# DiSCmini

**Handheld diffusion size classifier** for nanoparticle measurement.


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Nanoparticle measurement anywhere

# It already exists

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DiSCmini operates without working fluids or radioactive sources and works in any orientation.

# Is your air healthy or not?

Nanoparticle measuring and monitoring on-the-go.

Particle number concentration [pt/cm³]

Average particle diameter [nm]

Press to display lung-deposited surface area concentration (alveolar)


Battery life for 8 h of mobile measuring

Easy recording on «Secure Digital Memorycard»

Raw data files can be imported directly into Excel, or analyzed with a cross-platform software tool.



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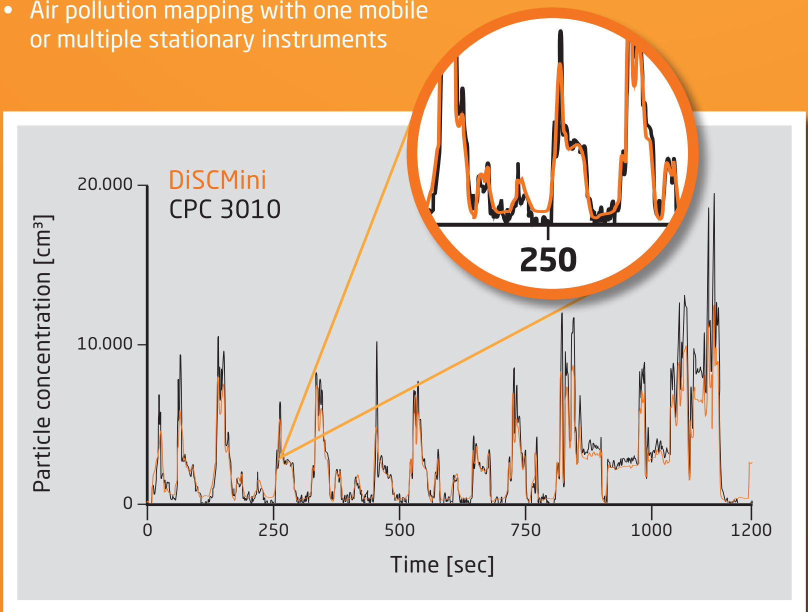
DiSCmini is the smallest instrument capable of nanoparticle number measurement available today, with a patented sensor, working in any orientation.

The portable "Diffusion Size Classifier" can be used for personal exposure monitoring or quick walk-through surveys of an area of interest, such as a workplace, or an urban area with heavy traffic.

Suited for all applications where ease of use is quite important

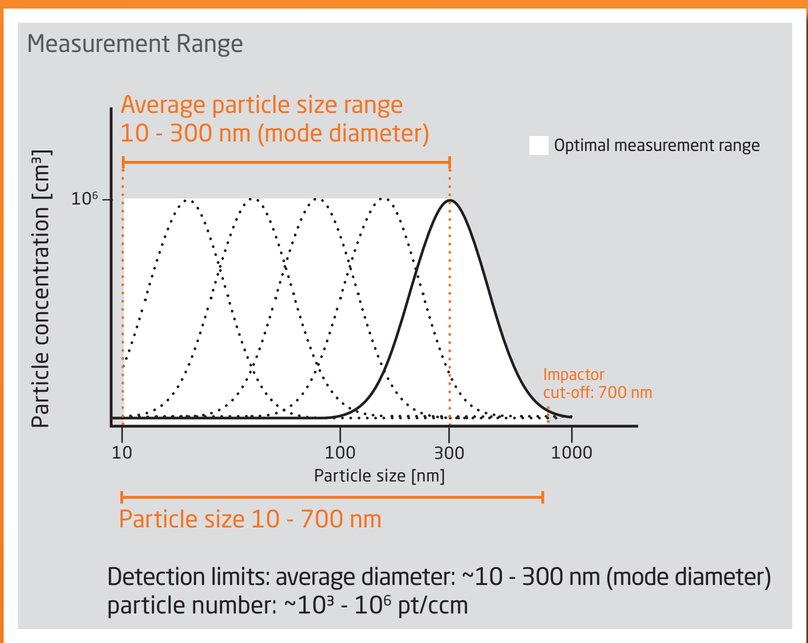
- Personal exposure monitoring
- Workplace hazard identification
- Filtration efficiency verification
- Air pollution mapping with one mobile or multiple stationary instruments




Compared to a small CPC DiSCmini is truly handheld, easier to use and also delivers an average particle diameter and lung-deposited surface area and not only the particle number concentration. DiSCmini measures size particles smaller than about half a micron correctly.

Due to its small size and low weight, the DiSCmini can also be used easily for airborne measurements, e.g. with a balloon or small airplane.

The internal charger can be turned off, and the miniDiSC will then operate as the world's smallest aerosol electrometer.




| Technical Specifications | |
|---|---|
| Average particle size range (mode diameter) | 10 - 300 nm |
| Particle size | 10 - 700 nm |
| Concentration Range | $10^3$ - $10^6$ particles/cm³ |
| Time Resolution | 1 Hz |
| Battery Life | approximately 8 hour |
| Dimensions | 180 x 90 x 40 mm |
| Weight | 670 g |
| Data-Storage | MMC/SD-Card |

Prof. Peter Gehr, University of Bern, Switzerland - Institute of Anatomy

Peter Gehr is professor emeritus at the faculty of medicine of the University of Berne / Switzerland. His scientific work is dedicated to biological interfaces, and especially the interaction of nanoparticles with tissue cells of the human lung.

