# Egor Demidov

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orcid.org/0000-0003-3082-488X | scholar.google.com/citations?user=vZx_CiUAAAAJ

## Education

**New Jersey Institute of Technology**, PhD in Chemistry — Sep 2023 to present
- Research Assistantship

**New Jersey Institute of Technology**, BS in Chemical Engineering — Sep 2019 to May 2023
Minor in Computer Science
- Albert Dorman Honors Scholar
- Magna Cum Laude

## Publications

Ashoka Karunarathne, ***Egor V. Demidov***, Ali Hasani, Alexei F. Khalizov
"Mechanical properties of bare and coated soot aggregates probed by atomic force microscopy"
*Submitted to Journal of Aerosol Science*, **2024**

***Egor V. Demidov***, Gennady Y. Gor, Alexei F. Khalizov
"Discrete element method model of soot aggregates"
*Physical Review E*, **2024**, 110, 054902, 10.1103/PhysRevE.110.054902

***Egor V. Demidov***, Ogochukwu Y. Enekwizu, Ali Hasani, Chong Qiu, Alexei F. Khalizov
"Differences and similarities in optical properties of coated fractal soot and its surrogates"
*Journal of Aerosol Science*, **2024**, 180, 106392, 10.1016/j.jaerosci.2024.106392

## Conference Proceedings

Alexei F. Khalizov, Ella V. Ivanova, ***Egor V. Demidov***, Ali Hasani, Jeffrey Curtis, Nicole Riemer, Gennady Y. Gor
"An unaccounted pathway for rapid aging of atmospheric soot"
*American Geophysical Union Fall Meeting 2024, Washington, DC*, **Dec 2024**

Alexei F. Khalizov, Ali Hasani, ***Egor V. Demidov***
"Soot restructuring in condensation-evaporation cycles"
*American Association for Aerosol Research 42ˆnd Annual Conference, Albuquerque, NM*, **Oct 2024**

Ella V. Ivanova, ***Egor V. Demidov***, Nicole Riemer, Gennady Y. Gor, Alexei F. Khalizov
"Capillary condensation as an unaccounted pathway for rapid aging of atmospheric soot"
*American Association for Aerosol Research 42ˆnd Annual Conference, Albuquerque, NM*, **Oct 2024**

Ogochukwu Y. Enekwizu, ***Egor V. Demidov***, Arthur J. Sedlacek, Ernie R. Lewis, Alexei F. Khalizov
"Reconciling measured and modeled optical properties of black carbon"
*American Association for Aerosol Research 42ˆnd Annual Conference, Albuquerque, NM*, **Oct 2024**

***Egor V. Demidov***, Gennady Y. Gor, Alexei F. Khalizov
"Discrete element method model for restructuring of soot aggregates"
*American Association for Aerosol Research 42ˆnd Annual Conference, Albuquerque, NM*, **Oct 2024**

Ogochukwu Y. Enekwizu, ***Egor V. Demidov***, Arthur J. Sedlacek, Ernie R. Lewis, Alexei F. Khalizov
"Reconciling measured and modeled optical properties of black carbon"

*Pacific Northwest National Laboratory Environmental Molecular Sciences Laboratory User Meeting, online*, **Oct 2024**

***Egor V. Demidov***, Gennady Y. Gor, Alexei F. Khalizov
"Modeling of soot restructuring"
*Pacific Northwest National Laboratory Environmental Molecular Sciences Laboratory User Meeting, online*, **Oct 2024**

***Egor V. Demidov***, Gennady Y. Gor, Alexei F. Khalizov
"Discrete element method model for restructuring of atmospheric soot aggregates"
*American Chemical Society Middle Atlantic Regional Meeting 2024, University Park, PA*, **Jun 2024**

***Egor V. Demidov***, Ali Hasani, Gennady Y. Gor, Alexei F. Khalizov
"Development of a model for restructuring of fractal soot aggregates and its parameterization using AFM experiments"
*42ˆnd Regional Meeting on Kinetics and Dynamics, Hartford, CT*, **Jan 2024**

***Egor V. Demidov***, Alexei F. Khalizov
"An algorithm for evaluating fractal parameters of a single soot aggregate"
*American Association for Aerosol Research 41ˆst Annual Conference, Portland, OR*, **Oct 2023**

