

Saad A. Jajja

Postdoctoral Research Associate
Oak Ridge National Laboratory
1 Bethel Valley Road
Oak Ridge, TN 37830

jajjasa@ornl.gov
(541) 908-8418

EDUCATION

Oregon State University, Corvallis, OR, USA

Doctor of Philosophy, Mechanical Engineering, (2016 - 2020)

Dissertation Title: Turbulent Heat Transfer of Supercritical Carbon Dioxide in the Proximity of the Pseudo-Critical Point for Non-Uniform Heat Flux Boundary Conditions.

University of Colorado, Boulder, CO, USA

Master of Science, Mechanical Engineering, (2014 - 2016)

University of Engineering and Technology, Taxila, Pakistan

Bachelor of Science, Mechanical Engineering, (2009 - 2013)

EXPERIENCE

Postdoctoral Research Associate

December 2020 – Present

Oak Ridge National Laboratory

Oak Ridge, TN

- **Heat and mass transfer fundamentals for low GWP refrigerants.** I have designed and developed a test bench that can measure the heat transfer coefficients and pressure drops of a range of refrigerants under both boiling and condensation conditions.
- **Thermal-hydraulic characterization of additively manufactured ceramic heat exchangers for high temperature applications.** My assignment was to develop a test bench that can test heat exchangers at temperatures of up to 800 °C.
- **Decentralized water purification systems.** I developed the thermodynamic and economic models for both heat-driven and electricity-driven water purification systems.

Graduate Research Assistant

Sept 2016 – Sept 2020

Oregon State University

Corvallis, OR

- **Experimental investigation of fundamentals of turbulent heat transfer of supercritical carbon dioxide in microscale geometries.** In particular, the project was focused on understanding the coupled phenomena of buoyancy, flow acceleration, and dramatic changes in thermophysical properties in the proximity of the thermodynamic critical point. This work was sponsored by the NSF and involved both experimental and analytical tools.
- **Developed a transient and steady state heat transfer model for a megawatt scale microchannel based solar power tower receiver using supercritical carbon dioxide as heat transfer fluid.** This work was sponsored by the US DOE Solar Energy Technology Office.

Instructor of Record

July 2019 – March 2020

Oregon State University

Corvallis, OR

- ME 311 – Introduction to Thermal-Fluid Sciences.
- Responsible for developing lectures, quizzes, and exams.

- Developed an experimental test facility for the thermal characterization of hybrid wicking structures being used in thermal ground planes (flat heat pipes).
- Fabricated thermal ground planes and conducted performance testing.

**REFEREED
JOURNAL
PUBLICATIONS**

1. **Jajja, S.A.**, Randle, Lindsey, and Fronk, B.M (2022), “A Modeling Approach to Account for Unstable Stratification, Flow Acceleration, and Variable Thermophysical Properties for Supercritical Carbon Dioxide”, *International Journal of Heat and Mass Transfer*, 187, 122537.
2. **Jajja, S.A.** and Nawaz, K (2022), “Decentralized Water Purification Systems for Multi-Family and Commercial Buildings in the United States”, *Energy Conversion and Management - Under Review*.
3. **Jajja, S.A.** and Fronk, B.M (2021), “Investigation of Near-Critical Heat Transfer in Rectangular Microchannels with Single Wall Heating Using Infrared Thermography”, *International Journal of Heat and Mass Transfer*, 177, 121470.
4. **Jajja, S.A.**, Sequeira, J.M, Fronk, B.M (2020), “Geometry and Orientation Effects in Non-Uniformly Heated Microchannel Heat Exchangers Using Supercritical Carbon Dioxide”, *Experimental Thermal and Fluid Science*, 112. DOI: doi.org/10.1016/j.exptthermflusci.2019.109979
5. **Jajja, S. A.**, Zada, K. R., Fronk, B. M. (2019), “ Experimental Investigation of Supercritical Carbon Dioxide in Horizontal Microchannels with Non-Uniform Heat Flux Boundary Conditions”, *International Journal of Heat and Mass Transfer*, 130, pp 304-319. DOI: doi.org/10.1016/j.ijheatmasstransfer.2018.10.027
6. Zhao, D., Qian, X., Gu, X., **Jajja, S. A.**, Yang, R. (2016) “Measurement Techniques for Thermal Conductivity and Interfacial Thermal Conductance of Bulk and Thin Film Materials”, *Journal of Electronic Packaging*, 138(4). DOI: 10.1115/1.4034605
7. **Jajja, S. A.**, Ali, W., Ali, H. M. (2014), “Multi Walled Carbon Nanotube Nanofluids for Thermal Management of High Heat Generating Computer Processor”, *Heat Transfer-Asian Research* 43(7), pp 653-666. DOI: doi.org/10.1002/htj.21107
8. **Jajja, S. A.**, Ali, W., Ali, H. M. Ali, A. M. (2013), “Water Cooled mini channel heat sinks for microprocessor cooling: effect of fin spacing”, *Applied Thermal Engineering*, 64(1-2), pp. 76-82. DOI: doi.org/10.1016/j.applthermaleng.2013.12.007

