John L. Pagliaro, Ph.D., P.E., CFEI

Senior Managing Engineer

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Professional Profile

Dr. Pagliaro is a Senior Managing Engineer at Gexcon US who specializes in the areas of combustion, fire science, heat transfer, thermodynamics, fluid mechanics, and process safety. He applies his expertise to the investigation and analysis of fires, explosions, carbon monoxide exposures, chemical releases, and failures involving gas delivery systems, industrial and residential gas-fired appliances, dust handling equipment, heavy machinery, self-reactive materials, and electronic components. Dr. Pagliaro uses numerical and experimental methods to formulate and test cause and origin hypotheses and supports incident investigations through review of safety codes and standards and technical product literature.

Dr. Pagliaro also performs fire and explosion consequence/mitigation studies. He has participated in experimental and numerical studies to quantify the hazards related to flammable refrigerants, hydrogen detonations, and large-scale deflagration to detonation transitions. He also applies CFD to predict the consequences of combustible dust explosions and to determine effective mitigation measures for complex dust handling equipment.

Prior to joining Gexcon, Dr. Pagliaro was a guest researcher in the Fire Research Division at National Institute of Standards and Technology (NIST). His research focused on characterizing the performance of chemically active gas-phase fire suppressants for use in commercial aircraft, as well as characterizing the flammability of new environmentally friendly refrigerant working fluids. While at NIST, he designed, built, and operated experiments to measure fundamental properties of premixed flames, including flammability limits, minimum ignition energy, laminar burning velocity, and flame response to stretch. In addition, Dr. Pagliaro used detailed chemical kinetic models to study halogenated flame chemistry and to understand the suppressing effectiveness of halogenated fire suppressants and the reduced reactivity of halogenated refrigerants.

Academic Credentials

Ph.D., Mechanical Engineering, University of Maryland, 2015

M.S., Fire Protection Engineering, University of Maryland, 2012

B.S., Double Major - Mechanical Engineering / Engineering Science and Mechanics, Virginia Polytechnic Institute and State University, 2010

Teaching Experience

Lecturer: University of Maryland, College Park, Department of Fire Protection Engineering, Course Title - Fire and Explosion Investigation and Reconstruction - ENFP465 / ENFP 665. Spring 2024, 2025.

Licenses and Certifications

Authorized Professional Engineer, Maryland, #53621

Certified Fire and Explosion Investigator (CFEI) in accordance with the National Association of Fire Investigators National Certification Board per NFPA 921

Publications and Conference Proceedings

Pagliaro, J.L., Davis, S.G, DeBold, T.F. (September 2024). Part 2 - 2012 Flaminia Explosion and Fire Investigation Findings and Lessons Learned. *10th International Symposium on Fire Investigation Science and Technology (ISFI 2024)*. Orlando, Florida.

Davis, S.G, Pagliaro, J.L., DeBold, T.F. (September 2024). Part 1 - 2012 Flaminia Explosion and Fire How to Accurately Predict Thermal Runaway: Experimental Study Involving Lab-Scale and Full-Scale Tests. *10th International Symposium on Fire Investigation Science and Technology (ISFI 2024)*. Orlando, Florida.

Davis, S.G., Pagliaro, J.L., DeBold, T.F. (September 2024). Odor Fade: When Propane Tanks Need Extra Conditioning. *10th International Symposium on Fire Investigation Science and Technology (ISFI 2024)*. Orlando, Florida.

DeBold, T.F., Pagliaro, J.L., Davis, S.G. (September 2024). Slipping Through the Cracks - How Underground Gas Leaks Can Preferentially Migrate and Cause Explosions. *10th International Symposium on Fire Investigation Science and Technology (ISFI 2024)*. Orlando, Florida.

Davis, S.G., DeBold, T.F., Pagliaro, J.L. (September 2024). When Investigators Resist the Scientific Method: A Case Study Showing Increased Burning Hazards Caused by Flame Jetting. *10th International Symposium on Fire Investigation Science and Technology (ISFI 2024)*. Orlando, Florida.

