Determination of airborne nanoparticle mass concentration from number concentration using their effective density - Application to ELPI/SMPS data

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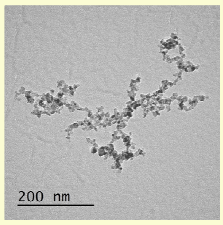
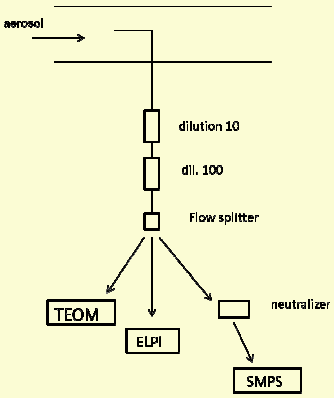
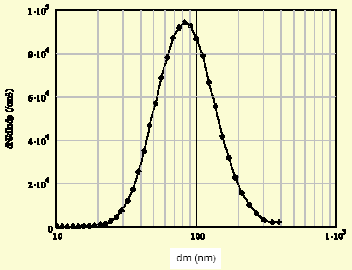


Zn/Al particles generated by electrical arc spraying process
dpp = 9 nm

Aerosol sampling



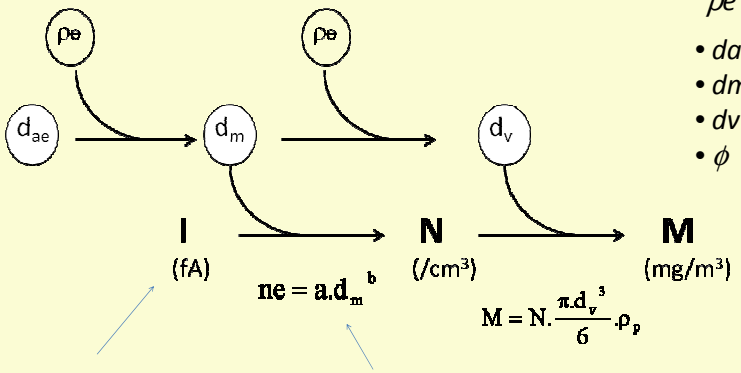
Number particle size distribution (SMPS data) – Lall&Friedlander correction for dpp = 9 nm



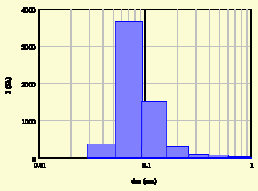
$$\phi_{d_{ae}} . d_{ae}^{\ 2} = \phi_{d_m} . d_m^{\ 2} . \frac{\rho e}{\rho_0} \qquad d_m = d_v . \left(\frac{\rho_p}{\rho e} \right)^{1/3}$$

ρe = effective density

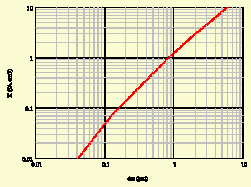
- *dae : aerodynamic diameter*
- *dm : electrical mobility diameter*
- *dv : volume diameter*
- *ϕ : correction de Cunningham*



Currents (ELPI)

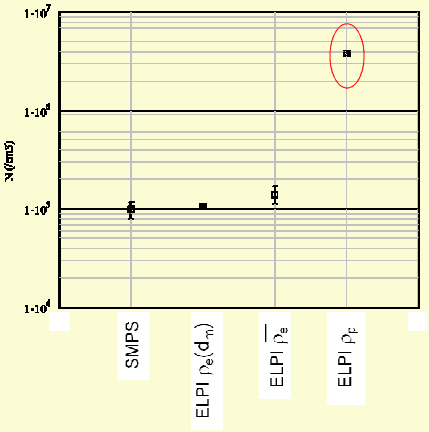


ELPI charger efficiency



RESULTS

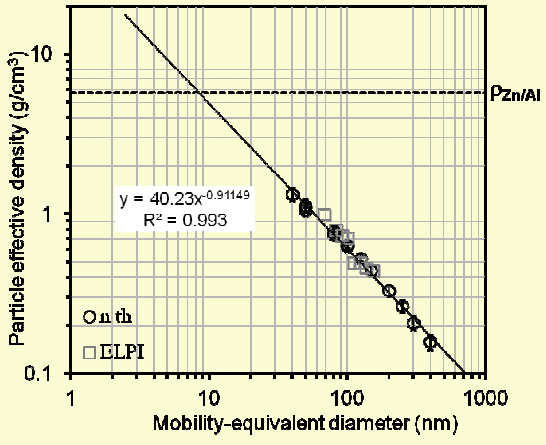
In Number



ELPI correction using:

- ρe = f(dm)
- mean ρe
- ρp = bulk material density

ρe measurement by tandem DMA - APM



In Mass