**REFERRED
CONFERENCE
PUBLICATIONS**

1. **Jajja, S.A.**, Sequeira, J.M., Fronk, B.M (2019), “Heating of Supercritical Carbon Dioxide in Small Channels”, *ASHRAE Transactions*, 125, 7-10. 2019.
2. **Jajja, S.A.**, Sequeira, J.M., Fronk, B.M (2019), “Experimental Investigation of Supercritical Carbon Dioxide in Horizontal Micro Pin Arrays with Non-Uniform Heat Flux Boundary Conditions”, *4th Thermal and Fluids Engineering Conference* Las Vegas, NV, USA, April 14–17, 2019. DOI: 10.1615/TFEC2019.fnd.027547
3. **Jajja, S. A.**, Fronk, B. M. (2018), “Buoyancy Influenced Heat Transfer Performance of Supercritical Carbon Dioxide in Microchannel Heat Exchangers Horizontal Flow Configuration”, *6th International Conference on Micro and Nano Flows* (MNF2018), Atlanta, GA, USA, 9–12 September.
4. Fronk, B.M., **Jajja, S. A.** (2018), “System and Component Transport Consideration of Micro-Pin Based Solar Receivers with High Temperature Gaseous

Working Fluids”, *ASME 15th International Conference on Nanochannels, Microchannels and Mini Channels*, Dubrovnik, Croatia, 10–13 June 2018. DOI: 10.1115/ICNMM2018-7614

CONFERENCE TALKS

1. **Jajja, S.A.**, Sequeira, J.M., Fronk, B.M (2019), “Effect of Microchannel Aspect Ratio on Turbulent Heat Transfer of Supercritical Carbon Dioxide with a Non-Uniform Heat Flux Boundary Condition”, *Second Pacific Rim Thermal Engineering Conference* Maui, Hawaii, USA, December 13-17, 2019.
2. **Jajja, S.A.**, Sequeira, J.M., Fronk, B.M (2019), “Experimental Investigation of Supercritical Carbon Dioxide in Horizontal Micro Pin Arrays with Non-Uniform Heat Flux Boundary Conditions”, *4th Thermal and Fluids Engineering Conference* Las Vegas, NV, USA, April 14–17, 2019.
3. **Jajja, S. A.**, Fronk, B. M. (2018), “Characterization of sCO₂ Heat Transfer in Microchannel Heat Exchangers”, *American Nuclear Society Oregon State University Chapter*, Corvallis, OR, 27th January, 2018.
4. **Jajja, S. A.**, Fronk, B. M. (2017), “Transient Modeling of Microchannel Based Concentrated Solar Tower Receiver”, *ASME Summer Heat Transfer Conference*, Bellevue, WA, USA, 9-12th July, 2017.

SKILLS

1. Experimental methods in thermal-fluid science
2. Infrared thermography
3. Numerical heat transfer modeling
4. Thermodynamic state point modeling
5. Expertise in EES, MATLAB, and COMSOL Multiphysics.

HONORS AND AWARDS

1. Awarded the School of MIME Teaching Fellowship (2019).
2. Awarded the Fulbright Scholarship by the J. William Fulbright Foreign Scholarship Board (FFSB) (2014 - 2016).
3. Best Undergraduate Senior thesis of the year 2013 at University of Engineering and Technology Taxila, Pakistan (2013).

MENTORING

1. Bertrand Schyns (Feb. 2020 - Aug. 2020) – Visiting graduate student from University of Liege, Belgium. Training him to conduct transient heat transfer experiments for supercritical carbon dioxide for single wall heating boundary conditions.
2. Kristen Travers (2019 - 2020) – Undergraduate student in the School of MIME at Oregon State. Training her to do experiments at high heat fluxes on the supercritical heat transfer facility.
3. Jessa M. Squeira (2018 - 2019) – Undergraduate student in the Energy Systems Engineering program at Oregon State University. Trained her to operate the supercritical heat transfer experimental facility.