Davis, S.G., DeBold, T.F., Pagliaro, J.L. (September 2024). Lessons Learned When Low-Pressure Natural Gas Components are Overpressurized. *10th International Symposium on Fire Investigation Science and Technology (ISFI 2024)*. Orlando, Florida.

Dutro, G.M., Sanai, M., Davis, S.G., Pagliaro, J.L. (July 2024). Pressure Resistant Designs to Withstand Hydrogen-Oxygen Deflagration to Detonation Transitions: Experimental Evaluation and Numerical Modeling Validation. *47th International Pyrotechnics Society Seminar*. Albuquerque, New Mexico.

Davis, S.G., Pagliaro, J.L., Botwinick, D., Engel, D.M. (March 2024). Large scale testing confirms: A deflagration to detonation transition needs to be considered when facility siting – Invited Best-of-the-Best Papers. *American Institute of Chemical Engineers 2024 Spring Meeting and 20th Global Congress on Process Safety*. New Orleans, Louisiana.

Davis, S.G., Pagliaro, J.L., Engel, D.M., DeBold T. (March 2024). Safety strategies to avoid possible pitfalls and ensure the safe use of hydrogen. *American Institute of Chemical Engineers 2024 Spring Meeting and 20th Global Congress on Process Safety*. New Orleans, Louisiana.

Davis, S.G., Pagliaro, J.L., Engel, D.M., DeBold T. (March 2024). How to accurately predict thermal runaway: Experimental study involving lab-scale and full-scale tests. *American Institute of Chemical Engineers 2024 Spring Meeting and 20th Global Congress on Process Safety*. New Orleans, Louisiana.

Davis, S.G., Pagliaro, J.L. (February 2024). Understanding and managing risks for the hydrogen technology. *Hydrogen Safety & Hazardous Areas Conference.* Brisbane, Australia.

Davis, S.G., Pagliaro, J.L., Engel, D.M. (March 2023). Protecting gasoline storage tanks from lightning: Lessons learned from a recent gasoline storage tank explosion and fire. *American Institute of Chemical Engineers 2023 Spring Meeting and 19th Global Congress on Process Safety*. Houston, Texas.

Davis, S.G., Engel, D.M., Pagliaro, J.L. (March 2023). Ammonia safety: Emergency ventilation design for machinery rooms. *American Institute of Chemical Engineers 2023 Spring Meeting and 19th Global Congress on Process Safety*. Houston, Texas.

Davis, S.G., Pagliaro, J.L. (February 2023). Strategies to safely manage the new hydrogen technology. *Hydrogen Safety & Hazardous Areas Conference.* Brisbane, Australia.

Davis, S.G., Pagliaro, J.L., Engel, D.M., DeBold, T. (April 2022). Propane cylinder BLEVE: Investigation findings and lessons learned in the 2014 Philadelphia food truck explosion. *American Institute of Chemical Engineers 2022 Spring Meeting and 18th Global Congress on Process Safety*. San Antonio, Texas.

Davis, S.G., Pagliaro, J.L., Engel, D., DeBold, T. (April 2022). Improving our understanding of hydrogen through testing and advanced modeling to avoid possible pitfalls and ensure its safe use. *American Institute of Chemical Engineers 2022 Spring Meeting and 18th Global Congress on Process Safety*. San Antonio, Texas.

Davis, S.G., DeBold, T., Engel, D., Pagliaro, J.L. (April 2022). Why do devastating ammonium nitrate detonations still occur? Lessons still not learned in Beirut, Tianjin and West Texas. *American Institute of Chemical Engineers 2022 Spring Meeting and 18th Global Congress on Process Safety*. San Antonio, Texas.

Davis, S.G., Engel, D., Pagliaro, J.L. (March 2022). Machinery room ventilation and ammonia release computational fluid dynamics (CFD) study. *44th Annual Meeting International Institute of Ammonia Refrigeration*. Savannah, Georgia.

