OLIVIER DURIF

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RESEARCH EXPERIENCE

Postdoctoral Researcher – Max Planck Institute for Solid State Research, Stuttgart 2026–present
Group of Dr. Kelvin Anggara, ERC Starting Grant GlycoX
Design and development of electrospray ion beam deposition (ESIBD) instrumentation for landing molecular ions on surfaces, coupled with scanning tunneling microscopy (STM) for single-molecule imaging.

Postdoctoral Researcher – KTH Royal Institute of Technology, Stockholm 2022–2025
Department of Chemistry, EPHEMERAL project (ERC Advanced Grant)
Research on atmospheric peroxy radicals using proton-transfer-reaction time-of-flight mass spectrometry. Built a flow-tube reactor for gas-solid uptake measurements; optimized ion optics and detection systems; developed MassSpec.jl for automated data analysis.

PhD Candidate – Institut de Physique de Rennes, France 2016–2019
Laboratory Astrophysics
Low-temperature chemical kinetics using CRESU uniform supersonic flow coupled to PEPICO mass spectrometry. Built a novel apparatus combining supersonic molecular beams with time-of-flight detection.

TEACHING EXPERIENCE

Physics & Chemistry Teacher – Lycée Guillaume Apollinaire, Nice 2025–2026
National Education
Teaching physics and chemistry at high school level (seconde). Developed pedagogical materials and laboratory demonstrations.

Teaching Assistant (Monitorat) – University of Rennes 1 2016–2019
130 hours of teaching service

- Physics courses for first-year biology students (L1)
- Data processing course for Master 1 students
- Tutorials and lab sessions in physics (mechanics, optics) for undergraduate physics students
- Participation in student project evaluation juries and "Fête de la Science" outreach

Student Supervision
Supervision of Master's and PhD students during postdoctoral positions at KTH.

INDUSTRY EXPERIENCE

Design Office Engineer – AKKA Technologies, Toulon 2021–2022
Naval Group contract
Functional integration for naval navigation systems.

EDUCATION

PhD in Physics – University of Rennes 1 2016–2019
Thesis: "A New Instrument for Studying Kinetics and Branching Ratios of Reactive Collisions in Uniform Supersonic Flows."

Master in Physics – University of Nice-Sophia Antipolis 2014–2016
Specialization: Modeling and Scientific Computing

Undergraduate in Physics – University of Nice-Sophia Antipolis 2011–2014

PUBLICATIONS

7 peer-reviewed publications (4 as first-author). See attached publication list.

TECHNICAL EXPERTISE

Mass spectrometry – PTR-TOF-MS, PEPICO, CIMS, ion optics, time-of-flight detection

Atmospheric chemistry & aerosols – Peroxy radical chemistry, VOC oxidation, gas-surface interactions, aerosol characterization

Vacuum systems & molecular beams – Supersonic expansions, Laval nozzle design (CAD), reactor construction, high vacuum systems

Instrumental development – High-voltage electronics, signal acquisition, detector optimization

Scientific programming – Julia, Python, data analysis, open-source software development (MassSpec.jl, CRESU nozzle designer)

Chemical kinetics – Flow-tube reactors, gas-phase and surface kinetics

March 2026

List of scientific productions in support of the application

Publications in peer-reviewed journals

✯ **Olivier Durif**, Lucas Bard, Karine Elihn, Barbara Nozière, Ulf Olofsson, and Sarah S. Steimer. "Emissions of Volatile Organic Compounds from Brake Wear and Their Role in Ultrafine Particle Nucleation". In: *ES&T Air* (2025). DOI: 10.1021/acsestair.5c00070

Major contribution: conducted data analysis and writing, assisted with measurements.

✯ Anil Patel, Sneha Aggarwal, Lucas Bard, **Olivier Durif**, Micol Introna, Ana Teresa Juárez-Facio, Minghui Tu, Karine Elihn, Barbara Nozière, Ulf Olofsson, and Sarah S. Steimer. "Gaseous Emissions from Brake Wear Can Form Secondary Particulate Matter". In: *Scientific Reports* 14.1 (Oct. 2024), p. 23253. ISSN: 2045-2322. DOI: 10.1038/s41598-024-74378-5

Minor contribution: assisted with measurements, conducted mass spectrometery data analysis.

✯ **Olivier Durif**, Felix Piel, Armin Wisthaler, and Barbara Nozière. "Strong Uptake of Gas-Phase Organic Peroxy Radicals (ROO•) by Solid Surfaces Driven by Redox Reactions". In: *JACS Au* (Apr. 2024). DOI: 10.1021/jacsau.4c00060

Major contribution: conceptualization, measurements, data analysis, writing.

