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Engineering & Scientific Consulting

James Rundel, Ph.D., P.E., CFEI

Senior Engineer | Thermal Sciences
Los Angeles
+1-310-754-2721 | jrundel@exponent.com

Professional Profile

Dr. Rundel has expertise in thermodynamics, combustion, reacting flows, heat transfer, and energy systems. He performs origin and cause investigations of fires and explosions, with particular experience involving wildland fires, and applies his expertise to a wide range of complex problems involving fires, explosions, and thermal failures.

Dr. Rundel's project experience includes investigations and analyses involving fires and explosions; compressed gas cylinders; fireworks and pyrotechnic devices; regulatory and operational considerations for natural gas systems; and compliance and clearance considerations related to munitions and explosives. He has conducted origin and cause investigations of wildland and structure fires and has evaluated thermal failures and fire hazards involving consumer products and equipment. His work has also involved matters related to utility infrastructure and gas distribution systems, such as master meter systems, and included testing and analysis with evaluation in the context of applicable codes, standards, and industry practices.

Prior to joining Exponent, Dr. Rundel worked in the utility industry, with experience in natural gas distribution, operations and maintenance of coal-fired and natural-gas combined-cycle power plants, and energy management and efficiency services for large electric customers, including rate review, load analysis, and basic energy audits. He maintains an ongoing interest in energy systems and power generation. His graduate research focused on combustion and pyrolysis processes associated with soot and carbonaceous particle formation. This work combined laboratory experimentation, including flow-tube pyrolysis and photoionization mass spectrometry to characterize combustion-generated aerosols, with computational analysis of chemical reaction pathways and kinetics.

Academic Credentials & Professional Honors

Ph.D., Mechanical Engineering, University of Colorado, Boulder, 2023

M.S., Mechanical Engineering, University of Wyoming, 2018

B.S., Energy Systems Engineering, University of Wyoming, 2014

Licenses and Certifications

Professional Engineer Mechanical, California, #M42172

Professional Engineer, Colorado, #PE.0064210

40-Hour Hazardous Waste Operation and Emergency Response Certification (HAZWOPER) (CA)

FI-210, Wildland Fire Origin and Cause Determination

Certified Fire and Explosion Investigator (CFEI)

Fire Investigation 1A (Cause and Origin), California Office of State Fire Marshal (CA)

Prior Experience

Rotational Engineer, Black Hills Corp., 2014-2016

Professional Affiliations

National Fire Protection Association (member)

International Association of Wildland Fire (member)

National Association of Fire Investigators (member)

American Chemical Society (member)

American Society of Mechanical Engineers (member)

American Association for the Advancement of Science (member)

Patents

US Patent No. 11205565, Belmont, E., Basile, F., Rundel, J., Goodenough, A., Non-intrusive laser-based technique for monitor and control of protein denaturation on surfaces, December 2021

Publications

Rundel, J., Martí, C., Zádor, J., Schrader, P., Johansson, K., Bambha, R., Buckingham, G., Porterfield, J., Kostko, O., Michelsen, H. The identity and chemistry of C7H7 radicals observed during soot formation. The Journal of Physical Chemistry A, 127 (13), 2023; 3000-3019.

Rundel, J., Johansson, K., Schrader, P., Bambha, R., Wilson, K., Zádor, J., Ellison, G., Michelsen, H. Production of aliphatic-linked polycyclic hydrocarbons during radical-driven particle formation from propyne and propene pyrolysis. Combustion and Flame (In Press), 2022; 112457.

Rundel, J., Thomas, C., Schrader, P., Wilson, K., Johansson, K., Bambha, R., Michelsen, H. Promotion of particle formation by resonance-stabilized radicals during hydrocarbon pyrolysis. Combustion and Flame (243), 2022; 111942.

Presentations

Rundel, J., Insights into Soot Formation Chemistry from Aerosol Mass Spectrometry Coupled with Synchrotron VUV Photoionization, 5th QUADMARTS Conference, Estes Park, CO, June 2023

Rundel, J., Thomas, C., Johansson, P., Schrader, P., Bambha, R., Zádor, J., Wilson, K., Michelsen, H., Solving Soot: Resonance-Stabilized Radicals and the CHRCR Mechanism (Poster), Sandia National Laboratories Research Day, Boulder, CO, August 2022.

Rundel, J., Schrader, P., Wilson, K., Johansson, O., Michelsen, H., Links Between Resonance-Stabilized Radicals & Sooting Onset in Pyrolysis Experiments (Poster), International Sooting Flame Workshop 5, January 2021.

Goodenough, A., Rundel, J., Basile, F., Belmont, E., Radiative Heating Thermal Decomposition/Digestion for On-Tissue Digestion of Proteins for Imaging-MALDI-MS, Proceedings of the 66th ASMS Conference, San Diego, CA June 2018.

Miura, N.M., Rundel, J., Jaimes, D., Welchert, N., Christiansen, E., Investigating the Ignition Propensity of Forest Fuels by Molten Copper and Aluminum Droplets (Poster), Fire Behavior and Fuels Conference, International Association of Wildland Fire, Boisie, ID, April 2024