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Exhaled particles and viruses from humans with upper respiratory infection

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NOSA 2026

Nordic Society for Aerosol Research Symposium



3-5 March 2026, at AF-Borgen, Lund University, Sweden



LTH
FACULTY OF
ENGINEERING



Local organization committee

Christina Isaxon

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Nikolaos Evangeliou

Ulas Im

Marianne Tronstad Lund

Christina Isaxon

Sarah Steimer

Angela Buchholz

Outi Meinander

Pavla Dagsson-Waldhauserová

Detailed program

Tuesday, March 3

- 11:00 – Registration opens at IKDC, tour of Lund University Aerosol Lab
- 13:00 – 15:30 **Tutorial 1 (at MAXIV):** Jenny Rissler, Xiangrui Kong, Calle Preger, Jack Lin
- *Synchrotron-based techniques for aerosol science*
- 15:30 – 16:00 Coffee break at IKDC
- 16:00 – 17:00 **Tutorial 2:** Nanna Myllys
- *Molecular-level atmospheric science*
- 17:00 – 18:30 Ice breaker
- 19.30 Art of Air - Performance by Peter Lång, Lund Cathedral

Wednesday, March 4

- 08:00 – Registration opens
09:00
- Oral session 1: Aerosol science to societal impact**
Session chairs: Merve Polat, Erik Swietlicki
- 09:00 – Welcome
09:15
- 09:15 – Keynote: Ebba Malmqvist - *Air pollution policy - How does it work and what research are needed?*
09:45
- 09:45 – Pavla Dagsson-Waldhauserova - *High Latitude Dust: Atmospheric observations and impacts on climate and society*
10:00
- 10:00 - Jens Wahlström - *Reflecting on Non-Exhaust Emission Factors: Insights from Scaled Laboratory Tribological Testing*
10:15
- 10:15 – Coffee break and exhibition.
11:00
- Oral session 2: Particle mechanics in the respiratory system**
Session chairs: Malin Alsved, Nonne Prisle
- 11:00 – Matjaz Malok - *Selective detection of aerosolised respiratory droplets in ambient air*
11:15

- 11:15- 11:30 Hugo Öhrneman - *Validation of an aerosol-based method to detect disease in the alveolar region of the lung*
- 11:30- 11:45 Pontus Roldin - *Air pollution exposure and respiratory tract deposited doses of particulate matter and related oxidative potential among the population in Europe*
- 11:45- 12:00 Karine Sartelet - *Quantification and sources of ultrafine particle deposition in the human lung and olfactory regions*
- 12:00 - 13:00 Lunch and exhibition.

Oral session 3: Air quality and environmental monitoring

Session chairs: Þuríður Nótt Björgvinsdóttir, Knut Deppert

- 13:00 – 13:30 Keynote: Kaspar Dällenbach - *Chasing invisible killers using mass spectrometry, data science, and modelling*
- 13:30- 13:45 Nikolaos Evangeliou - *Updated atmospheric microplastic emissions constrained by inverse modelling*
- 13:45- 14:00 Leo Håkansson - *A drone-based sampling platform for vertically resolved chemical characterization of aerosol particles using chemical ionization mass spectrometry*
- 14:00 – 14:15 Haitong Zhang - *Quantifying Residential Wood Combustion Emissions in Lahti, Finland: Local Emissions Processing and Modelling Insights*
- 14:15 – 15:30 Poster session, coffee break and exhibition

Oral session 4: Climate modelling and atmospheric aerosol dynamics

Session chairs: August Thomasson, Ulas Im

- 15:30 – 15:45 Robin Wollesen de Jonge - *DMS-driven new particle formation in the remote marine boundary layer and its effects on cloud condensation nuclei from the Arctic to the Amazon*
- 15:45- 16:00 Sini Talvinen - *Aerosol concentration responses to extreme precipitation events in mid-latitudes*
- 16:00- 16:15 Jonas Elm - *Modelling Atmospheric Freshly Nucleated Particles*
- 16:15- 16:30 Petri Clusius - *Modelling the impact of anthropogenic aerosols on CCN concentrations over a rural boreal forest environment*
- 18:00 – Conference dinner at Mejeriet, Stora Södergatan 64