✯ Barbara Nozière, **Olivier Durif**, Éloé Dubus, Stephanie Kylington, Åsa Emmer, Fabienne Fache, Felix Piel, and Armin Wisthaler. "The reaction of organic peroxy radicals with unsaturated compounds controlled by a non-epoxide pathway under atmospheric conditions". In: *Physical Chemistry Chemical Physics* (Feb. 2023). Publisher: The Royal Society of Chemistry. ISSN: 1463-9084. DOI: 10.1039/D2CP05166D

Minor contribution: assisted with measurements and data analysis.

✯ **Olivier Durif**. "Design of de Laval nozzles for gas-phase molecular studies in uniform supersonic flow". In: *Physics of Fluids* 34.1 (Jan. 2022). Publisher: American Institute of Physics, p. 013605. ISSN: 1070-6631. DOI: 10.1063/5.0060362

Major contribution.

✯ **Olivier Durif**, Michaël Capron, Joseph P. Messinger, Abdessamad Benidar, Ludovic Biennier, Jérémy Bourgalais, André Canosa, Jonathan Courbe, Gustavo A. Garcia, Jean-François Gil, Laurent Nahon, Mitchio Okumura, Lucile Rutkowski, Ian R. Sims, Jonathan Thiévin, and Sébastien D. Le Picard. "A new instrument for kinetics and branching ratio studies of gas phase collisional processes at very low temperatures". In: *Review of Scientific Instruments* 92.1 (Jan. 2021). Publisher: American Institute of Physics, p. 014102. ISSN: 0034-6748. DOI: 10.1063/5.0029991

Major contribution: main Ph.D. result.

✯ Jérémy Bourgalais, Kacee L. Caster, **Olivier Durif**, David L. Osborn, Sébastien D. Le Picard, and Fabien Goulay. "Product Detection of the CH Radical Reactions with Ammonia and Methyl-Substituted Amines". In: *The Journal of Physical Chemistry A* 123.11 (Mar. 2019), pp. 2178–2193. ISSN: 1089-5639. DOI: 10.1021/acs.jpca.8b11688

Minor contribution: assisted with measurements and data analysis.

Others publications

- **Olivier Durif**, Lauren Cork, and Barbara Nozière. "Uptake of $CH_3OO^{\bullet}$ by Various Atmospherically-Relevant Inorganic Solid Surfaces". In: (Submitted.)

  Major contribution: conceptualization, measurements, data analysis, writing.

- **Olivier Durif**. *Commentary Regarding the CRESU-SIS Experiment: Concerns About the Uniform Supersonic Flow Reactor*. Sept. 2023. DOI: 10.48550/arXiv.2306.12349. arXiv: 2306.12349

  Major contribution.

Datasets

- Olivier Durif. *Data Archive Supporting: Uptake of CH3OO· by Atmospherically-Relevant Inorganic Solid Surfaces, Durif et al. 2026*. Zenodo, 2025. DOI: 10.5281/zenodo.18098757
- **Olivier Durif**. *Emissions of Volatile Organic Compounds from Brake Wear and Their Role in Ultrafine Particle Nucleation: Data Set*. Feb. 2025. DOI: 10.5281/zenodo.13869976
- **Olivier Durif**, Felix Piel, Armin Wisthaler, and Barbara Nozière. *Strong Uptake of Gas-Phase Organic Peroxy Radical (ROO•) by Solid Surfaces Driven by Redox Reactions*. Mar. 2024. DOI: 10.5281/zenodo.10790197
- **Olivier Durif**. *Supporting Data for Commentary Regarding the CRESU-SIS Experiment: Concerns about the Uniform Supersonic Flow Reactor*. Feb. 2023. DOI: 10.5281/zenodo.7685812

Software projects

- ✯ **Olivier Durif**. MassSpec.jl - A Julia package for PTR-TOF-MS data analysis. https://odurif.gitlab.io/MassSpec.jl/
- ✯ **Olivier Durif**. A program to compute de Laval nozzles profiles in rarefied gas flow. Gitlab. https://gitlab.com/odurif/cresu

