



**INDustrial TECHNOLOGIES 2018**  
Innovative Industries for Smart Growth



# **INDTECH2018**

## **Innovative industries for smart growth**

29-31 October, 2018  
Vienna, Austria

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Pillar 2

Session 2.5

Methods for rapid and cost-effective nanotechnology testing and their standardization

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International  
Standardization for  
nanotechnologies or  
nanomaterials

-

a multidisciplinary  
challenge

Organization	TC / SC	Main Responsibilities
ISO	TC 24 / SC 4	<b>Particle characterization</b>
	TC 142	Cleaning equipment for air and other gases
	TC 146 / SC 2	Air Quality – Workplace Atmospheres
	TC 194	Biological evaluation of medical devices
	TC 201	Surface chemical analysis
	TC 202	Microbeam analysis
	TC 229	<b>Nanotechnologies</b>
	TC 256	<b>Pigments, dyestuffs and extenders</b>
IEC	TC 113	Nanotechnology standardization for electrical and electronic products and systems
CEN	TC 137	Assessment of workplace exposure to chemical and biological agents
	TC 138	Non-destructive testing
	TC 162	Protective clothing including hand and arm protection and lifejackets
	TC 195	Air filters for general air cleaning
	TC 230	Water analysis
	TC 248	Textiles and textile products
	TC 352	<b>Nanotechnologies</b>



## International Standardization - TC Structure

### ISO/TC 24/SC 4 „Particle Characterization“

WG1 Results representation, WG2-17 Measurement methods

*“vertically”, measurement methodology oriented*

### TC 256 “Pigments, dyestuffs and extenders”

WG2 Nanotechnological properties of pigments and extenders

### ISO/TC 229 „Nanotechnologies“

WG1 Terminology, WG2 Measurement, WG3 HSE-Aspects, WG4 Material spec. Standards, WG5 Products

*“horizontally”, interdisciplinary, application oriented*

### CEN/TC 352 „Nanotechnologies“

WG1 Measurement, WG2 Commercial Aspects, WG3 HSE-Aspects

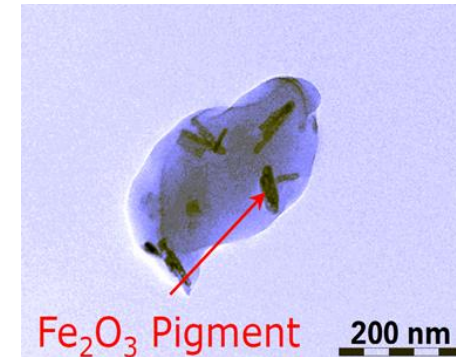
## CEN TC 352 Nanotechnologies

FprCEN/TS 17273:2018 Nanotechnologies – Guidance on detection and identification of nano-objects in complex matrices, **Scope:**

This Technical Specification sets requirements for sampling and treatment of the complex matrices in order to obtain a liquid dispersion with sufficiently high concentration of the nano-objects of interest. This Technical Specification provides guidelines for detection and identification of specific nano-objects in complex matrices, such as liquid environmental compartments, waste water and consumer products (e.g. food, cosmetics).

This Technical Specification requires for the identification a priori knowledge of the nature of the nano-objects like their chemical composition. The selected detection and identification methods are based on a combination of size classification and chemical composition analysis. Identification can also be supported e.g. by additional morphology characterization. Currently only Field Flow Fractionation, Electron Microscopy and single particle Inductively Coupled Plasma – Mass Spectrometry fulfil this combination condition.

Illustration of applications of measuring techniques, based on selected nano-objects:



