

Una Trivanovic

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EDUCATION

- 2020 – now **Ph.D. in Mechanical and Process Engineering**, ETH Zürich, Switzerland
Thesis (tentative title): Synthesis and dynamics of carbonaceous nanoparticles during enclosed spray combustion, (Prof. Sotiris E. Pratsinis)
- 2017 – 19 **M.A.Sc. in Mechanical Engineering**, University of British Columbia, Canada
Thesis: Characterization of the effects of fuel and entrained salt on soot morphology, (Prof. Steven N. Rogak)
- 2011 – 16 **B.S. in Mechanical Engineering**, Montana State University
- 2011 – 16 **B.A. in Modern Languages & Literature**, Montana State University
- 2014 **Semester abroad**, Université Paul Valéry, Montpellier, France

PROFESSIONAL EXPERIENCE

- 2019 **Visiting Researcher**, Boies Research Group, University of Cambridge, UK,
Project: Image analysis of electron microscopy of carbon nanotubes (Prof. Adam Boies)
- 2016 – 17 **Condition Monitoring Specialist**, SKF Canada, Ltd., Canada
Reliability of rotating equipment for oil & gas, paper, chemical and metal manufacturing
- 2015 – 16 **Undergraduate Researcher**, Montana State University, USA
In-situ alignment of graphene-carboxymethyl cellulose nanocomposites (Prof. S. Sofie)
- 2015 **Reliability Engineering Intern**, SKF Canada, Ltd., Canada
Baseline vibration readings on rotating equipment, automated diagnostic systems
- 2014 **Predictive Maintenance Co-op Student**, Zellstoff Celgar Ltd., Canada
Automated machinery diagnostics software for oil analysis databases and shape analysis.

HONOURS & AWARDS

- 2023 Best Poster Award, European Aerosol Conference, Sept. 3 – 8, 2023, Málaga, Spain
- 2022 *Environmental Science: Atmospheres* Poster Award, 11th International Aerosol Conference, Sept. 4 – 9, 2022, Athens, Greece
- 2022 Best Poster Award, 6th International Sooting Flame Workshop, July 22 – 23, 2022, Vancouver, Canada
- 2022 Best Poster Award, 25th ETH-Conference on Combustion Generated Nanoparticles (Virtual), June 21-23, 2022, Zürich, Switzerland
- 2022 Gesellschaft für Aerosolforschung (GAeF) Student Travel Support
- 2020 NSERC Canada Graduate Scholarship-Doctoral (\$CAD 105 000)
- 2019 Mitacs Globalink Research Award
- 2019 UBC Go Global Self-Initiated Research Award
- 2017, 2018 UBC Faculty of Applied Science Masters Graduate Award
- 2015 MSU Undergraduate Scholars Program Research Grant

