



**Exponent**<sup>®</sup>  
Engineering & Scientific Consulting

## James Vickery

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### Professional Profile

Mr. Vickery specializes in fire and explosion hazard analysis, prevention and investigation, particularly combustible dust hazards and battery failures. Through his education and work experience, he possesses expertise in thermodynamics, fluid dynamics, heat transfer, and combustion. Mr. Vickery has broad experience performing standardized testing, such as UL or ASTM standards, and developing custom experimental setups. He has applied his expertise to a variety of applications including lithium-ion batteries, combustible dusts, burn injuries, industrial and consumer products, fuel gas systems, and fire and explosion investigation.

Mr. Vickery applies his expertise to assess the safety of batteries and battery-powered systems. His work focuses on failures and thermal runaway of lithium-ion battery systems. He has extensive experience performing a variety of battery abuse tests involving cell external heating, nail penetration, overcharge, and overcurrent. The tests have been used to characterize the thermal hazard (i.e. heat release rate and properties of vent gases) and evaluate mitigation features and fire protection devices. Mr. Vickery has experience advising on best practices for fighting fires involving lithium-ion batteries, particularly in systems with large energy capacities such as electric vehicles and battery energy storage systems.

Mr. Vickery applies his knowledge to fire and explosion hazards, particularly combustible dust hazards. Prior to joining Exponent, Mr. Vickery was a graduate student in McGill University's Alternative Fuels Laboratory where he experimentally studied combustible dust-air flames. Since joining Exponent, Mr. Vickery has leveraged his combustible dust background to perform ASTM standard tests assessing the explosibility/combustibility hazard of different dusts. Additionally, Mr. Vickery uses his expertise to perform Dust Hazard Analyses (DHAs) in a variety of industrial settings. Mr. Vickery is an alternate member of the technical committee for NFPA 484: Standard for Combustible Metals.

### Academic Credentials & Professional Honors

B.M.E., McGill University, 2014

### Professional Affiliations

Combustion Institute (member)

### Publications

Vickery J, Julien P, Goroshin S, Frost DL, Bergthorson JM. Propagation of isobaric spherical flames in hybrid aluminum-methane fuel mixtures. *J. Loss. Prev.* 2017; 472-480.

Soo M, Goroshin S., Glumac N, Kumashiro K, Vickery J, Frost DL, Bergthorson JM. Emission and laser absorption spectroscopy of flat flames in aluminum suspensions. *Combust. Flame* 2017; 180:230-238.

Bergthorson JM, Yavor Y, Palecka J, Georges W, Soo M, Vickery J, Goroshin S, Frost DL, Higgins AJ. Metal-water combustion for clean propulsion and power generation. *Appl. Energy* 2017; 186:13-27.

Julien P, Vickery J, Goroshin S, Frost DL, Bergthorson JM. Freely-propagating flames in aluminum dust clouds. *Combust. Flame* 2015; 162:4241-4253.

Julien P, Vickery J, Whiteley A, Wright A, Goroshin S, Bergthorson JM, Frost DL. Effect of scale on freely-propagating flames in aluminum dust clouds. *J. Loss Prev. Ind.* 2014; 26:230-236.

## **Presentations**

Vickery J, Julien P, Goroshin S, Frost DL, Bergthorson JM. Spherically-expanding flames in hybrid aluminum methane fuel mixtures at atmospheric pressure. International Colloquium on Detonations, Explosions, and Reactive Systems, Boston, MA, August 2017.

Vickery J, Julien P, Goroshin S, Frost DL, Bergthorson JM. Spherically-expanding flames in hybrid aluminum methane fuel mixtures. *Combust. Institute Canadian Section Spring Technical Meeting*, Montreal, QC, May 2017.

Vickery J, Julien P, Goroshin S, Frost DL, Bergthorson JM. Thermodiffusive instabilities in flames propagating through aluminum dust clouds, *Combust. Institute Canadian Section Spring Technical Meeting*, Waterloo, Ont., May 2016.

Julien P, Vickery J, Goroshin S, Frost DL, Bergthorson JM. Pulsating and spiral thermo-diffusive instabilities in aluminum dust clouds. U.S. National Combustion Meeting, Cincinnati, OH, May 2015.