Ella V. Ivanova, Ali Hasani, ***Egor V. Demidov***, Gennady Y. Gor, Alexei F. Khalizov
"Modeling of joint capillary condensation of trace chemicals and water on fractal soot aggregates"
*American Association for Aerosol Research 41ˆst Annual Conference, Portland, OR*, **Oct 2023**

***Egor V. Demidov***, Laurence Lu, Divjyot Singh, Alexei F. Khalizov
"Retrieval of the fractal parameters of individual soot aggregates"
*41ˆst Regional Meeting on Kinetics and Dynamics, Amherst, MA*, **Jan 2023**

***Egor V. Demidov***, Ali Hasani, Ogochukwu Enekwizu, Chong Qiu, Alexei F. Khalizov
"Light absorption and scattering by coated combustion soot and its surrogates"
*American Geophysical Union Fall Meeting 2022, Chicago, IL*, **Dec 2022**

***Egor V. Demidov***, Alexei F. Khalizov
"Heterogeneous nucleation of a non-wetting vapor on NaCl aerosol nanoparticles and its implications on cloud forming and optical properties"
*American Chemical Society Northeast Regional Meeting 2022, Rochester, NY*, **Oct 2022**

***Egor V. Demidov***, Alexei F. Khalizov
"Predicting vapor supersaturation and particle growth rate in a laminar flow"
*40ˆth Regional Meeting on Kinetics and Dynamics, online*, **Jan 2022**

Ali Hasani, ***Egor V. Demidov***, Alexei F. Khalizov
"Different mechanisms of soot restructuring by wetting and non-wetting liquid"
*40ˆth Regional Meeting on Kinetics and Dynamics, online*, **Jan 2022**

***Egor V. Demidov***, Ali Hasani, Ogochukwu Enekwizu, Alexei F. Khalizov
"Light scattering and absorption by soot aerosols with different morphologies and coating distributions"
*102ˆnd American Meteorological Society Annual Meeting, online*, **Jan 2022**

***Egor V. Demidov***, Alexei F. Khalizov
"Methods for predicting supersaturation in a laminar flow"
*102ˆnd American Meteorological Society Annual Meeting, online*, **Jan 2022**

Ali Hasani, ***Egor V. Demidov***, Alexei F. Khalizov
"Different mechanisms of soot restructuring by wetting and non-wetting liquids"

*American Geophysical Union Fall Meeting 2021, online*, **Dec 2021**

***Egor V. Demidov***, Alexei F. Khalizov
"Enhanced light scattering and absorption by soot aerosols with different coating distributions"
*American Chemical Society Middle Atlantic Regional Meeting 2021, online*, **Jun 2021**

## Referee Work

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| **Atmospheric Pollution Research** | 2024 |
| **Nature Reviews Physics** | 2024 |
| **Physical Review Fluids** | 2024 |
| **Journal of Geophysical Research** | 2024 |

## Software Projects

**soot-dem**

- Developed a discrete element method contact model for soot aggregate mechanics
- Implemented the developed contact model in an in-house code
- Tools Used: C++, OpenMP, Eigen
- The project resulted in a publication

**soot-dem-gui**

- Developed a graphical user interface wrapper from the soot mechanics engine
- Tools Used: C++, Qt, VTK

**create-latexdiff**

- Developed a GitHub action to automatically generate latexdiff files for version-controlled LaTeX projects
- Tools Used: Docker, Bash

## Experimental Projects

**Optics of soot and its surrogates**

- Designed and conducted a series of experiments to investigate the optical properties of bare and coated soot and its surrogates
- The project resulted in a publication

**Aerosol growth tube**

- Designed a condenser tube with precise vapor supersaturation control
- Rates of heat and mass transfer in the condenser were simulated numerically

**Aerosol coagulation chamber**

- Extended Alexei Khalizov's aerosol generation and aging system with a coagulation chamber with controlled residence time
- The coagulation chamber allowed us to investigate the mechanical differences between nascent soot aggregates and agglomerates of aggregates

## Areas of Expertise

**Computational chemistry and physics:** discrete element method, classical molecular dynamics, finite element analysis, finite difference methods, discrete dipole approximation, T-matrix, core-shell Mie scattering

**Experimental techniques:** scanning electron microscopy, electrostatic aerosol sizing, aerosol scattering measurements, contact angle measurements