I. RESEARCH

A. Refereed Publications

1. Kelesidis, G.A., Nagarkar, A., **Trivanovic, U.**, Pratsinis, S.E. (2023) Towards eliminating soot emissions from jet fuel combustion, *Environmental Science and Technology*, 57, 10276–10283.
2. **Trivanovic, U.**, Pereira Martins, M., Benz, S., Kelesidis, G.A., Pratsinis, S.E. (2023) Dynamics of soot surface growth and agglomeration by enclosed spray combustion of jet fuel, *Fuel*, 342, 127864, doi: [10.1016/j.fuel.2023.127864](https://doi.org/10.1016/j.fuel.2023.127864)
3. **Trivanovic, U.**, Kelesidis, G.A., Pratsinis, S.E. (2022) High-throughput generation of aircraft like soot, *Aerosol Science and Technology* 56, 732-743, doi: [10.1080/02786826.2022.2070055](https://doi.org/10.1080/02786826.2022.2070055)
4. Sipkens, T.A., **Trivanovic, U.**, Naseri, A., Bello, O.W., Baldelli, A., Kazemimanesh, M., Bertram, A.K., Kostjuk, L., Corbin, J.C., Olfert, J.S., Rogak, S.N. (2021) Using two-dimensional distributions to inform the mixing state of soot and salt particles produced in gas flares, *Journal of Aerosol Science* 158, 105826, doi: [10.1016/j.jaerosci.2021.105826](https://doi.org/10.1016/j.jaerosci.2021.105826)
5. Kazemimanesh, M., Baldelli, A., **Trivanovic, U.**, Popovicheva, O., Timofeev, M., Shonija, N., Obvintsev, Y., Kuang, C., Jefferson, A.M., Corbin, J.C., Goss, G.G., Alessi, D.S., Johnson, M.R., Rogak, S.N., Olfert, J.S. (2021) Particulate emissions from turbulent diffusion flames with entrained droplets: A laboratory simulation of gas flaring emissions, *Journal of Aerosol Science* 157, 105807, doi: [10.1016/j.jaerosci.2021.105807](https://doi.org/10.1016/j.jaerosci.2021.105807)
6. Peng, W., Yang, J., Corbin, J.C., **Trivanovic, U.**, Lobo, P., Kirchen, P., Rogak, S.N., Gagné, S., Miller, J.W., Cocker, D. (2020) Comprehensive analysis of the air quality impacts of switching a marine vessel from diesel fuel to natural gas. *Environmental Pollution* 266, 115404, doi: [10.1016/j.envpol.2020.115404](https://doi.org/10.1016/j.envpol.2020.115404)
7. **Trivanovic, U.**, Sipkens, T.A., Kazemimanesh, M., Baldelli, A., Jefferson, A.M., Conrad, B.M., Johnson, M.R., Corbin, J.C., Olfert, J.S., Rogak, S.N. (2020) Morphology and size of soot from gas flares as a function of fuel and water addition, *Fuel* 279, 118478, doi: [10.1016/j.fuel.2020.118478](https://doi.org/10.1016/j.fuel.2020.118478)
8. Baldelli, A., **Trivanovic, U.**, Sipkens, T.A., Rogak, S.N. (2020) On determining soot maturity: A review of the role of microscopy-and spectroscopy-based techniques. *Chemosphere* 252, 126532, doi: [10.1016/j.chemosphere.2020.126532](https://doi.org/10.1016/j.chemosphere.2020.126532)
9. Baldelli, A., **Trivanovic, U.**, Corbin, J.C., Lobo, P., Gagné, S., Miller, J.W., Kirchen, P., Rogak, S.N. (2020) Typical and atypical morphology of non-volatile particles from a diesel and natural gas marine engine. *Aerosol and Air Quality Research* 20, 730-740, doi: [10.4209/aaqr.2020.01.0006](https://doi.org/10.4209/aaqr.2020.01.0006)
10. Corbin, J. C., Peng, W., Yang, J., Sommer, D.E., **Trivanovic, U.**, Kirchen, P., Miller, J.W., Rogak, S.N., Cocker, D.R., Lobo, P., Gagné, S. (2019) Characterization of particulate matter emitted by a marine engine operated with liquefied natural gas and diesel fuels. *Atmospheric Environment* 220, 117030, doi: [10.1016/j.atmosenv.2019.117030](https://doi.org/10.1016/j.atmosenv.2019.117030)
11. **Trivanovic, U.**, Corbin, J.C., Peng, W., Yang, J., Kirchen, P., Miller, J.W., Lobo, P., Gagné, S., Rogak, S.N. (2019) Size and morphology of soot produced by a dual-fuel marine engine. *Journal of Aerosol Science* 138, 105448, doi: [10.1016/j.jaerosci.2019.105448](https://doi.org/10.1016/j.jaerosci.2019.105448)
12. Baldelli, A., **Trivanovic, U.**, Rogak, S.N. (2019) Electron tomography of soot for validation of 2D image processing and observation of new structural features, *Aerosol Science and Technology*, 53, 575-587. doi: [10.1080/02786826.2019.1578860](https://doi.org/10.1080/02786826.2019.1578860)

B. Invited Lectures

1. [“High throughput generation of aircraft-like soot”](#) AAAR AS&T Lectures (virtual) April 19, 2023
2. [“Enclosed spray combustion of jet fuel: a surrogate of aircraft soot emissions?”](#) Global Young Scientists Summit, Singapore (17/1/2023)

