



1-3 nm particles in urban air

Minna Väkevä¹, Joonas Vanhanen¹, Katrianne Lehtipalo^{1,2},
Jyri Mikkilä^{1,2}, Markku Kulmala²

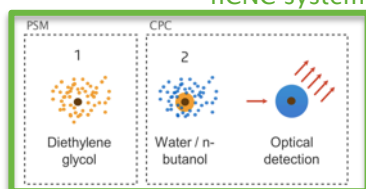
¹Airmodus Ltd., Pietari Kalmin katu 1 F 1, 00560 Helsinki, Finland

²University of Helsinki, Finland

E-mail minna.vakeva@airmodus.com

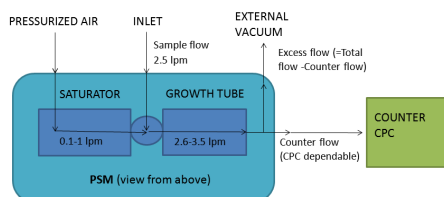
Principle of detecting the smallest particles

nCNC system



Diethylene glycol enables reaching higher supersaturations and activating smaller particles (than water/butanol) without homogenous nucleation. A second stage (growth booster) is needed to reach optical sizes. Iida et al., 2009

PSM flow diagram



A11 nCNC



Sampling:

The losses of the smallest particles are remarkable → Short sampling lines

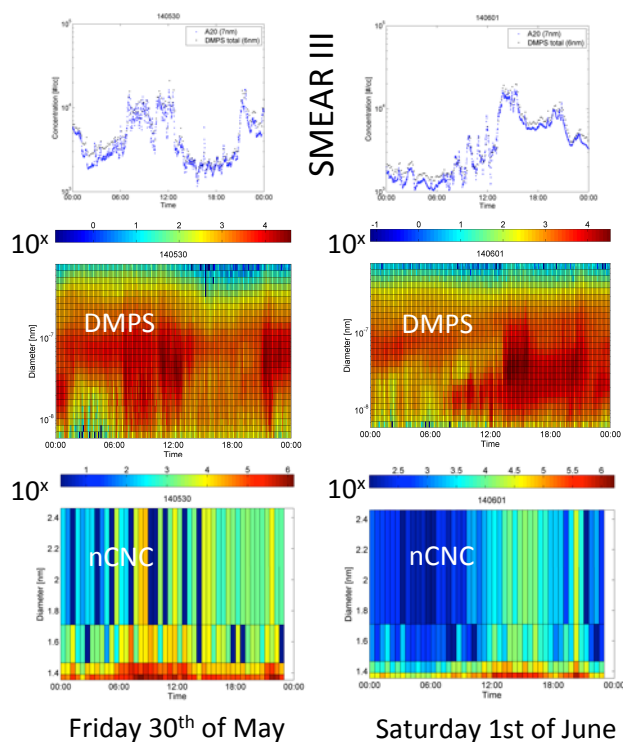
Nucleation:

PSM acts as a nucleation chamber; delicate process that is sensitive to the same parameters that affect nucleation in general

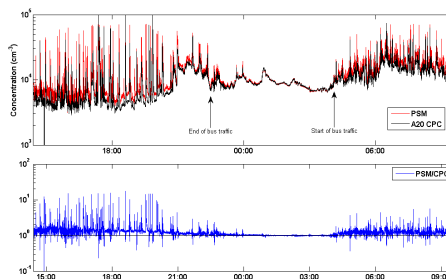
Summary of studies:

- Always ~1 000 – 100 000 particles/cm³ in the size range < 3 nm in the atmosphere.
- This size range consists of molecules, clusters and particles.
- Most of them are neutral and cannot be measured using techniques based on e.g. electrical mobility.
- Crucial to measure to understand particle formation

Measurements in Helsinki – urban background & near road



University Campus in Kumpula, above a street with a bus stop



Data by D. Wimmer,
University of Helsinki

Further reading:

www.airmodus.com → Highlights → Publications

AIRMODUS

