

Initial Development of a Personal Electrostatic Bioaerosol Sampler (PEBS)

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The objective of this exploratory research is to develop a personal electrostatic bioaerosol sampler (PEBS) with high sample concentration rate. In this sampler, bioaerosols are drawn into an open channel collector, electrically charged and deposited onto a removable plate covered with a superhydrophobic substance. The new sampler will allow a more accurate monitoring of personal exposures to even low microorganism concentrations and thus improve the ability to identify the exposure risks and protect affected populations. Since this personal bioaerosol sampler will be light, self-contained and battery-operated, it will be easy to wear and apply for occupational and environmental studies and field deployments.

The prototype of PEBS was designed and optimized using computational fluid dynamics (CFD) simulation. It has a shape of a cylinder of 1 inch in diameter and is made of static dissipative material (Delrin). The collection chamber is split in two by a stainless steel rectangle collection plate (1×1.75 inches) and each half has a charger (e.g., carbon fiber) located 0.75 inches downstream of the collection plate front; this configuration allows collection of dual samples. The sampler features a 3D-printed air blender positioned at its inlet to improve mixing of the incoming bioaerosol particles with ions. When the sampler was tested at different sampling flow rates (10 to 30 L/min) and collection/charging voltages (-3 to -5 kV) with 1 micron polystyrene latex particles, it showed collection efficiency as high as 90%. The sampler was also tested with biological particles and showed collection efficiencies in the 70-80% range. The samples were effectively removed from the collection plate and analyzed using

adenosine triphosphate based bioluminescence. In the next stage, the sampler will be further modified to improve its performance at higher flow rates and then it will be challenged with multiple bacteria and fungi. Overall, the new sampler concept is showing good potential as a personal bioaerosol sampler.

Acknowledgement

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- [Monday](#)
[7th September](#)
- [Tuesday](#)
[8th September](#)
- [Wednesday](#)
[9th September](#)
- [Thursday](#)
[10th September](#)
- [Friday](#)
[11th September](#)

Plenary Lectures

08:45 - 09:45

Plenary lecture: Toxicology and risk assessment of airborne nanosized particles

Plenary speaker: Günter Oberdörster

Chairs: Denis Boulaud and Ian Colbeck

Room: Aula Magna

[Link to pdf](#)

ORAL SESSION

10:30-12:50

Session: Atmospheric Aerosol - Aerosol Processes and Properties

Sub-session 15: Field measurements and long-term observations

Lynn Mazzoleni and Florian Ditas

Room: Aula Magna

show lectureshide lectures

10:30-10:50 **15AAP_O014**

Aerosols in Amazonia: Urban impacts on a pristine atmosphere at GoAmazon 2014-15

P. Artaxo, H.M.J. Barbosa, J.F. Brito, S. Carbone, E.T. Sena, B. Holanda, M.A.F. Silva Dias, G. Cirino, L.V. Rizzo, R. Souza, S. Martin, M. O. Andreae, C. Pöhlker, and J. Saturno

[Link to pdf](#)

10:50-11:10 **15AAP_O015**

Chemical characterization of submicron aerosol particles during the dry and wet seasons in the Amazon forest – ATTO station

S. Carbone, J.F. Brito, L.V. Rizzo, B.A. Holanda, J. Saturno, C. Pöhlker, H.M.J. Barbosa, M.O. Andreae, and P. Artaxo

[Link to pdf](#)

11:10-11:30 **15AAP_O016**

Pulmonary consequences of concentrated atmospheric nanoparticle inhalation in rats

Á. Filep, G.H. Fodor, F.K. Szabó, L. Tiszlavicz, Z. Rázga, Z. Bozóki, G. Szabó, and F. Peták

[Link to pdf](#)

2IEH_P027

Particulate matter personal dose in a subway microenvironment

V. Martins, T. Moreno, M.C. Minguillón, X. Querol, and M. Lazaridis

[Link to pdf](#)

2IEH_P028

Age-specific aerosol doses deposited in the respiratory system of electronic and conventional cigarette smokers

M. Manigrasso, G. Buonanno, F.C. Fuoco, L. Stabile, and P. Avino

[Link to pdf](#)

2IEH_P029

The regional deposition of inhaled porous particles in the human respiratory airways

M. Belka, J. Lippay, J. Jedelsky, F. Lizal, and M. Jicha

[Link to pdf](#)

2IEH_P030

The change of the MMAD of inhaled drugs in humidified air measured by next generation impactor and optical analysis

A. Kerekes, A. Nagy, M. Veres, S. Kugler, and A. Czitrovszky

[Link to pdf](#)

2IEH_P031

Passenger exposure to black carbon particles from ferryboat emissions

P. Krecl, A. Targino, and J.P. Moraes Ribeiro

[Link to pdf](#)

2IEH_P032

Environmental implications of mining and quarrying activities at Umoughara, Ezza North, Ebonyi State

O. N. Omaka, N. C. Chidinma, and G. I. Nwovu

[Link to pdf](#)

3IEH_P048

Monitoring the transport behaviour of toluene through protective polymer gloves using quartz crystal microbalance

M.-J. Chena, L.-H. Chenga, and T.-P. Tseng

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3IEH_P054

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