C. Conference Talks (presenting author in bold)

1. **Trivanovic, U.**, Kelesidis, G.A., Pratsinis, S.E., “Soot Size Distribution & Structure during Enclosed Spray Combustion of Jet Fuel” American Association for Aerosol Research 41st Annual Conference 2023, Portland, USA (2-6/10/2023)
2. **Kelesidis, G.A.**, Nagarkar, A., Trivanovic, U., Pratsinis, S.E., “Eliminating Soot Emissions from Jet Fuel Combustion.” American Association for Aerosol Research 41st Annual Conference 2023, Portland, USA (2-6/10/2023)
3. **Trivanovic, U.**, Pereira Martins, M., Kelesidis, G.A., Pratsinis, S.E., “Carbon Black or Soot Surface Growth & Agglomeration during Enclosed Spray Combustion” European Aerosol Conference 2023, Malaga, Spain (3-8/9/2023)
4. **Kelesidis, G.A.**, Nagarkar, A., Trivanovic, U., Pratsinis, S.E., “Eliminating Soot Emissions from Jet Fuel Combustion.” European Aerosol Conference 2023, Malaga, Spain (3-8/9/2023)
5. **Trivanovic, U.**, Kelesidis, G.A., Pratsinis, S.E., “High-throughput generation of aircraft-like soot: Dynamics of soot surface growth and agglomeration by enclosed spray combustion of jet fuel” 26th ETH Nanoparticles Conference, Zürich, Switzerland (20-22/6/2023, scheduled)
6. **Kelesidis, G.K.**, Trivanovic, U., Pratsinis, S.E., “High-throughput generation of aircraft-like soot” 9th World Congress on Particle Technology, Madrid, Spain (18-22/9/2022)
7. **Trivanovic, U.**, Kelesidis, G.K., Pratsinis, S.E., “High-throughput generation of aircraft-like soot” Cambridge Particle Meeting, Cambridge, UK (25/6/2022)
8. **Trivanovic, U.**, Kelesidis, G.K., Pratsinis, S.E. “High-throughput soot generation by flame spray pyrolysis” European Aerosol Conference 2021, Virtual (30/8-3/9/2021)
9. **Kazemimanesh, M.**, Baldelli, A., Trivanovic, U., Popovicheva, O., Timofeev, M., Shonija, N., Obvintsev, Y., Kuang, C., Jefferson, A.M., Corbin, J.C., Goss, G.G., Alessi, D.S., Johnson, M.R., Rogak, S.N., Olfert J.S., “Particulate emissions from laboratory gas flares with entrained droplets” European Aerosol Conference 2021, Virtual, (30/8-3/9/2021)
10. **Naseri, A.**, Sipkens, T.A., Trivanovic, U., Kazemimanesh, M., Bello, O.W., Bertram, A., Corbin, J.C., Rogak, S.N., Olfert, J.S., “Comparison of inversion schemes for retrieving black carbon mixing state distributions using CPMA-SP2 measurements”, 38th Annual American Association for Aerosol Research Conference, Virtual (5-9/10/2020)
11. **Peng, W.**, Yang, J., Li, Q., Corbin, J.C., Trivanovic, U., Lobo, P., Rogak, S.N., Kirchen, P., Gagné, S., Cocker, D.R., Miller, J.W., “Air Quality Benefits of Switching a Freight Ferry from Diesel Fuel to Natural Gas”, 8th International Urban Freight Conference, Long Beach, USA (16-18/10/2019)
12. **Peng, W.**, Yang, J., Corbin, J.C., Li, Q., Trivanovic, U., Rogak, S.N., Lobo, P., Kirchen, P., Gagné, S., Cocker, D.R., Miller, J.W., “Impacts of switching from diesel to liquefied natural gas (LNG) for a marine vessel”, 37th Annual American Association for Aerosol Research Conference, Portland, USA (14-18/10/2019)
13. **Trivanovic, U.**, Baldelli, A., Spikens, T., Kazemimanesh, M., Conrad, B., Jefferson, A.M., Corbin, J., Johnson, M., Olfert, J., Rogak, S. “Effects of fuel mixture and inorganic salts on the

morphological and optical properties of soot from gas flares”, European Aerosol Conference 2019, Gothenburg, Sweden (25-30/8/2019)

