Swisens

Beyond details

Factsheet

Swisens AG

English

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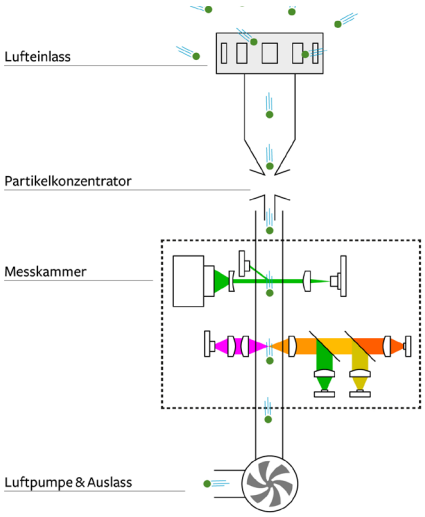
Swisens AG is a Swiss company with experienced specialists and skilled employees with profound know-how in aerosol technology, high-tech engineering, Big Data and artificial intelligence, which develops and produces high-precision measuring systems for the real-time measurement and identification of aerosol particles. Swisens AG was founded in 2016 and is a spin-off of the Lucerne University of Applied Sciences and Arts. Swisens offers complete system solutions consisting of measurement systems including comprehensive software for the identification of individual aerosol particles as well as for Big Data data analysis and management. The patented systems are versatile and can be used, for example, for air quality and environmental measurements and in process technology.

Thanks to its close cooperation with customers, partners and the scientific community, Swisens AG is a technology leader and pioneer for groundbreaking solutions in aerosol particle measurement and stands for quality, innovation and customer proximity. Swisens supports its customers in their research into the aerosol microcosm and enables new discoveries that lead to a better understanding of our environment.

Swisens AG‘s goal is to make an active contribution to improving the health, knowledge and quality of life of all living creatures on our planet.

Swisens Poleno

Swisens Poleno is a high-tech aerosol particle measuring system developed and produced in Switzerland. The highly sensitive system measures and identifies aerosol particles for applications such as automatic measurement of bioaerosols, real-time pollen measurements and scientific research projects. The rich measurement data, which are measured very reliably around the clock, and the combination with artificial intelligence allows unprecedented particle classification and long-term monitoring of particles in ambient air. The innovative system meets the high demands for environmental measurements required today and in the future with outstanding precision and quality.



Functional principle of Swisens Poleno

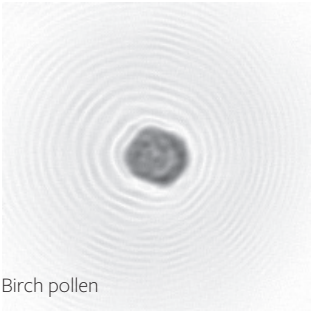
The diagram shows the structure of the Swisens Poleno system for automated particle measurement in real time. The ambient air and the particles contained in it are sucked into the system. In the integrated particle concentrator, particles larger than 20gm are concentrated by a factor of 1000 and fed into the measuring chamber. For local pollen measurements even very small concentrations can be measured reliably. Smaller aerosol particles enter the measuring chamber in unconcentrated form and the system can measure particles with a diameter of 0.5gm to 300gm.

In the measuring chamber the aerosol particles are measured in flight using optical measuring methods. The particles are analysed and as a result the different particle types (e.g. certain types of pollen) and their concentrations in the ambient air are available. The particles fly through the system and are ejected at the end.

The measuring methods

Measurement of morphological properties with digital holography

A holographic method with dynamic image analysis is used to measure the dimension and shape of the particles in flight. The result of this method is images as shown in the following figures. The images show the characteristic shapes of the different pollen types.



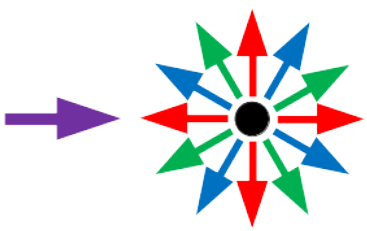
Birch pollen

Hazel lpollen

Oak pollen

Measurement of chemical properties with light-induced fluorescence

Complementary information about the particle morphology is provided by a second method. This method uses the physical effect of autofluorescence. For the measurement a particle is illuminated with a bundled light beam. If the particle has autofluorescence properties, it emits a part of the light after a short time as shown in the following figure. This light has different colors than the excitation light. Depending on the chemical composition of the particle, these colours are different. These differences are used for detection and are measured by the detectors. The light emission is very short in time and lasts a few nanoseconds. The duration of this light flash also depends on the chemical composition and is measured. Both together give measurement data on the fluorescence intensity and lifetime of the particle and can be used for its detection.



Automatic identification of pollen types

In a first step, an algorithm recognizes and marks the desired particle from the entire particle cosmos, which for example also contains fine dust particles. In a second step the particle type (e.g. desired pollen type) is then determined. Pollen is a natural product and therefore the pollen grains of one type are not all exactly the same. State-of-the-art algorithms based on artificial intelligence can deal with this variability very well and still reliably differentiate. For allergic persons, the frequency of a certain type of pollen in the ambient air is decisive. By additionally measuring the amount of air examined, the concentration of the different pollen types can be determined. From this information the pollen load is then determined.

New possibilities for air quality measurement

The particle measurement technology developed by Swisens has the potential to provide better information on air quality. The Swisens Poleno systems are modular in design. The additional module for fluorescence measurement enables the acquisition of information on the chemical composition of aerosol particles and thus extends the possibilities for particle recognition.

This unique combination of measurement methods at Swisens Poleno provides rich information about every single particle in the air for comprehensive particle characterization. Swisens Poleno provides in-depth insights into the composition of the air and the particles it contains, opening up countless new applications.

The potential of additional fluorescence measurement for the expansion of pollen detection is currently being investigated. Swisens AG is continuing this development with a research project for the selective recognition of spores. Examples of this are the Alternaria alternata fungus, which occurs as a mould in the household and can cause allergies in humans. There are many other types of spores that cause diseases in plants. The benefit in agriculture is for example a more targeted and reduced use of fungicides. A further goal is to better break down the different classes of particles in fine dust in order to better investigate and understand the health effects.

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