DFM
Danish National Metrology Institute

Aerosol Metrology for Atmospheric Science and Air Quality (AEROMET*)

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The project

AEROMET
Aerosol metrology for atmospheric science and air quality

Motivations:

- Lack of traceable calibration standards and procedures for air-borne particulate matter (PM).
- Quantification of regulated aerosol components is inaccurate, not sensitive enough, and inflexible.
- Reliable calibration procedures for particle sizing and counting instruments are needed.

Objectives:

- To develop reproducible reference aerosol chamber system for PM10 and PM2.5 calibration.
- To establish traceable methods for the determination of major components of particulate matter
- To provide calibration procedures for Mobility Particle Size Spectrometers (MPSS) and Condensation Particle Counters (CPCs).
- To apply mobile x-ray spectroscopy for quantifying particle composition in the field.

Creating impact:

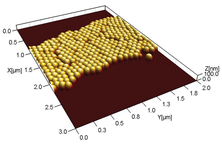
- Measurement supply chain: accredited laboratories.
- Standards developing organisations: ISO TC 24, CEN TC 264, EU Air Quality Directive 2008/50/EC, etc.
- End users: Network of National Air Quality Reference Laboratories (AQUILA), the European Monitoring and Evaluation Programme (EMEP), etc.

EMPIR EURAMET
The EMPIR initiative is co-funded by the European Union's Horizon 2020 research and innovation programme and the EMPIR Participating States

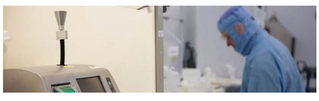
DFM's contribution and related activities

- Participate in the design and validation of reference aerosol chambers
- Participate in field test with optical particle counters
- Demonstrate polychromatic light scattering particle counter for material detection
- Contribute to standardisation and technical committees (ISO TC24 SC4 "Particle characterization")

Traceable particle sizing with Atomic Force Miscroscopy (AFM)



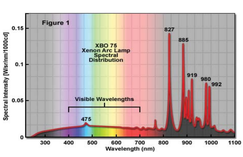
Optical particle counter calibration Danak accredited, ISO 21501-4

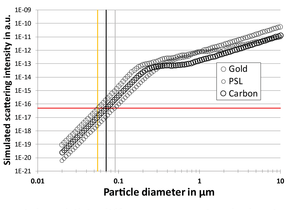


Typ. size range : 100 nm – 10 µm
Max. conc. (5% coincidence): 1 000 000 #/L

Analysis method to retrieve material information of PM based on optical light scattering signal

By employing a polychromatic light scattering counter (= multiple scattering intensities per particle at various wavelengths), not only the particle size can be determined, but also material properties can be deduced based on reverse Mie-scattering analysis (look-up table) in real-time.





Materials exhibit different scattering behaviour due to differences in their refractive indeces.