Hegetschweiler, M.J., Pagliaro, J.L., Berger, L., Hesse, R., Beeckmann, J., Bariki, C., Pitsch, H., & Linteris, G.T. (2022). Data reduction considerations for spherical R-32(CH_2F_2)-air flame experiments. *Combustion and Flame*. doi.org/10.1016/j.combustflame.2021.111806

Pagliaro, J.L, & Davis, S.G. (2020). Comparison of simple and complex methods for determining refrigerant/air laminar burning velocities from the pressure rise in constant-volume experiments. *Science and Technology for the Built Environment*. doi.org/10.1080/23744731.2020.1715249

Hegetschweiler, M.J., Pagliaro, J.L., Berger, L., Hesse, R., Beeckmann, J., Pitsch, H., & Linteris, G.T. (2020). Effects of stretch and radiation on the laminar burning velocity of R32-air flames. *Science and Technology for the Built Environment*. doi.org/10.1080/23744731.2020.1717244

Davis, S.G., Pagliaro, J.L., Botwinick, D., DeBold, T., van Wingerden, K., Allason, D., & Johnson, D. M. (2019). Do not believe the hype: Using case studies and experimental evidence to show why the HSE is wrong about excluding deflagration-to-detonation transitions. *Process Safety Progress*, *38*(2). doi.org/10.1002/prs.11998

Davis, S.G., & Pagliaro, J.L. (2019). Importance of properly designing dust explosion protection systems: Case study – 2014 plywood manufacturing facility fire and explosion. *Process Safety Progress*, *38*(4). doi.org/10.1002/prs.12036.

Burrell, R.R., Pagliaro, J.L., & Linteris, G.T. (2019). Effects of stretch and thermal radiation on difluoromethane/air burning velocity measurements in constant volume spherically expanding flames. *Proceedings of the Combustion Institute*, *37*(3), 4231-4238. doi.org/10.1016/j.proci.2018.06.018

Davis, S.G., Pagliaro, J.L., Botwinick, D (March 2019). Fire hazards and mitigation measures of ASHRAE Class A3 refrigerants in commercial refrigeration applications. *International Institute of Ammonia Refrigeration 2019 Natural Refrigeration Conference*. Phoenix, Arizona.

Davis, S.G., Pagliaro, J.L., Botwinick, D., and van Wingerden, K. (March 2019). How effective are safety gaps at mitigating explosions: Large scale testing of safety gaps to prevent DDTs. *15th Global Congress on Process Safety*. New Orleans, Louisiana.

Davis, S.G. and Pagliaro, J.L. (September 2018). Investigation findings and lessons learned in the 2014 Georgia Pacific Corrigan facility fire and explosion. *9th International Symposium on Fire Investigation Science and Technology (ISFI 2018)*. Itasca, Illinois.

Davis, S.G., Pagliaro, J.L., DeBold, T.F. (September 2018). Propane safety: Investigation findings and lessons learned in the 2014 Philadelphia food truck explosion. *9th International Symposium on Fire Investigation Science and Technology (ISFI 2018)*. Itasca, Illinois.

Davis, S.G., DeBold, T.F., Pagliaro, J.L. (September 2018). Are liquid propane leaks really 270 times larger than vapor? Case study regarding the physics of liquid and vapor propane leaks. *9th International Symposium on Fire Investigation Science and Technology (ISFI 2018)*. Itasca, Illinois.

DeBold, T.F, Pagliaro, J.L., Davis, S.G. (September 2018). Could this gas leak have caused the explosion? Case study showing why air infiltration needed to be considered to explain flammable gas accumulation. *9th International Symposium on Fire Investigation Science and Technology (ISFI 2018)*. Itasca, Illinois.

