

# AMBICON LAB

Faculty of Natural and Technical Sciences  
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## Who we are ?

- AMBICON Lab, a division of the Faculty of Natural and Technical Sciences at Goce Delcev University in Stip, has existed in various forms for more than a few decades, with a strong emphasis on the development of a methodological foundation for ambient air monitoring and environmental analyses.
- The current structure of AMBICON brings together two distinct scientific groups: the **ambient control and sampling group**, and the **material analysis group**.



# Accreditations

- The laboratory has been accredited in accordance with ISO 17025 for the testing of environmental samples since 2014. Main testing areas include:
  - Standard gravimetric measurement method for the determination of the PM10/PM2,5 mass concentration of suspended particulate matter;
  - Personal exposure or background workplace concentration.
  - Asbestos sampling and analysis.
  - Determination of chemical composition of ambient particulate matter using Energy Dispersive X-Ray Fluorescence (EDXRF);
  - Direct on filter analyses of ambient air particulates mineralogy by X-ray diffractometer;
  - Particulate geometry/morphology and composition using Electron Scanning Microscopy equipped energy dispersive spectrometer (EDS).



# Collaboration with industry

- As a result of permanent development and high-quality services, the lab has built a long-term collaboration with largest industrial and servicing companies based in Macedonia, Serbia, Bulgaria, Kosovo and Albania, thus building a large scientific and research database (over 1000 individual analysis per annum).





# Open science and multidisciplinary research

- From its inception, the laboratory has maintained a steadfast commitment to an open science approach and the pursuit of multidisciplinary research.
- Over the course of the past five years, more than 100 research personnel from various locations within the country and the area have conducted their research activities at the AMBICON Laboratory.

## A close look at air pollution's impact on the skin

The skin is exposed to numerous particulate and gaseous air pollutants. Particles that stick to the skin's surface warrant particular interest, since they can cause skin damage (possibly including atopic dermatitis, acne, premature skin ageing and skin cancers) and even enter the circulatory system. Detailed knowledge of their properties is essential to understanding the mechanisms of air pollution-induced skin damage, but data on the skin and systemic toxicity of most air pollutants are lacking.

In an analysis of a small group of healthy volunteers based in the capital of Macedonia, Mirakovski *et al.* developed a method employing a scanning electron microscopy coupled with energy-dispersive X-ray analysis (SEM-EDX) for examining particulate matter adhering to exposed skin. Their method provides evidence of the contamination of exposed skin by various airborne particulate matter of natural or anthropogenic origin (the latter caused by humans). The advantage of SEM-EDX over other analytical methods is its capacity to analyse particle composition and morphology. This study may lead to opportunities for future research.

Mirakovski D, Damevska K, Simeonovski V, *et al.* Use of SEM/EDX methods for the analysis of ambient particulate matter adhering to the skin surface. *J Eur Acad Dermatol Venereol* 2022; 36: 1376-1381.

<https://doi.org/10.1111/jdv.18146>.

# New look on old problems

- Assessing exposure and related risks using limit values for aerosol mass concentrations ( $\mu\text{g}/\text{m}^3$ ) is not ideal and can result in underestimating or overestimating health concerns.
- These findings underline the need of additional aerosol mixture characterisation and description to support risk assessment based on relevant exposure and exact source identification.
- Thus, we are developing automated SEM/EDS methods to define particle properties including number, size, shape, and elemental composition at the individual level.
- **Everyone is invited.**

