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Professional Profile

Dr. Holagh specializes in transport phenomena, fluid mechanics, and thermodynamics, with expertise in single- and multiphase flow systems including phase-change processes (boiling and condensation). He applies his expertise as a mechanical engineer to design, model, analyze, optimize, and monitor fluid production and transportation systems and thermal equipment in upstream oil and gas production units, pipelines and piping networks, petrochemical and refinery plants, compressor and pumping stations, power and renewable energy production plants, energy storage units, mining operations, electronic cooling systems, and carbon capture technologies. He has four years of prior industrial experience, primarily in the downstream oil and gas sector, and his research has resulted in 40 publications in top-tier journals, with more than 1,700 citations worldwide.

Academic Credentials & Professional Honors

Ph.D., Engineering, University of Guelph, 2025

M.Sc., Mechanical Engineering, Iran University of Science and Technology, 2018

B.Sc., Mechanical Engineering, University of Tabriz, Iran, 2015

International Doctoral Tuition Scholarship, University of Guelph, Canada, 2021 to 2025.

Barrett Family Graduate Scholarship, University of Guelph, Canada, 2021.

Braithwaite Conference Travel Grant, University of Guelph, Canada, 2024 and 2025.

Recognition as a top reviewer by Process Safety and Environmental Protection (PSEP) Journal, 2024.

Licenses and Certifications

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

Certified Forklift Operator for Sit-Down Counterbalanced Forklifts (CA)

Publications

Holagh SG, Ahmed WH. Slug-to-Churn or Churn-to-Slug: revisiting the flow patterns transition debate. International Journal of Multiphase Flow 2025; 105350.

Holagh SG, Ahmed WH. Unlocking the dynamics of complex instability mechanisms in developing gravity-driven slug flows. International Journal of Multiphase Flow 2025; 188:105230.

Taha MH, Holagh SG, Rosettani J, Moussa SE, Ahmed WH. Optimizing airlift pumps for efficient solid-liquid transport: effect of particle properties, submergence ratio, and injector design. Chemical Engineering Research and Design 2025; 215: 292–311.

Holagh SG, Ahmed WH. Characterizing the development of gravity-driven slug flows using high-speed imaging and PIV-PLIF techniques. Experimental Thermal and Fluid Science 2025; 160:111334.

Fadlalla D, Holagh SG, Ahmed WH, Weales D, Moussa M. Using machine vision algorithms for characterizing gas-liquid slug flows in vertical pipes. Flow Measurement and Instrumentation 2024; 99:102671.

Holagh SG, Ahmed WH. Critical review of vertical gas-liquid slug flow: an insight to better understand flow hydrodynamics' effect on heat and mass transfer characteristics. International Journal of Heat and Mass Transfer 2024; 225:125422.

Doucette A, Holagh SG, Ahmed WH. CO2 capture using gas-lift pumps operating under two-phase flow conditions. International Journal of Heat and Mass Transfer 2024; 224:125374.

Doucette A, Holagh SG, Ahmed WH. Experimental evaluation of airlift pumps' thermal and mass transfer capabilities. Experimental Thermal and Fluid Science 2024; 154:111174.

Bukhari SS, Abed R, Holagh SG, Ahmed WH. Flow pattern dependent model for airlift pumps performance: Analytical simulation and experimental verification. Chemical Engineering Research and Design 2024; 201:67–81.

Fadlalla D, Rosettani J, Holagh SG, Ahmed WH. Airlift pumps characteristics for shear-thinning non-Newtonian fluids: An experimental investigation on liquid viscosity impact. Experimental Thermal and Fluid Science 2023; 149:110994.

Chitsaz A, Bafekr SH, Holagh SG. Exergy and environmental assessments of the performance of a molten carbonate fuel cell cogeneration plant: External steam reforming against internal steam reforming. Fuel Communications 2023; 16:100092.

Hasanzadeh A, Holagh SG, Janbazvatan M, Rashidpour H, Chitsaz A, Khalilian M. Electrochemically mediated amine regeneration and proton concentration modulation processes for flue gas CO2 capture: comparison and artificial intelligence-based optimization. Journal of CO2 Utilization 2023; 67:102306.

Jalili M, Holagh SG, Chitsaz A, Song J, Markides CN. Electrolyzer cell-methanation/Sabatier reactors integration for power-to-gas energy storage: thermo-economic analysis and multi-objective optimization. Applied Energy 2023; 329:120268.

Holagh SG, Abdous MA, Rastan H, Shafiee M, Hashemian M. Performance analysis of micro-fin tubes compared to smooth tubes as a heat transfer enhancement technique for flow condensation. Energy Nexus 2022; 8: 100154.

Tohidi F, Holagh SG, Chitsaz A. Performance enhancement in hybrid static power generation by AMTEC–TEG systems: Energy, exergy, and interactions analyses and optimizations. Energy Reports 2022; 8:14771–14792.

