

We measure it.



%RH

CO₂

m/s

mbar

O₂

Application – Application Occupational exposure monitoring

with the testo DiSCmini

- Field measurements in facilities manufacturing and processing ceramic materials

Application #2: Occupational exposure monitoring

NP types

**Manufactured
(MNM)**

**Process-generated
(PGNP)**

**Background
(BG)**

Intentionally manufactured for commercial purposes (2011/696/EU; 1-100nm, >50%)

NPs emitted during highly energetic (thermal or mechanic) industrial processes

Natural origin (e.g., forest fires)

Anthropogenic origin (e.g., diesel)



Measurement strategy



Outdoor



Plasma chamber



DiscMini
(10 - 700 nm)



NanoScan SMPS
(10 to 420 nm)



TEM
samples



Breathing zone



CPC TSI 3775
(4-1500 nm)



DiscMini
(10 - 700 nm)



Grimm 1.108
(300 to 20 000
nm)



TEM
samples

Metrics:

- Particle number
- Mass
- LDSA
- Mean diameter

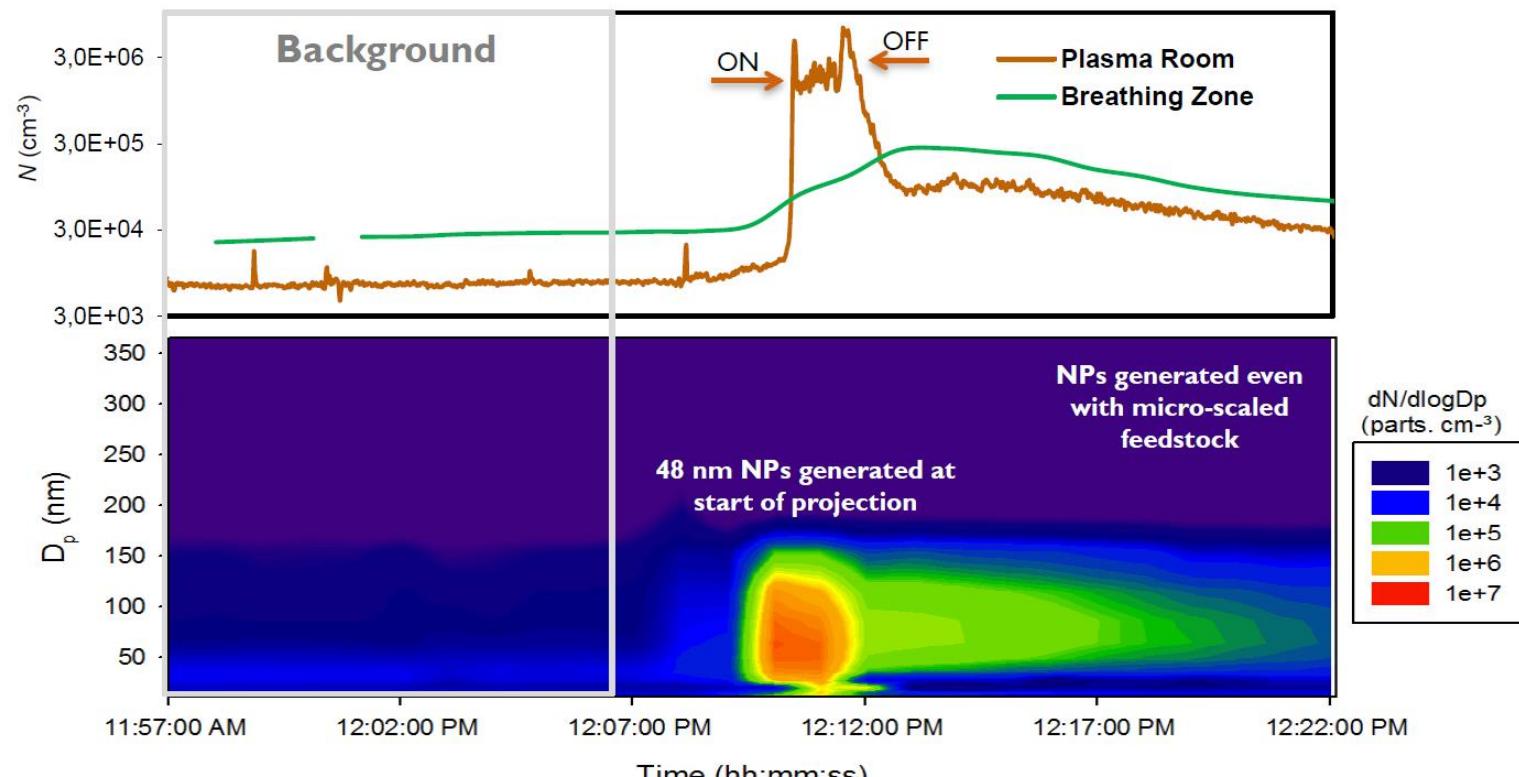
Range: 5 nm – 20 µm

Application #2: Occupational exposure monitoring



Results: plasma spraying

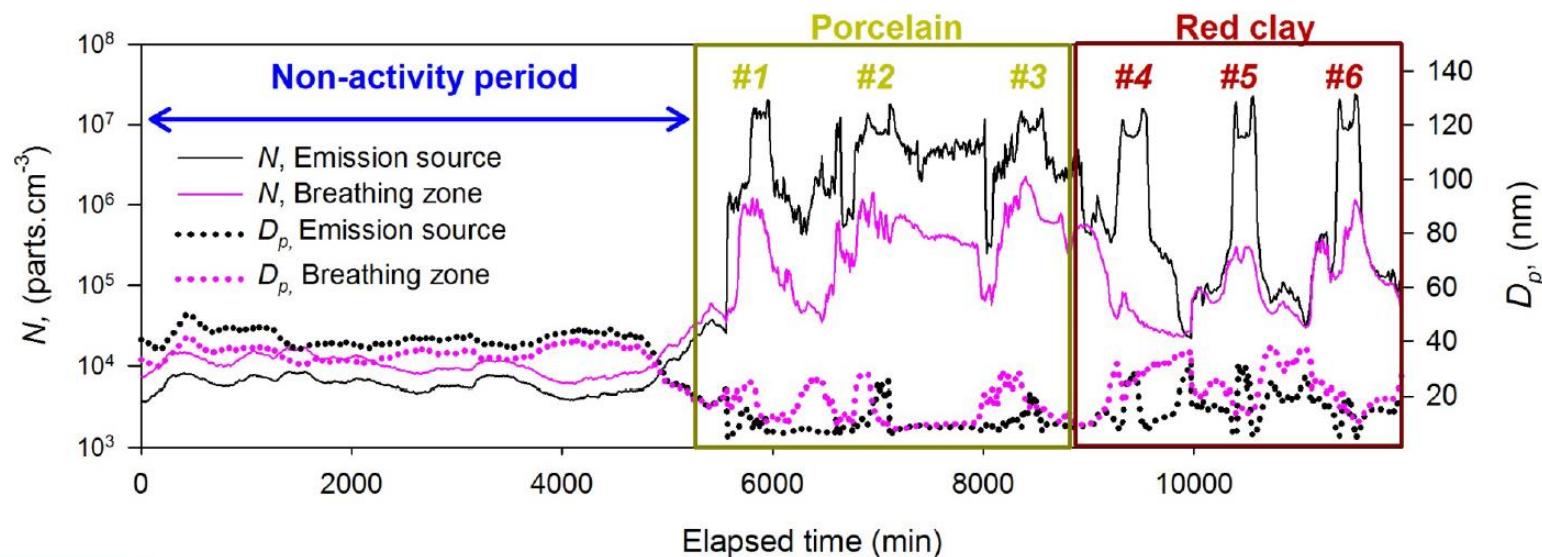
Feedstock: micro-suspension (ceramic glass powder <63 µm + 1% of fluidised nano 7 nm)



Application #2: Occupational exposure monitoring



Results: tile sintering



	Source	Breathing zone
N	$>10^7/\text{cm}^3$	$>10^5/\text{cm}^3$
D _p	8-18 nm	13-27 nm