14. **Trivanovic, U.**, Corbin, J.C., Baldelli, A., Kazemimanesh, M., Conrad, B.M., Jefferson, A.M., Peng, J., Yang, J., Kirchen, P., Miller, J.W., Johnson, M.R., Olfert, J.S., Lobo, P., Gagné, S., Rogak, S.N., “Primary particle and aggregate size of soot relationships for soot from a marine engine and gas flares”, UK Combustion Aerosol Conference and Cambridge Particle Meeting, Cambridge, UK (26-28/6/2019)
15. **Trivanovic, U.**, Baldelli, A., Kazemimanesh, M., Conrad, B.M., Jefferson, A.M., Corbin, J.C., Johnson, M.R., Olfert, J.S., Rogak, S.N., “The effect of inorganic salts from flowback operations on the size, effective density, mixing State, and optical properties of soot from gas flares”, 2019 Spring Technical Meeting of the Canadian Section of the Combustion Institute, Kelowna, Canada (13-16/5/2019)
16. Baldelli, A., **Trivanovic, U.**, Rogak, S.N., “Use of electron tomography to analyze the actual primary particles distribution and agglomerate morphology of soot”, 10th International Aerosol Conference, St. Louis, USA (2-7/9/2018)
17. Baldelli, A., Dastanpour, R., Trivanovic, U., Jefferson, A.M., Olfert, J.S., Moallemi, A., Thomson, K.A., Johnson, M.R., Popovicheva, O., **Rogak, S.N.**, “Physio-chemical characterization of small scale gas flaring”, 10th International Aerosol Conference, St Louis, USA, (2-7/9/2018)

D. Posters presentations

1. **Trivanovic, U.**, Pratsinis, S.E., “Soot-free Emissions from Jet Fuel Combustion: Oxidation Dynamics of Aircraft-like Soot” American Association for Aerosol Research 41st Annual Conference 2023, Portland, USA (2-6/10/2023)
2. **Trivanovic, U.**, Kelesidis, G.A., Pratsinis, S.E., “Evolution of soot size distribution & nanostructure during enclosed spray combustion of jet fuel” European Aerosol Conference 2023, Malaga, Spain (3-8/9/2023)
3. **Trivanovic, U.**, Meisterhans, Y., Kelesidis, G.K., Pratsinis, S.E., “Carbon black surface chemistry and internal nanostructure during internal oxidation”, 11th International Aerosol Conference, Athens, Greece (4-9/9/2022)
4. **Nagarkar, A.**, Kelesidis, G.K., Trivanovic, U., Pratsinis, S.E. “Oxidation dynamics of soot produced by spray combustion of jet fuel”, 11th International Aerosol Conference, Athens, Greece (4-9/9/2022)
5. Trivanovic, U., **Pereira Martins, M.**, Kelesidis, G.K., Pratsinis, S.E., “High-throughput generation of aircraft-like soot”, 11th International Aerosol Conference, Athens, Greece (4-9/9/2022)
6. **Trivanovic, U.**, Pereira Martins, M., Kelesidis, G.K., Pratsinis, S.E., “Carbonaceous aerosol formation & growth by enclosed spray combustion of hydrocarbons”, 11th International Aerosol Conference, Athens, Greece (4-9/9/2022)
7. **Trivanovic, U.**, Pereira Martins, M., Kelesidis, G.K., Pratsinis, S.E., “Dynamics of soot nanoparticles during spray combustion of jet fuel”, 39th International Symposium on Combustion, Vancouver, Canada (24-29/7/2022)
8. **Trivanovic, U.**, Kelesidis, G.K., Pratsinis, S.E., “High-throughput generation of aircraft-like soot” 24th ETH Conference on Combustion-Generated Nanoparticles, Virtual (22-24/6/2021)