# Reason for measuring?

u^b UNIVERSITÄT BERN

Where do nanoparticles occur?

Everywhere. You breathe in millions of different particles with every breath. The majority of these are nanoparticles.

Why are these harmful to the human body?

When talking about nanoparticles, we need to differentiate between two groups. On the one hand, we have those resulting from combustion processes. They are exhaust fumes created by traffic and by heating systems. They form the largest part. And then we have the artificial nanoparticles such as titanium dioxide, metals, metal oxides and carbon nanotubes, just to name a few, which are created artificially.

And why do they harm us?

The larger particles behave differently to the nanoparticles in a biological environment, i.e. in human beings. Because they are so small, the nanoparticles which we breathe in enter the deepest part of our lungs, the so-called alveoli. Nanoparticles possess the property of being able to penetrate easily into cells and to pass through them and through tissue. Therefore, in the alveoli they can penetrate into the blood vessels, and with this being distributed in the whole organism. Larger particles can't do this. And that, in my view, is what makes them so critical, as compared to larger particles.

What are the medical consequences of this?

The harmful consequence which we know of, is that the cell can be destroyed. Or that the nanoparticles can penetrate the cell nucleus and may lead to damage to the genetic material. It can also cause the cell to enter a situation of uncontrolled division, which may lead to cancer. We are speaking here – and this is one of the most critical things – of so-called „gene toxicity". This means that nanoparticles may lead to genetic damage. This, however, needs a lot of research still.

Why is it so important to carry out nanoparticle measurements close to human beings?

As the name suggests, the nanoparticles are so small that they hardly sink. Unless they agglomerate. When that happens, they immediately sink and settle, and are no longer measurable in the air. On the other hand, nanoparticles are much more inert than gas molecules, so they tend to stay close to their source. The concentration of nanoparticles caused by traffic, for example, decreases drastically within just a few metres, because they move away from the road quite slowly. If we want to find out which effect this has on humans, we need to look at which nanoparticles exist in a person's direct vicinity, and in which concentrations and size. If we measure further away, many nanoparticles are no longer present.

There are two measurement methods: Nanoparticle counting and mass measurement. Usually, mass measurement is used. Why is a mass measurement with PM10 for nanoparticles not meaningful, and why is nanoparticle counting so relevant?

The supporters of PM10 measurement take the view that measurements are very easy to carry out, as there are measurement stations everywhere. However: If you use mass measurement, you simply don't record the nanoparticles. A measurement using PM10 tells you absolutely nothing at all about nanoparticles. Nanoparticles, however, may be more of a problem for the body than larger particles, as, inhaled, they can enter cells, tissues and the blood vessels rather easily. And it is there, close to the body, where measurements need to be conducted. You only record this exposure if you measure the number of nanoparticles, which are the actual problem component of the particles in the air pollution. And the reason they are problematic is because they can easily enter deeper regions in the organism.

So could we say, in layman's terms, that PM10 or PM 2.5 are still important measurement methods, but that nanoparticle counting is just as important as a complement to them?

Yes, nanoparticle counting is an important complement. And in my opinion, it will probably in time replace PM10. Let me explain: Among the large particles which are recorded using PM10, there are many which are actually no problem for us. Not from a health point of view, not toxic, not because of their size. And, if I can generalize for a moment, it is the very small carbon particles in particular, the so-called carbon blacks, which are the critical ones. Basically, we can say that we can evaluate the air quality by counting the carbon blacks, and that this evaluation can only ever be very rudimentary using PM10. Example: In many cities, the speed limit on the highways is reduced to 80 km/h when there is inversion weather. But this has resulted in only a very slight reduction in the measurement of PM10. I believe that if the number of carbon blacks had been measured, i.e. not simply all nanoparticles in the PM10 fraction, but the carbon black fraction instead, then quite considerably larger differences would have been determined. This is the only way we can take meaningful measurements and make decisions based on them.

The particle number is therefore definitely the better parameter. These critical nanoparticles cannot be determined using their mass. And today we can say that nanoparticles are more dangerous than larger particles. Previously, the opposite was thought. Today we have moved on. We now know more.

How do you explain the fact that automobile exhaust legislation regulates nanoparticle emissions, but there are no standards for ambient air?

I think maybe it is not so well-known that the number of nanoparticles can be recorded, and that you can also measure their size so easily. At the touch of a button, you have a value which is very reliable, and quickly recorded. And you can go into a room, you can go outside, you can go inside a car. You can practically watch the values increase and decrease. So particle number counting is a great step forward. With it, we have a really good instrument in our hands which we can use to evaluate air quality.

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Get in contact with our specialists.
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## Your partner in nanoparticle management

Matter Aerosol is a provider in the field of nanoparticle measurement. Primarily specialising in workable and realistic analysis of nanoparticles and various particle generator devices we are able to offer measuring devices as well as full range service of ultimate perfection.

Founded in 2001, we unify an over 50 year experience in design of instruments and nanoparticle research. Close cooperation with leading institutions – such as ETH Zurich – advance our high demand on excellence.

From coal-fired power plant up to automotive industry: For all matters of efficient measurement and generation of nanoparticles, Matter Aerosol is your partner.

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