12)
- **Line mixing in the nitric oxide R-branch near 5.2 μm at high pressures and temperatures: Measurements and empirical modeling using energy gap fitting** *JOURNAL OF QUANTITATIVE SPECTROSCOPY & RADIATIVE TRANSFER*
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- **Shock tube measurements of high-temperature argon broadening and shift parameters for the potassium D1 and D2 resonance transitions** *JOURNAL OF QUANTITATIVE SPECTROSCOPY & RADIATIVE TRANSFER*
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- **Scientific accomplishments and research avenues of Professor Ronald Hanson** *COMBUSTION AND FLAME*
Davidson, D. F., Jeffries, J. B., Oehlschlaeger, M. A., Strand, C. L.
2021; 224: 2–5
- **Development of a Stark shift measurement technique using excited-state oxygen atoms to determine electron number density in shock heated O-2/Ar above 10 000 K** *PLASMA SOURCES SCIENCE & TECHNOLOGY*
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- **Time-resolved, single-ended laser absorption thermometry and H₂O, CO₂, and CO speciation in a H-2/C₂H₄-fueled rotating detonation engine** *PROCEEDINGS OF THE COMBUSTION INSTITUTE*
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- **An In Situ Laser-Absorption Sensor for Crank Angle-Resolved Temperature, Pressure, and Humidity in Intake-Runner Flows** *SAE INTERNATIONAL JOURNAL OF ENGINES*
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- **Temperature-dependent absorption cross section measurements for propene, 1-butene, cis/trans-2-butene, isobutene and 1,3-butadiene in the spectral region 8.4-11.7 μm** *JOURNAL OF QUANTITATIVE SPECTROSCOPY & RADIATIVE TRANSFER*
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- **Analysis of laser absorption gas sensors employing scanned-wavelength modulation spectroscopy with 1f-phase detection** *APPLIED PHYSICS B-LASERS AND OPTICS*
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Li, Y. n., Wang, S. n., Strand, C. L., Hanson, R. K.
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- **Calibration-free breath acetone sensor with interference correction based on wavelength modulation spectroscopy near 8.2 μ m** *APPLIED PHYSICS B-LASERS AND OPTICS*
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2019; 30 (3)
- **Single-Ended Sensor for Thermometry and Speciation in Shock Tubes Using Native Surfaces** *IEEE Sensors Journal*
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- **Fitting of calibration-free scanned-wavelength-modulation spectroscopy spectra for determination of gas properties and absorption lineshapes** *APPLIED OPTICS*
Goldenstein, C. S., Strand, C. L., Schultz, I. A., Sun, K., Jeffries, J. B., Hanson, R. K.
2014; 53 (3): 356-367
- **Supersonic Mass-Flux Measurements via Tunable Diode Laser Absorption and Nonuniform Flow Modeling** *49th AIAA Aerospace Sciences Meeting / New Horizons Forum and Aerospace Exposition*
Chang, L. S., Strand, C. L., Jeffries, J. B., Hanson, R. K., Diskin, G. S., Gaffney, R. L., Capriotti, D. P.
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