Occupational inhalation exposure assessment using DiSCmini



NanoIndEx Workshop / 31.5.2016

Outline

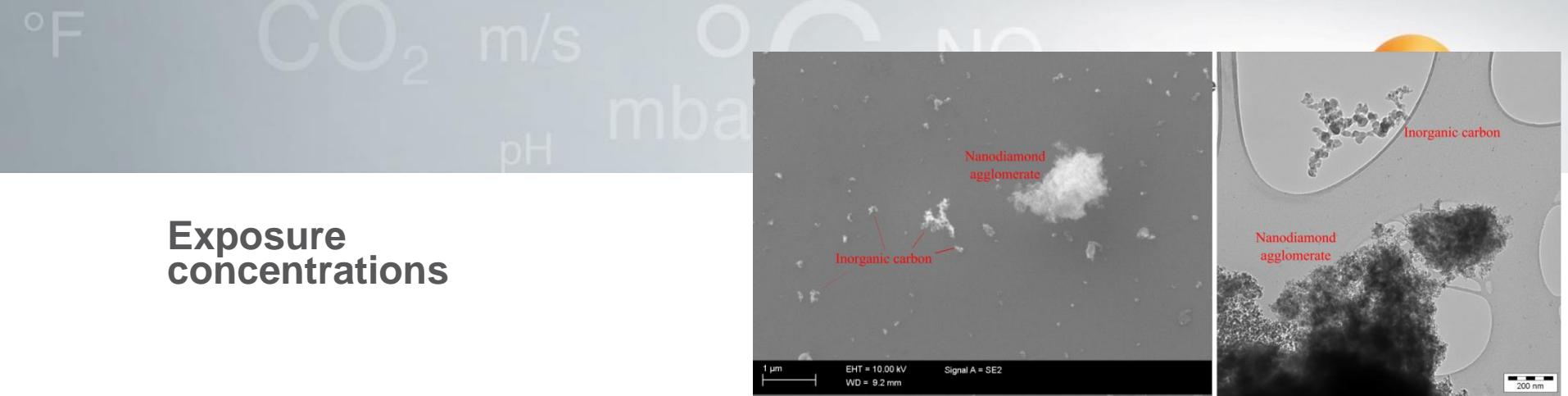
- Workplace measurements using DiSCmini:
 - Handling of Nanodiamonds (NDs)
 - A handcraft workshop
 - Injection molding of car bumpers
 - Tungsten carbide-cobalt (WoCCo) sieving and milling
 - Jet engine emissions
- Summary of 8-h doses defined from DiSCmini measurements
- Biological relevance of the doses
- Summary