9. **Trivanovic, U.**, Sipkens, T.A., Kazemimanesh, M., Baldelli, A., Jefferson, A.M., Conrad, B.M., Johnson, M.R., Corbin, J.C., Olfert, J.S., Rogak, S.N., “Effect of sodium chloride solutions on soot morphology and mixing state from a large-scale laboratory flare”, Fuels, Processes, and Combustion Physics in the Energy Transformation WE-Heraeus-Seminar, Bad Honnef, Germany (8-12/3/2020)
10. **Bello, O.W.**, Sipkens, T.A., Kazemimanesh, M., Trivanovic, U., Naseri, A., Schmidt, S., Baldelli, A., Callahan, R., Bui, D., Bertram, A., Rogak, S.N., Harynuk, J.J., Kostiuk, L., Olfert, J.S., “Emission characterisation from a propane flame with entrained droplets of salt solutions”, Petroleum Technology Alliance Canada - 2019 Methane Emissions Reduction Forum, Banff, Canada, (26-27/11/2019)
11. **Baldelli, A.**, Trivanovic, U., Kazemimanesh, M., Olfert, J., Rogak, S.N., “Effects of fuel mixture and flowback fluid on the effective density, mixing state, and nanostructure of soot emissions from a lab-scale flare”, 2018 Petroleum Technology Alliance Canada - 2018 Methane Emissions Forum, Banff, Canada (27-28/11/2018)
12. Baldelli, A., **Trivanovic, U.**, Rogak, S.N., “Use of electron tomography to analyze the actual primary particles distribution and agglomerate morphology of soot”, 10th International Aerosol Conference, St. Louis, USA (2-7/9/2018)
13. **Muretta, J.**, Trivanovic, U., “Second derivative Fourier transform infrared spectroscopy analysis of aligned graphene and graphene oxide in carboxymethyl cellulose films”, Materials Science & Technology Conference and Exhibition 2016, Salt Lake City, USA (23-27/10/2016)

II. TEACHING

A. Teaching Assistant

- Micro- and Nanoparticle Technology (MSc-level) Fall 2021, 2022, ETH Zürich. 5 – 15 students
Lead exercise sessions, supervised student projects, wrote exam problems, invigilated and marked written exams, acted as a scribe in oral exams.
- Mass Transfer (BSc-level) Fall 2020, ETH Zürich. 80 – 120 students
Assisted exercises where students could ask questions about the problem set, aided in preparing and invigilating exams, marked written exams.
- Brownian Motion Laboratory Practicum (BSc-level) Spring 2020, ETH Zürich. 5 – 20 students
Lead a practical session where students wrote simulation code, marked student reports.
- Materials for Mechanical Design (BSc-level) Fall 2018, University of British Columbia. 5 – 20 students
Lead exercise sessions where students could ask questions about the problem set, aided in writing and marking exam.
- Intro. to the Mechanical Design Process (BSc-level) Spring 2018, 2019, University of British Columbia. 5 – 20 students
Mentored student groups during the process of a semester long design challenge, lead exercise sessions where students could ask questions about the problem set, marked exams.
- Applied Engineering Data Analysis (BSc-level) Fall 2015, Montana State University. 5 students (tutoring)

B. Pedagogical Training

- MECH Teaching Assistant Best Practices Training, University of British Columbia, 09/2017
- MECH Classroom Orientation Training, University of British Columbia, 09/2017