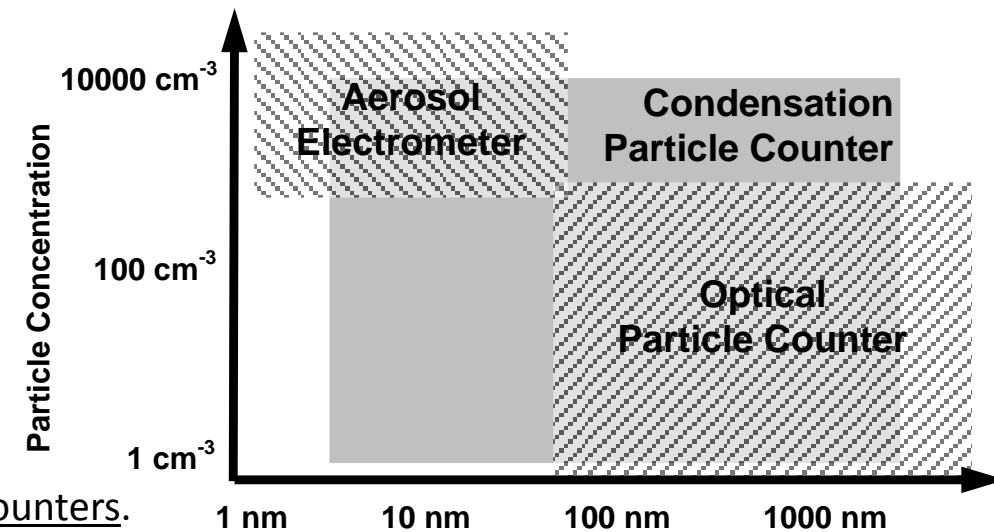
Materials	FFF		SEM		TEM with EDX <sup>5</sup>		spICP-MS	
	Size <sup>3</sup> [nm]	Concentrat <sup>4</sup> [mg · l <sup>-1</sup> ]	min size [nm]	concentrat <sup>1</sup> [mg · l <sup>-1</sup> ]	min size [nm]	concentrat <sup>1</sup> [mg · l <sup>-1</sup> ]	Size range [nm]	concentrat <sup>2</sup> [mg · l <sup>-1</sup> ]
Aluminium oxide	1-1000	1 <sup>F3</sup>	5-10	1-500	1-3	1-500	50-1000	0,05
Carbon black	1-1000	1 <sup>F1</sup> , 5 <sup>F4</sup>	5-10	1-500	1-3	1-500	Not applicable	
Cerium oxide	1-1000	1 <sup>F3</sup>	5-10	1-500	1-3	1-500	20-1000	0,005



## ISO/TC 24/SC 4 Particle Characterization – WG 12: Nanoparticles in Aerosols

Standardization in nanoparticle characterization is performed in 15 Working Groups within ISO/TC 24/SC 4. Additionally to imaging methods for morphology inspection of single particles, aerosol measurement devices have some benefits for exposure analysis compared with particle measurement techniques for liquid dispersions (i.e. emulsions, suspensions or combinations of them), for instance the ability of providing absolute count numbers or the independency from specific material properties (e.g. from the index of refraction).

A fundamental aerosol measurement principle that allows the characterization of particles down to a view nanometre is the electrical mobility analysis as described within ISO 15900:2009 (now rev.). One problem from metrological view, which still exists for aerosol measurement technology, is the lack of a concentration reference material. An important step in this direction represents the international standard ISO 27891:2015 for the calibration of condensation counters.



## ISO/TC 256 Pigments, dyestuffs and extenders

ISO/DIS 21683: 2018 Pigments and extenders — Determination of experimentally simulated nano-object release from paints, varnishes and pigmented plastics

### Scope:

This standard specifies a method for experimental determination of the release of nanoscale pigments and extenders into the environment following a mechanical stress of paints, varnishes and pigmented plastics.

The method is used to evaluate if and how many particles of defined size and distribution under stress (type and height of applied energy) are released from surfaces and emitted into the environment.

The samples may be aged, weathered or otherwise conditioned to simulate the whole lifecycle.

### Aerosol measurement data:

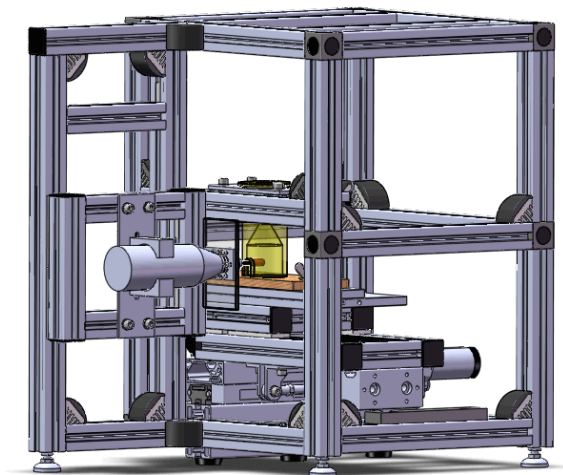
particle number concentration

number-weighted particle size distributions

### Independent release parameters:

fractional particle release numbers  $n$  ( $x \leq 100$  nm,  $x < 10$   $\mu$ m,  $x \geq 1$   $\mu$ m)

relation to stressed area - area specific release numbers [# / cm<sup>2</sup>]





Thank You!

Questions?

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