Exposure during handling and sieving nanodiamonds

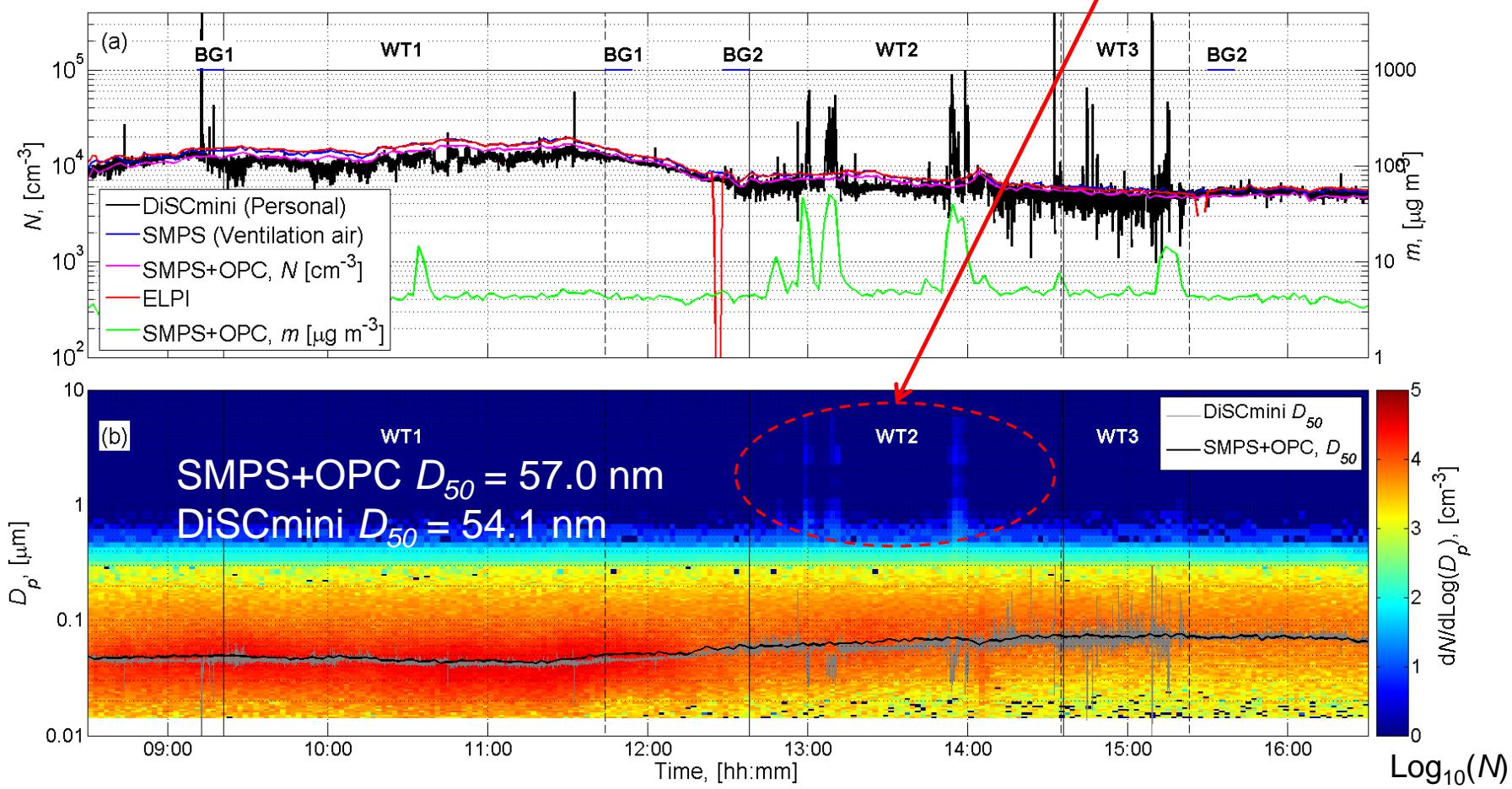


Concentration measurements:

- Breathing zone (DiSCmini)
- Background from ventilation air (SMPS)
- Work station (SMPS, DiSCmini, OPS, ELPI, ...)



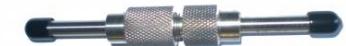
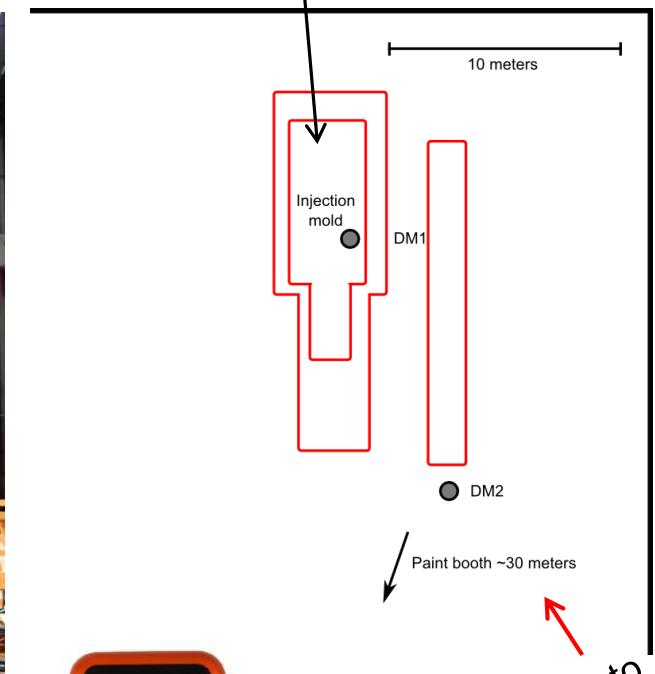
Exposure concentrations



Injection molding of car bumpers



Engel 2500 tonnes injection molding machine:



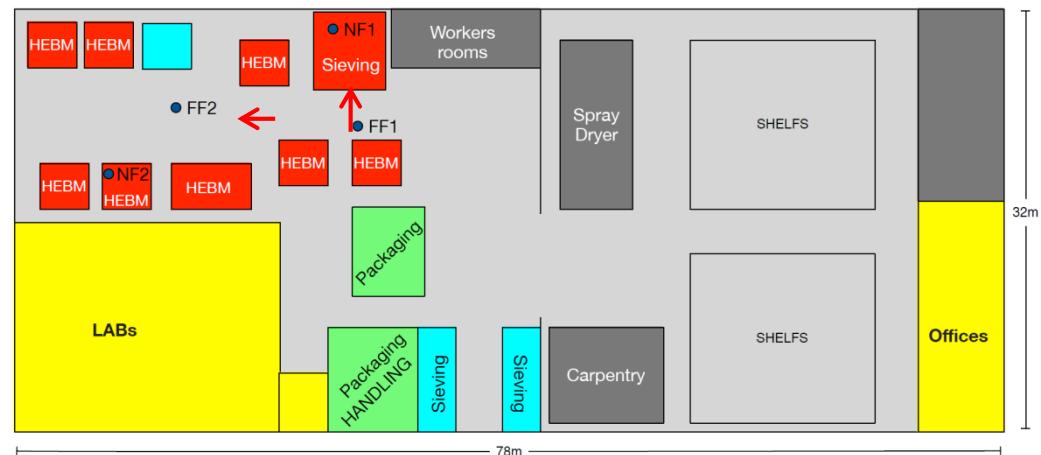
Instrumentation:

- 2 x DiSCmini (two stage diffusion charger)
- Mini Particle Sampler for microscopy analysis

Tungsten carbide-cobalt (WoCCo) sieving and milling



Vibratory sieve shaker



References

❖ Personal exposure

Contact Testo for Reference list

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References

❖ Occupational Health & Safety

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