Thursday, March 5

Oral **Aerosol technology and measurements**

session 5: Session chairs: TBD, Adam Kristensson

- 09:00 – Keynote: Chris Hogan - *Particles and Droplets at High Speeds and Cryogenic Temperatures: “Far Out Applications of Aerosol Science”*
- 09:30 – Kim Cuong Le - *Studying Carbonaceous Aerosols Using Advanced Optical Diagnostic Techniques*
- 09:45 – Matthew S. Johnson - *Environmental DNA as a New Tracer for Terrestrial Aerosols and Biodiversity*
- 10:00 – Aiden Jönsson - *Characterizing and identifying biological, anthropogenic, and inorganic coarse-mode particles with fluorescence spectroscopy and optical morphology*
- 10:15 – Poster session, coffee break and exhibition.
- 11:30 –

Oral **Aerosol chemistry**

session 6: Session chairs: Jonatan Knutsson, Merete Bilde

- 11:30 – Sneha Aggarwal - *Sea spray aerosol as an overlooked source of gas-phase perfluoroalkyl substances (PFAS)*
- 11:45 – Eva Horchler - *Aging and acidification of sea spray aerosols from natural sources in an atmospheric simulation chamber*
- 12:00 – Nina Sarnela - *Towards harmonized measurements of aerosol precursors*
- 12:15 – Lunch and exhibition.
- 13:15 –

Oral **Aerosol sources in the green transition and emissions from transport**

session 7: Session chairs: Morten Engsvang, Sarah Steimer.

- 13:15 – Keynote: Topi Rönkkö - *Ultrafine particle emissions of modern vehicles and their impact on urban air quality*
- 13:45 – Saema Ansar - *Chemical Composition of Maritime Fuel Emissions Drives Distinct Cellular Toxicity Profiles Revealed by Integrated Omics Analysis*
- 14:00 – Teemu Lepistö - *Investigating the ultrafine particle dispersion from a medium-large international airport*
- 14:15 – Coffee break and exhibition
- 15:00 –

Oral Indoor and workplace aerosols

session 8: Session chairs: Jussi Hoivala, Aneta Wierzbicka

- 15:00 – Frederik Bælum Hildebrand - *Overview of indoor air pollution measurements in elementary schools in Denmark and impacts of air-purification devices: a case study*
15:45
- 15:15- Edvin Elmroth - *Fly ash aerosols from high temperature hazardous waste incineration utilizing rotary kiln*
15:30
- 15:30- Karin Lovén - *Characterization of occupational airborne metal exposure during copper beneficiation*
15:45
- 15:45 – Awards, closing remarks
16:00
- 19.00 Dinner and post-conference mingling (at own cost)

Friday 6 March

- 8:00 Departure for visit to ACTRIS/ICOS station Hyltemossa
- 09:30 – ACTRIS/ICOS stations (including lunch sandwich)
13:00
- 13:00 Bus back to Lund (EAT 14.30)

Poster presentations

Even numbers: Poster session 4/3. Odd numbers: Poster session 5/3		
Poster number	Presenting author	Title
1	C. Abrahamsson	Fumed silica particle release during bag dumping in a chemical plant setting
2	C. Andersen	VOC and aerosol particle measurements during plastic welding in a work environment
3	E. Andersson	Urban PM _{2.5} at Realistic Environmental Concentrations Impairs Blood–Brain Barrier Integrity and Enhances Stroke Biomarker Expression in Human Brain Endothelial Cells
4	D. Ayoubi	Direct Measurements of Oxygen in Organic Aerosol particles and Possible Implications on Atmospheric Chemistry
5	S. Barua	NO increases secondary aerosol precursor formation from aromatic carbonyl compounds
6	S. Bengtsdotter	Physical and Chemical Characterization of Road Wear Particles from 5 Road Surface Materials
7	Þ. Björgvinsdóttir	Chamber of Secrets: Dimers and other degradation products of sabinene and limonene
8	E. Cwalina	How Are PAHs and Aerosols Formed and Emitted During Biomass Thermal Conversion? Insights from Pyrolysis, Gasification and Combustion
9	L. Dahlberg	Ranging and characterizing aerosolized soot using a hyperspectral Scheimpflug Raman lidar
10	F. Dahlkötter	Mobile measurement of particle number concentrations of traffic-related emissions
11	C. Daub	New Horizons in Sulphur Aerosol Chemistry -- Organosulphates (And Organosulphites?)
12	F. S. Doré	Chemical composition differences in gas- and particle-phase organic and DMS-derived oxidation products between a pristine marine environment and a wildfire-influenced marine air mass
13	J. Enarsson	Reactive oxygen species and oxygen functionalization on carbon nanomaterials
14	J. Enarsson	Effect of carbonaceous particles on BPEAnit-based measurements of reactive oxygen species
15	M. Engsvang	CONNECTING THE DOTS: FROM NANOSCALE CLUSTERS TO AEROSOL PARTICLES
16	N. Evangeliou	High-Latitude Wildfires as an Arctic Aerosol Sources
17	S. Farhoudian	NO-Triggered RO-Mediated Propagation in the OH Oxidation of a Saturated Cyclic Alkane
18	A. Glasell	Temporal Variability of Ice Nucleating Particles in Southern Sweden

