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Wierzbicka, Aneta; Pagels, Joakim

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LUND UNIVERSITY

PO Box 117
221 00 Lund
+46 46-222 00 00

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Measurement techniques, advances and limitations

Aneta Wierzbicka
Joakim Pagels

Ergonomics and Aerosol Technology,
Department of Design Sciences
Lund University, Sweden

In order to assess exposure to airborne particles we need to have appropriate instrumentation and measurement techniques. Most of the legislative requirements in workplaces are still given as mass concentration limit values. Efforts to understand mechanisms behind observed health effects due to exposure to airborne particles and trials to link specific particle properties to a given health endpoint requires detailed particle characterization which goes beyond conventional mass concentration determination. Properties that have been suggested to be of importance when correlating particle exposure with health effects comprise particle size, number concentration, surface area, shape, chemical composition, bioavailable transition metals, solubility, acidity, particle surface reactivity and core chemistry. We will discuss which of these that can be measured in-situ and off-line. In workplaces but also in epidemiological studies, which require measurements in large amount of places, there is a need for simple, small, cost effective and portable instruments. We will discuss the accuracy of such portable instruments and describe a few recently introduced techniques. In-situ techniques that give more detailed information of the particle properties on-line will also be discussed. These include tandem techniques for in-situ measurements of non-spherical particles and Aerosol Mass Spectrometry for highly time and size resolved analysis of the particle chemical composition. Applications of these techniques in workplaces and indoor air will be discussed.



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