Shamsaiee M, Holagh SG, Abdous MA, Saffari H. Experimental investigation of surface finishing technique impact on subcooled flow boiling heat transfer enhancement: sandpapering and sandblasting. Heat and Mass Transfer 2022; 58(10): 1785–1810.

Bafekr SH, Chitsaz A, Holagh SG. Thermo-electrochemical modeling of oxygen ion-conducting solid oxide fuel cells with internal steam reforming in the water-energy nexus. Energy Nexus 2022; 5:100057.

Jalili M, Ghasempour R, Ahmadi MH, Chitsaz A, Holagh SG. An integrated CCHP system based on biomass and natural gas co-firing: exergetic and thermo-economic assessments in the framework of energy nexus. Energy Nexus 2022; 5:100016.

Holagh SG, Haghghi MA, Chitsaz A. Which methane-fueled fuel cell is of superior performance in CCHP applications; solid oxide or molten carbonate?. Fuel 2022; 312:122936.

Akbari E, Holagh SG, Saffari H, Shafiee M. On the effect of silver nanoparticles deposition on porous copper foams on pool boiling heat transfer enhancement: an experimental visualization. Heat and Mass Transfer 2022; 58(3):447–466.

Jalili M, Ghasempour R, Ahmadi MH, Chitsaz A, Ghazanfari Holagh S. Exergetic, exergo-economic, and exergo-environmental analyses of a trigeneration system driven by biomass and natural gas. Journal of Thermal Analysis and Calorimetry 2022; 147(6):4303–4323.

Tohidi F, Holagh SG, Chitsaz A. Thermoelectric Generators: a comprehensive review of characteristics and applications. Applied Thermal Engineering 2022; 201:117793.

Jalili M, Chitsaz A, Holagh SG. Sustainability improvement in combined electricity and freshwater generation systems via biomass: a comparative emergy analysis and multi-objective optimization. International journal of hydrogen energy 2022; 47(5):2885–2899.

Jalili M, Chitsaz A, Holagh SG, Ziyaei M, Rosen MA. Syngas-fed membrane-based and steam and water-fed electrolysis-based hydrogen production systems: renewability, sustainability, environmental and economic analyses and optimization. Journal of Cleaner Production 2021; 326:129424.

Hasanzadeh A, Holagh SG, Chitsaz A. Non-isothermal electrochemically mediated amine regeneration for CO2 capture: Performance evaluation and optimization. Journal of CO2 Utilization 2021; 54:101758.

Zoghi M, Habibi H, Chitsaz A, Holagh SG. Multi-criteria analysis of a novel biomass-driven multi-generation system including combined cycle power plant integrated with a modified Kalina-LNG subsystem employing thermoelectric generator and PEM electrolyzer. Thermal Science and Engineering Progress 2021; 26:101092.

Parikhani T, Delpisheh M, Haghghi MA, Holagh SG, Athari H. Performance enhancement and multi-objective optimization of a double-flash binary geothermal power plant. Energy Nexus 2021; 2:100012.

Cao Y, Abdous MA, Holagh SG, Shafiee M, Hashemian M. Entropy generation and sensitivity analysis of R134a flow condensation inside a helically coiled tube-in-tube heat exchanger. International Journal of Refrigeration 2021; 130:104–116.

Alirahmi SM, Assareh E, Chitsaz A, Holagh SG, Jalilinasrabady S. Electrolyzer-fuel cell combination for grid peak load management in a geothermal power plant: power to hydrogen and hydrogen to power conversion. International journal of hydrogen energy 2021; 46(50): 25650–25665.

Holagh SG, Abdous MA, Shafiee M, Rosen MA. Performance evaluation of helical coils as a passive heat transfer enhancement technique under flow condensation by use of entropy generation analysis. Thermal Science and Engineering Progress 2021: 23:100914.

Holagh SG, Abdous MA, Roy P, Shamsaiee M, Shafiee M, Saffari H, Valiño L, Andersson R. An experimental investigation on bubbles departure characteristics during sub-cooled flow boiling in a vertical U-shaped channel utilizing high-speed photography. Thermal Science and Engineering Progress 2021; 22:100828.

Holagh SG, Abdous MA, Shamsaiee M, Saffari H. An experimental study on the influence of radial pressure gradient on bubbles dynamic behavior in subcooled flow boiling. Thermal Science and

Engineering Progress 2020; 16:100468.

Holagh SG, Haghghi MA, Mohammadi Z, Chitsaz A. Exergoeconomic and environmental investigation of an innovative poly-generation plant driven by a solid oxide fuel cell for production of electricity, cooling, desalinated water, and hydrogen. International Journal of Energy Research 2020; 44(13):10126–10154.

