

Can we trust real time measurements of lung deposited surface area concentrations in dust from powder nanomaterials? – Supplementary material

Particle concentration analysis

The theoretical NSAM PM₁-cyclone penetration efficiency used to multiply with ELPI data to mimic a PM₁-cyclone is shown in **Table S1** for the ELPI midpoint sizes.

Table S1. Midpoint sizes and corresponding PM₁-cyclone penetration factors.

Impactor Stage	12	11	10	9	8	7	6	5	4	3	2	1
Stage midpoint [µm]	0.04	0.07	0.12	0.2	0.32	0.49	0.77	1.24	1.97	3.11	5.2	8.2
PM ₁ penetration	1	1	1	1	1	0.999959	0.925926	0.119048	0.0001	2.37E-10	0	0

Particle number concentrations

All tested materials produced similar temporal trends in number concentration during the rotating drum dustiness tests. **Figure S1** shows a typical test concentration as function of time as measured by FMPS and ELPI. The concentrations quickly increase as the rotation starts and reaches a steady state concentration where it stays until the rotations stops. After this it gradually decreases and eventually reaches background concentrations.

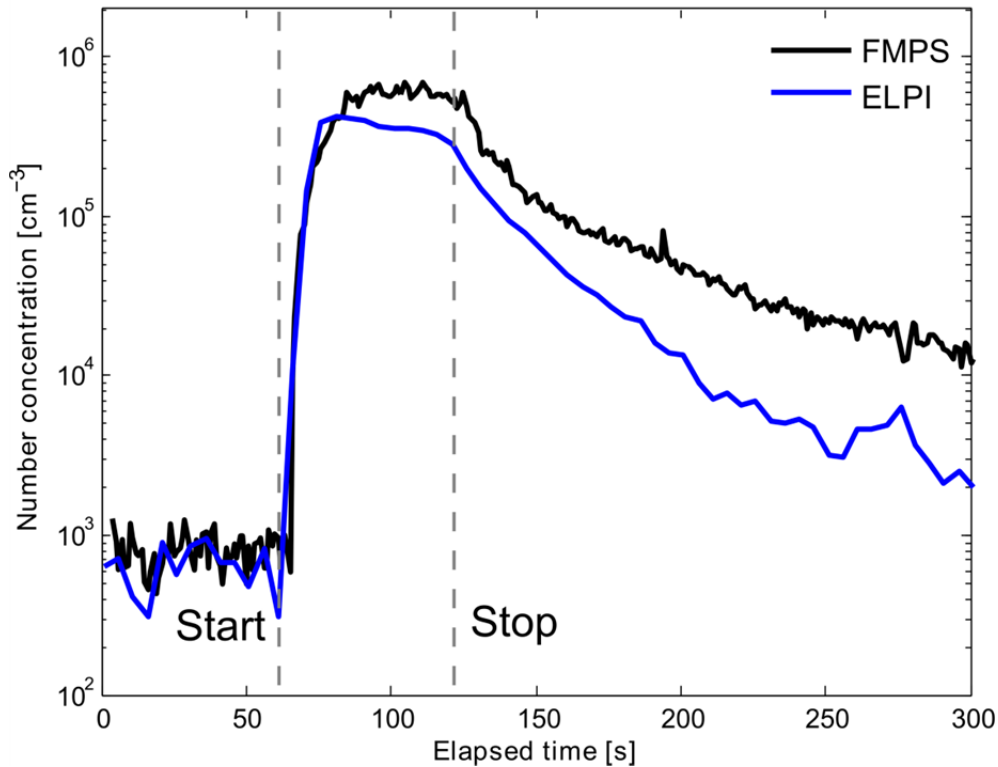


Figure S1. Example measurement of temporal evolution of number concentration during a dustiness test as measured by FMPS and ELPI. Dashed lines denoted start and stop of drum rotation.

The FMPS measures a higher peak particle number concentration than the ELPI for all materials even though having smaller measurement size range (**Figure S2**). This difference is increased even, ratio-wise, when looking at the alveolar deposited fractions.

The total peak concentrations agree well with the indications of particle concentrations given by the dustiness indexes with ZnO, UF-TiO₂ and CaCO₃ (coated) being the highest. The difference between NGAP NP and the bottom three (TiO₂ pigment, TiO₂ AFDC and CaCO₃) is not as large as in the gravimetric measurements. This could be due to the materials having different particle generation rates, seeing as these numbers just give an overview of initial transient concentrations.

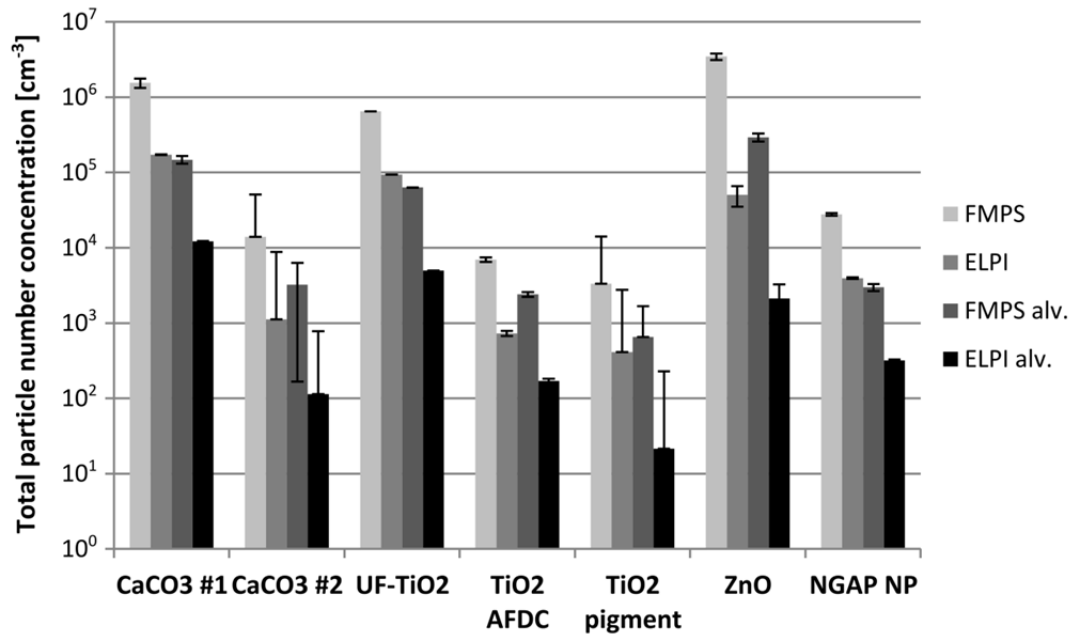


Figure S2. Total particle peak concentration and Alveolar deposited particle concentrations.