19	E. Gorjatsšova	Speciation of zinc in MSWI fly ash studied using 2D hyperspectral mapping
20	J. Gratzl	Fluorescent fungal spores as atmospheric ice nucleating particles in the European sub-Arctic
21	S. Haider	Roadside particle number (PN) measured with a high frequency CPC, volatile particle removing catalyst and ultrasonic anemometer
22	M. Hallquist	From Molecular Composition to Volatility: Gas-Particle Partitioning of Monoterpene SOA
23	G. Hasan	Surface-Mediated RO ₂ Oligomerization on Freshly Nucleated Atmospheric Particles
24	J. Hoivala	Dual study of underground mine air quality: Effects of fuel transition, intake air heating, and cabin air filtration on worker exposure
25	S. Holm	Towards a preparation-free analysis workflow for aerosol filters with TD-MION-Orbitrap
26	U. Im	Aerosol-cloud interactions over the high Arctic: CLeancloud Arctic Villum ExpeRiment (CLAVIER)
27	S. Ismayil	Source apportionment of dust aerosols in Southern Sweden
28	A. Jadav	Evaluating representation of marine aerosols in Norwegian Earth System Model
29	P. Juuti	On the cusp of nucleation with an oxidation flow reactor (DOFR™)
30	L. Jönsson	Time-resolved composition of CuZn nanoparticles generated by spark ablation
31	C. Karagianni	Cloud residual size distributions of clouds observed at Mt. Helmos, Greece, and the influence of potential measurement artifacts
32	I. Karppinen	Acetyl peroxy radical-initiated oxidation of oxygenated monoterpenes: functional group effects on reaction pathways
33	A. Kervinen	MULTIGENERATIONAL OXIDATION OF BENZYL ALCOHOL IN THE ATMOSPHERE
34	K. Kjær	Glycolic Acid Sulfate Formation in Aqueous Aerosols Analyzed with Hydrophilic Interaction Liquid Chromatography-Mass Spectrometry
35	Y. Knattrup	Growth of Atmospheric Freshly Nucleated Particles: A Semi-Empirical Molecular Dynamics Study
36	J. Knutsson	Biogenic Volatile Organic Emissions and Secondary Organic Aerosol Formation from a Newly Planted Boreal Forest
37	A. Koskinen	The Effect of Substitution on the Unimolecular Reaction Rates of Stabilized Criegee Intermediates
38	T. Krinke	Advanced Laser Diagnostics for Investigating the Formation of Metal Clusters from Spark Ablation
39	A. Kristensson	Are Nordic dust aerosol particles originating from deserts or near-regional sources?
40	A. Kristensson	Climate impact of afforestation in the Nordic countries
41	J. Köykkä	Investigating the regional and long-range transport of aerosols to Greenland
42	A-K Larsson Callerfelt	Different Susceptibility to Particulate Matter Exposure within the Respiratory Tract