Haghghi MA, Shamsaiee M, Holagh SG, Chitsaz A, Rosen MA. Thermodynamic, exergoeconomic, and environmental evaluation of a new multi-generation system driven by a molten carbonate fuel cell for production of cooling, heating, electricity, and freshwater. Energy Conversion and Management 2019; 199:112040.

Haghghi MA, Holagh SG, Pesteei SM, Chitsaz A, Talati F. On the performance, economic, and environmental assessment of integrating a solar-based heating system with conventional heating equipment; a case study. Thermal Science and Engineering Progress 2019; 13:100392.

Haghghi MA, Holagh SG, Chitsaz A, Parham K. Thermodynamic assessment of a novel multi-generation solid oxide fuel cell-based system for production of electrical power, cooling, fresh water, and hydrogen. Energy conversion and management 2019; 197:111895.

Abdous MA, Holagh SG, Shamsaiee M, Saffari H. The prediction of bubble departure and lift-off radii in vertical U-shaped channel under subcooled flow boiling based on forces balance analysis. International Journal of Thermal Sciences 2019; 142:316–331.

Holagh SG, Talati F, Shamsaiee M. Analytical solution of steady state heat conduction equations in irregular domains with various BCs by use of Schwarz-Christoffel conformal mapping. Thermal Science and Engineering Progress 2019; 11:8–18.

Holagh SG, Abdous MA, Shamsaiee M, Saffari H. Assessment of heat transfer enhancement technique in flow boiling conditions based on entropy generation analysis: twisted-tape tube. Heat and Mass Transfer 2020; 56(2):429–443.

Abdous MA, Holagh SG, Saffari H. Numerical investigation of flow boiling heat transfer in helically coiled tube under constant heat flux. Thermal Science and Engineering 2018; 1(2).

Presentations

Holagh SG, Ahmed WH. Liquid phase stabilization in developing gravity-driven slug flows: insights from PIV-PLIF analysis. ASME Fluids Engineering Division's (FED) Summer Meeting, Philadelphia, PA, USA, 2025.

Holagh SG, Ahmed WH. Bubble interactions in slug flows: unmasking the master-slave relationship. Poster presentation, ASME Fluids Engineering Division's (FED) Summer Meeting, Philadelphia, PA, 2025.

Holagh SG, Ahmed WH. AI-driven real-time detection and monitoring of static and dynamic instabilities of developing two-phase flows in vertical pipes. Gas-lift Workshop, Artificial Lift and R& Council, San Antonio, TX, USA, 2025.

Holagh SG, Ahmed WH. Dynamic stability in developing slug flows: a spatiotemporal-spectral framework. 12th International Conference on Multiphase Flow (ICMF), Toulouse, France, 2025.

Taha MH, Rosettani J, Holagh SG, Dickie-Wilson CR, Moussa SE, Ahmed WH. Effect of liquid density or presence of solid particles on the performance of airlift pumps. 12th North American Conference on Multiphase Production Technology, Banff, Canada, 2024.

Doucette A, Holagh SG, Dickie-Wilson CR, Ahmed WH. Carbon Dioxide capture using airlift pumps.

Poster presentation, 10th International Conference on Fluid Flow, Heat and Mass Transfer (FFHMT'23), Ottawa, Canada, 2023.

Holagh SG, Fadlalla D, Taha MH, Doucette A, Ahmed WH. Airlift pumps with annulus risers: an experimental investigation. 8th International Conference on Multiphase Flow and Heat Transfer, Lisbon, Portugal, 2023.

Holagh SG, Ahmed WH. Towards understanding the interfacial structures of non-developing slug flow in vertical pipes. 9th International Conference on Fluid Flow, Heat and Mass Transfer (FFHMT'22), Niagara Falls, Canada, 2022.

Project Experience

At Multiphase Flow and Energy Lab at University of Guelph, Canada:

- Led the design, fabrication, testing, and verification of: (a) an energy-efficient and cost-effective CO2 capture and waste heat recovery system; (b) gas-lift systems for pumping non-Newtonian fluids, viscous fluids, and solid-liquid mixtures; and (c) marine upwelling systems.
- Developed a novel AI-assisted data-driven framework for real-time flow stability monitoring and assurance for gas-lift operations.

Peer Reviews

Renewable & Sustainable Energy Reviews

Energy Conversion and Management

Journal of Cleaner Production

Desalination

Process Safety and Environmental Protection

Separation and Purification Technology

Energy

Energy Strategy Reviews

Fuel Communications

Cleaner Energy Systems

Energy Nexus

CO2 Utilization

Applied Thermal Engineering

Case Studies in Thermal Engineering

International Journal of Refrigeration

Journal of Thermal Science and Engineering Progress

Experimental Thermal and Fluid Science

Ain Shams Engineering Journal

Results in Engineering

International Journal of Multiphase Flows

Flow Measurement & Instrumentation

International Communications in Heat and Mass Transfer

Chemical Engineering Research and Design