Patents

- ✯ Two deposits pending

Relevant Presentations

- ✯ Oral contribution. O. Durif and B. Nozière. "Laboratory Measurements of Gas-Phase Reactions Kinetics and Uptake on Surfaces: Application to Organic Peroxy Radical". In: *Workshop on theoretical physical chemistry and atmospheric chemistry*. Marseille, France, 2025
- ✯ Poster presentation. O. Durif. *PTR-TOF-MS : Addressing Instrumental and Computational Challenges*. 41ème journées françaises de spectrométrie de masse, Montpellier, France, 2025
- ✯ Poster presentation. O. Durif. *Laboratory experiments for chemical kinetics at very low temperature: Why is the efficiency of gas-phase reactions overestimated?* 14th International Meeting on Atomic Molecular Physics Chemistry, Caen, France, 2025
- ✯ Oral contribution. O. Durif and B. Nozière. *A Novel Flow Tube Method for Measuring Gas-Phase Reactions Kinetics and Uptake on Solid Surfaces: Application to Organic Peroxy Radical*. Mar. 15, 2025. DOI: 10.5194/egusphere-egu25-11187
- ✯ Seminar talk. O. Durif. *Gas-Phase Tracking of Molecules by Proton-Transfer-Reaction Mass Spectrometry: Application to Atmospheric Chemistry*. KTH, Applied Physical Chemistry division, Stockholm, Sweden, 2025
- ✯ Poster presentation. O. Durif and B. Nozière. *Detection & Speciation of Organic Peroxy Radicals ($ROO^{\bullet}$)*. 27th International Symposium on Gas Kinetics and Related Phenomena, Leeds, England, 2024
- ✯ Oral contribution. O. Durif. "Proton-Transfer-Reaction Mass Spectrometry for Atmospheric Chemistry Applications". In: *Journées plénières du GDR EMIE*. Biarritz, France, 2024

- ✯ Poster presentation. O. Durif. *Grille de lecture alternative en cinétique chimique à très basse température: pourquoi l'efficacité des réactions en phase-gazeuse est surestimé ?* Journées plénières du GDR EMIE, Biarritz, France, 2024
- ✯ Poster presentation. O. Durif, S. Morales, and A. Bergeat. *Les faisceaux moléculaires croisés pour étudier l'homochiralité des biomolécules.* Conférence nationale d'Exobiologie, Grenoble, France, 2023
- ✯ Poster presentation. O. Durif and B. Nozière. *Detection & Speciation of Organic Peroxy Radicals ($ROO^{\bullet}$).* European Research Course on the Atmosphere, Grenoble, France, 2024
- ✯ Seminar talk. O. Durif. *Tribology Campaign, Results of Brake Emission Monitored by Proton-Transfer-Reaction Mass Spectrometry.* Department of Machine Design, KTH, Stockholm, Sweden, 2023
- ✯ Poster presentation. O. Durif and B. Nozière. *From RO_2 to HOMs: Investigating the monomolecular reactions of individual unsaturated RO_2 with proton transfer mass spectrometry.* 13th International Conference on Carbonaceous Particles in the Atmosphere, Berkeley, USA, 2023
- ✯ Oral contribution. O. Durif. "CRESUSOL : un instrument pour aider à caractériser la formation des molécules en phase gazeuse et à basse température". In: *Journées des doctorants de l'IPR.* Rennes, France, 2019
- ✯ Oral contribution. O. Durif, L. Biennier, and S.D. Le Picard. "Mesure de la cinétique et des rapports de branchement de collisions réactives en phase gazeuse par spectrométrie de masse à temps de vol et par ionisation synchrotron, une approche universelle". In: *Colloque annuel du Groupe Français de Cinétique et Photochimie (GFCP).* Rennes, France, 2019
- ✯ Oral contribution. O. Durif, L. Biennier, and S.D. Le Picard. "Experimental study of formic acid dimerization at very low temperatures with CRESUSOL". in: *GDRI QUADMARTS.* Nancy, France, 2019
- ✯ Oral contribution. O. Durif, L. Biennier, and S.D. Le Picard. "Détermination expérimentale de la cinétique et des rapports de branchement des collisions réactives entre espèces neutres aux basses températures". In: *Journées plénières du GDR EMIE.* Nouan-Le-Fuzelier, France, 2018
- ✯ Oral contribution. O. Durif, L. Biennier, and S.D. Le Picard. "CRESUSOL, a new instrument for determining kinetics and branching ratios of elementary processes at low temperatures". In: *25th International Symposium on Gas Kinetics.* Lille, France, 2018
- ✯ Oral contribution. O. Durif. *CREUSOL.* Séminaire des doctorants de l'IPR, Rennes, 2017