43	J. Lavric	High-Resolution Continuous Black Carbon Measurement for Improved Understanding of PM _{2.5} Toxicity and Mitigation of Pollution Hotspots
44	A. Le Bayon	Semi-explicit chemical mechanisms for aromatic oxidation by automatic identification of major SOA pathways
45	T. Lepistö	Investigating the ultrafine particle dispersion from a medium-large international airport
46	M. Liljenberg	Exhaled particles and viruses from humans with upper respiratory infection
47	J. Löndahl	Validation of an aerosol-based method to detect disease in the alveolar region of the lung
48	I. Mahmutovic Persson	PM _{2.5} exposure modulates inflammation and markers of barrier integrity in the lungs of rats: a comparative study of chronic and acute exposure
49	P. Marjanen	Characterizing Secondary Aerosol Formation from Lubricating Oil-Derived Emissions of a Prototype Natural Gas Engine
50	J. Masionis	Influence of Ion Polarity and Ventilation on Aerosol Removal Efficiency in Indoor Air Using a Custom-Built Ionizer
51	M. Meder	EXPLORING A NOVEL ISOMERISATION REACTION OF AROMATIC COMPOUNDS USING CHEMICAL IONISATION MASS SPECTROMETRY
52	B. Meuller	Combining Near Real-Time Elemental Insights with Auxiliary Low-Cost Sensors to Understand Metal Air Pollution at a Cu Beneficiation Plant
53	M.K. Mikkelsen	Photochemical production of chlorine Cl ₂ from aqueous iron chloride solutions: Impact of light, pH, [H ₂ O ₂], [Cl ⁻], [NO ₃ ⁻], [SO ₄ ²⁻] and [Fe(II/III)]/[Cl ⁻]
54	B. Muyschondt	Microbial (fungal) Contamination in Indoor Environments: A Study of Air Sampling Approaches
55	U-V Mäkinen	A concept for improving the detection of nanoparticles with the SP-AMS
56	L. Nilsson	Springtime observations of black carbon aerosols in and outside of low-level Arctic clouds during the ARTofMELT expedition 2023
57	A. Nurminen	Formation of aerosol precursors from the atmospheric oxidation of cumene
58	A. Ojala	Catechol oxidation dominates SOA formation from multigenerational oxidation of benzene and phenol
59	A.N. Pedersen	Atmospheric New Particle Formation Enhanced by Tricarboxylic Acids
60	K. Peek	SECONDS AFTER AEROSOLISATION: THE IMPACT OF RELATIVE HUMIDITY ON AIRBORNE INFLUENZA A VIRUS
61	J. Petersson (V. Geretti)	Matrix and Relative Humidity Effects on Organic Aerosol Evaporation Measured by FIGAERO-CIMS
62	K. Pira	A Scandinavian Cohorts Study of Black Carbon Exposure and Birth Weight Outcomes
63	M. Polat	Characterization of Organic Aerosols from Traditional and Alternative Asphalts Using Mass Spectrometry
64	Z. Pourjam	The influence of relative humidity on rhinovirus infectivity in aerosol phase