Davis, S.G., Botwinick, D., Pagliaro, J.L., Engel, D., van Wingerden K., Johnson, M. (August 2018). Advanced technique to study deflagration to detonation transition (DDT) at large scales. *12th International Symposium on Hazards, Prevention, and Mitigation of Industrial Explosions (ISHPMIE)*. Kansas City, USA.

Davis, S.G. and Pagliaro, J.L. (April 2018). Importance of properly designing dust explosion protection systems: Case study – 2014 Georgia Pacific Corrigan facility fire and explosion. *AICHE 14th Global Congress on Process Safety*. Orlando, Florida.

Davis, S.G., Pagliaro, J.L., Botwinick, D., van Wingerden, K., Allanson, D., Johnson, D.M. (April 2018). Don't believe the hype: Using case studies and experimental evidence to show why the HSE is wrong about excluding DDTs. *AICHE 14th Global Congress on Process Safety*. Orlando, Florida.

Davis, S.G., Pagliaro, J.L., DeBold, T.F, van Wingerden, M., van Wingerden, K. (March 2018). Large scale flammability and explosivity testing of ammonia: Impact on ammonia safety in refrigeration applications. *International Institute of Ammonia Refrigeration 2018 Natural Refrigeration Conference*. Colorado Springs, Colorado.

Davis, S. G., Pagliaro, J. L., DeBold, T. F., Van Wingerden, M., & Van Wingerden, K. (2017). Flammability and explosion characteristics of mildly flammable refrigerants. *Journal of Loss Prevention in the Process Industries*, *49*, 662-674. doi.org/10.1016/j.jlp.2017.05.019

Pagliaro, J. L., & Linteris, G. T. (2017). Hydrocarbon flame inhibition by $C_6F_{12}O$ (Novec 1230): Unstretched burning velocity measurements and predictions. *Fire Safety Journal*, *87*, 10-17. doi.org/10.1016/j.firesaf.2016.11.002

Pagliaro, J.L., Davis, S.G., van Wingerden, K. (October 2017). Is my facility at risk? Understanding the risks associated with low burning velocity compounds. *Mary Kay O'Connor Process Safety Center International Symposium*. College Station, Texas.

Davis, S.G., Pagliaro, J.L., DeBold, T.F., van Wingerden, M., van Wingerden, K. (March 2017). Large scale flammability and explosivity testing of low burning velocity gases: Validity of prediction tools and impact on siting studies and risk assessments. *AICHE 13th Global Congress on Process Safety*. San Antonio, Texas.

Davis, S.G., Pagliaro, J.L., Botwinick, D., Engel, D., van Wingerden, K., Merilo, E., Ziemba, A., Groethe, M. (March 2017). Large scale testing confirms: A deflagration to detonation transition needs to be considered when facility siting. *AICHE 13th Global Congress on Process Safety*. San Antonio, Texas.

Pagliaro, J.L., Bouvet, N., & Linteris, G.T. (2016). Premixed flame inhibition by CF_3Br and $C_3H_2F_3Br$ (2-BTP). *Combustion and Flame*, *169*, 272-286. doi.org/10.1016/j.combustflame.2016.04.017

Linteris, G.T., Babushok, V.I., Pagliaro, J.L., Burgess Jr, D.R., Manion, J.A., Takahashi, F., ... & Baker, P.T. (2016). Understanding overpressure in the FAA aerosol can test by $C_3H_2F_3Br$ (2-BTP). *Combustion and Flame*, *167*, 452-462. doi.org/10.1016/j.combustflame.2015.10.022

Pagliaro, J.L., Linteris, G.T., & Babushok, V.I. (2016). Premixed flame inhibition by $C_2HF_3Cl_2$ and C_2HF_5. *Combustion and Flame*, *163*, 54-65. doi.org/10.1016/j.combustflame.2015.08.015

Davis, S.G., Pagliaro, J.L., DeBold, T.F., van Wingerden, M., van Wingerden, K. (July 2016). Flammability and explosion characteristics of marginally flammable refrigerants. *11th International Symposium on Hazards, Prevention, and Mitigation of Industrial Explosions (ISHPMIE)*. Dalian, China.