C. Advising

1. Alex Weber, “Morphology and nanostructure of aircraft-like soot”, student project in the class Micro- and Nanoparticle Technology, ETH Zürich, Fall 2023. (ongoing)
2. Giacomo Rizzo, “Exploring carbon-slurries for flame spray synthesis of nanoparticles”, student project in the class Micro- and Nanoparticle Technology, ETH Zürich, Fall 2022.
3. Yannik Meisterhans, “Hydrophobicity of carbonaceous nanoparticles after oxidation”, BSc Thesis, ETH Zürich, Spring 2022.
4. Michael Pereira Martins, “Evolution of soot primary particle size and nanostructure during spray combustion, MSc Semester Project, ETH Zürich, Spring 2022.
5. Matteo d’Andria, “Thermal gravimetric analysis of aircraft-like soot”, student project in the class Micro- and Nanoparticle Technology, ETH Zürich, Fall 2021.
6. Michael Pereira Martins, “Tuning the hydrophobicity of carbonaceous nanoparticles”, student project in the class Micro- and Nanoparticle Technology, ETH Zürich, Fall 2021.
7. Amogh Nagarkar, “The impact of oxidation on soot size distribution, morphology and nanostructure”, MSc Semester Project, ETH Zürich, Spring 2021. (Co-supervisor)
8. Michael Pereira Martins, “Monitoring soot dynamics during flame spray pyrolysis of jet fuel”, BSc Thesis, ETH Zürich, Spring 2021.

III. SERVICE

A. Session Chair at Scientific Conferences

American Association for Aerosol Research 41st Annual Conference 2023, Portland, USA (2-6/10/2023)

Session Combustion I: "Soot Formation, Morphology, and emissions"

11th International Aerosol Conference 2022, Athens, Greece (4-9/9/2022)

Session BAP-5: "Aerosol transport properties and fluid dynamics"

European Aerosol Conference 2021 (Virtual), (30/8-3/9/2021).

Session AT-5: "High temperature aerosols"

B. Reviewer (in parenthesis # of articles)

Journal of Aerosol Science (6)

Scientific Reports (1)

C. Laboratory oversight duties

2022 – current Safety responsible person, Particle Technology Laboratory, ETH Zurich

2018 – 2019 Radiation safety officer, Aerosol Laboratory, University of British Columbia

D. Educational Outreach

2023 *AAAR Social Media Ambassador*

Served as a [member of the team](#) promoting the American Association of Aerosol Research (AAAR) annual conference on social media before and during the conference.

2023 *Pint of Science*

Presenter at the [Pint of Science festival](#) making the latest research accessible to the public

2022 – 2023 *Fix the Leaky Pipeline Peer Mentoring*

[This program](#) brings together women from across Switzerland to provide peer mentoring for one another. Our group of 12 PhD students organizes monthly workshops to learn new skills and support each other through our PhDs

2022 *Kangaroo goes science*

Female 7th grade students (aged 13-14) were invited to learn about natural sciences and engineering. I contributed a video (in German): [Sind Nanopartikel schädlich oder nützlich?](#)

2016 – present *EngineerGirl*

Contributor to the [EngineerGirl website](#) which highlights women in engineering and answers questions girls and young women have regarding careers in engineering

2015 – 2016 *Robotics outreach*

As part of the NASA robotic mining competition our team participated in community events designed to expose kids (aged 5 – 16 years old depending on the event) to science and technology. I acted as the team outreach coordinator organizing and participating in all events. [Example event](#)

2013, 2014 *Expanding Your Horizons group leader*

An annual event at Montana State University ([now called MSU STEAM Day](#)) to introduce middle school aged girls (11 – 14) to science, technology, engineering and math (STEM). As a group leader, I guided my group of girls through various hands-on STEM activities around campus, answered their questions and acted as a mentor

- 2013 *Girl Scouts Badge Day leader*
Helped Girl Scouts earn their engineering badge by guiding them through projects
- 2012 – 2013 *Boys and Girls Club mentor*
These clubs provide a safe place for youth during non-school hours particularly for kids with no place to go after school. Along with other NCAA athletes, I spent time with kids at the club on a recurring basis to build relationships and be a role model

E. Professional memberships

- 2020 – current Gesellschaft für Aerosolforschung (GAeF)
2022 – current Combustion Institute, German section
2019 – current UK Aerosol Society
2016 – 2022 Society for Canadian Women in Science & Technology (SCWIST)
2016 – 2019 Association of Professional Engineers and Geoscientists of Alberta (APEGA)
2011 – 2016 Montana State University Div. I NCAA Ski Team

F. Language Skills

- English – native language
Croatian – native language
German – working proficiency
French – working proficiency
Spanish – beginner