65	C. Preger	In-flight surface characterization of aerosol particles at MAXIV synchrotron radiation facility
66	S. Ramu	Combined PM2.5 and viral exposure dysregulates anti-viral defence and inflammatory signalling in human bronchial epithelial cells in in Vitro
67	M. Rasmussen	Probing cloud forming potential of particles containing organic acids
68	J. Rex	Aerosol Emissions from Electric Vehicle Battery Cells during Heating and Thermal Runaway
69	J. Rissler	Lab-method for dustiness testing of secondary aggregates and first results
70	M. Roudini	Miniaturized, cost-efficient, mass-producible and reproducible SAW-based aerosol generators
71	S. Sasikumar	In-Flight/Online Spectroscopic Characterisation of Soot Aerosol
72	A. Savolainen	Formation of Low-Volatility Compounds from the Multi-Generational Oxidation of 1,3,5-Trimethylbenzene
73	M. Sedrpooshan	Towards the Continuous Fabrication of Soft Magnetic Micro-Actuators
74	S. Steimer	Ambient ultrafine particle concentrations at a major Swedish airport
75	C. Svenhag	Structural and Parametric Contributions to Aerosol Effective Radiative Forcing Uncertainty in a Two-Model Perturbed Parameter Ensemble
76	B. Svenningsson	Missed evaporation from atmospherically relevant inorganic mixtures during droplet drying confounds experimental aerosol studies
77	E. Swietlicki	ACTRIS Sweden – The national research infrastructure for observations of atmospheric short-lived climate forcers and pollutants
78	K. Szaló-Pál	Relative Humidity Influences Chlorine Chemistry on Natural Salt Surfaces
79	A. Thomasson	The effects of vehicle emissions on particulate matter and number in Europe: a model comparison across chemical complexity
80	L. Thomsen	Investigation of Molecular Composition of Arctic Organic Aerosols and Marine Precursors
81	P. Tripathi	Real-time chemical characterization of cloud droplet residuals at the Maïdo high-altitude observatory, Réunion island
82	C. Udemezue	Interaction of SO2 and ice surface under atmospheric conditions: update, dissociation and surface disordering
83	W. Wei	Surface Lithium Enrichment in Lithium Mine Slag Analogue Aerosols Probed using In-Flight XPS
84	T. Wendt	Chemical Composition of Maritime Fuel Emissions Drives Distinct Cellular Toxicity Profiles Revealed by Integrated Omics Analysis
85	H. Wu	Molecular-to-Nanometer Scale Modeling of Atmospheric Aerosol Nucleation
86	M. Zhang	Effect of chronic pulmonary diseases on simulated aerosol drug deposition in the respiratory tract during adult HFNC and IMV

87	X. Zhang	The Residential Fire Emissions Experiment: Aerosol Composition, Chemistry and Exposure Assessment with a Drone & Mass Spectrometer Platform
88	K. Åbom	Probing viscosity of secondary organic aerosols from sabinene ozonolysis
89	T. Olenius	National ammonia emission reduction benefits for air quality and environment: Case study for Sweden

Exhaled particles and viruses from humans with upper respiratory infection

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Respiratory virus infection affects millions of humans every year, having a large economic and societal impact. Knowledge of the aerosols generated when speaking, coughing, and sneezing can help our understanding of infectious disease transmission through the air, and how to prevent it. The current study aims to investigate the particle size distribution, concentration, and virus content of exhaled aerosols from approximately 150 participants with recent onset of upper respiratory infection.

Measurement of exhaled particles and viruses from subjects with acute upper respiratory infection took place in a 36 m³ climate-controlled (temperature, relative humidity) chamber. The chamber air was HEPA filtered with 8.5 air exchanges per hour to minimize background particle concentrations. The subject with infection breathed, vocalized, and coughed into a funnel with a 30 Umin collection flow, which fed the exhaled aerosols to several instruments that measured and collected the aerosol particles. The same measurements were repeated several weeks later, after the subject had recovered from the infection, to investigate the difference in particle emissions between the infected and healthy state. Dry particle size concentrations between 0.3-20 µm was determined using an Aerodynamic Particle Counter (APS 3321, TSI Inc., US) and an Optical Particle Counter (OPC, model 11-D, Grimm Aerosol Technik, Germany). Exhaled CO₂ and H₂O concentration was measured with a LI-COR 850 (LI-850, LI-COR Biosciences, Germany). 50% of the exhaled aerosol flow was collected into liquid collection media using a BioSpot (Model 300-P, Aerosol Devices Inc., USA) for later virus quantification via qPCR. An infectivity assay of exhaled samples is planned for winter 2026.

At time of writing, 14 subjects performed the first visit while infected, and 11 subjects also did the healthy return visit. Particle concentration data during early virus infection of the 2 first subjects indicate undetectable particle emissions during breathing, 500-5000 particles/L during vocalization, and 2000-4000 particles/L while coughing. Of all participants, 64% had a rhinovirus infection (detected in nasopharynx), and 57% of rhinovirus positive subjects exhaled detectable levels of rhinovirus RNA in aerosol samples.

During the COVID-19 pandemic we learned that aerosol transmission contributed to disease transmission, especially in the early phase. It is likely that other acute respiratory infections also can spread through aerosol transmission, which would have implications for infection prevention strategies throughout society. The outcomes from this study will contribute to a better understanding of acute respiratory infections' ability to spread via aerosol transmission.