Pagliaro, J.L. and Linteris, G.T. (March 2016). Burning velocities of marginally flammable refrigerant-air mixtures. *Spring Technical Meeting, Eastern States Section of the Combustion Institute*. Princeton, NJ.

Pagliaro, J.L., Linteris, G.T., Sunderland, P.B., & Baker, P.T. (2015). Combustion inhibition and enhancement of premixed methane–air flames by halon replacements. *Combustion and Flame*, *162*(1), 41-49. doi.org/10.1016/j.combustflame.2014.07.006

Pagliaro, J.L., Linteris, G.T., Sunderland, P.B. (May 2015). Enhancement of premixed methane-air flames by Halon 1301 replacements. *9th U.S. National Meeting of the Combustion Institute*. Cincinnati, OH.

Babushok, V.I., Linteris, G.T., Meier, O.C., & Pagliaro, J.L. (2014). Flame inhibition by CF_3CHCl_2 (HCFC-123). *Combustion Science and Technology*, *186*(6), 792-814. doi.org/10.1080/00102202.2013.878709

Pagliaro, J.L., Linteris, G.T., Babushok, V.I., Sunderland, P.B., Baker, P.T. (October 2014). Reduced-scale experiments for screening, model validation, and understanding full-scale results of marginally flammable mixtures. *NIST Workshop "Exothermic Reaction of Halogenated Hydrocarbons*. Gaithersburg, MD.

Linteris, G.T., Manion, J.A., Tsang, W., Burgess Jr, D.R., Babushok, V., Katta, V.R., ... & Pagliaro, J.L. (December 2013). Overpressure in the FAA aerosol can test with halon replacements. *7th Triennial International Fire & Cabin Safety Research Conference*. Federal Aviation Administration Atlantic City, NJ.

Technical Reports

Davis, S.G., Engel, D.M., Pagliaro, J.L. Machinery room ventilation and ammonia computational fluid dynamics (CFD) study. 2022, International Association of Ammonia Refrigeration (IIAR) Ammonia Refrigeration Foundation (ARF).

Davis, S.G., Engel, D.M., Pagliaro, J.L. Combustible gas detection in residential occupancies and detector location analysis. 2020, Fire Protection Research Foundation Report No. FPRF-2020-09.

Davis, S.G. and Pagliaro, J.L. Experimental study on the consequences of full-scale ignition events involving the A2L refrigerant R-454C. 2019, AHRTI Report No. 9013.

Pagliaro, J.L. and Linteris, G.T. Burning velocities of marginally flammable refrigerant-air mixtures. 2018. NIST Technical Note 1988.

Linteris, G.T. and Pagliaro J.L. Burning velocity measurements and simulations for understanding the performance of fire suppressants in aircraft. 2016. NIST Technical Note 1904.

Linteris, G.T., Pagliaro, J.L, Sunderland, P.B. Test results prepared for Honeywell: Igniter material effects in the Japanese high-pressure gas law test. 2016. NIST Technical Note 1902.

Prior Experience

Research Associate, National Institute of Standards and Technology, Energy and Environment Division (2020-2021)

Guest Researcher, National Institute of Standards and Technology, Energy and Environment Division (2016-2020)

Guest Researcher, National Institute of Standards and Technology, Fire Research Division (2011-2016)

Peer Reviewer

Reviewer for Combustion and Flame, Process Safety and Environmental Protection, Journal of Fluorine Chemistry, International Journal for Hydrogen Energy, Science and Technology for the Built Environment, Journal of Testing and Evaluation

Professional Affiliations

National Association of Fire Investigators – NAFI (member)

Society of Fire Protection Engineers – SFPE (member)

American Society of Mechanical Engineers – ASME (member)

American Society of Heating, Refrigerating, and Air-Conditioning Engineers – ASHRAE (affiliate member)

Combustion Institute (member)