Construction and Characterisation of a Particle Magnifier

Helene Holmgren

Condensation is the most common technique for determining number concentrations of nanoparticles [1]. Typically, an aerosol-containing gas is saturated or mixed with vapour of a working medium at elevated temperature, and then cooled to cause supersaturation. The working medium then condenses onto all particles larger than a certain lower limit, allowing the particles to grow. Individual particles are counted by light scattering, and the particle concentration is provided. The temperature difference between saturator and cooler together with the mechanical design of the device controls supersaturation and thus, the smallest particle size that can be detected.

My research aims to optimise saturation and cooling systems with a view to grow nanoparticles into detectable size. The intention is to push the size detection limit of commercially available instruments downwards, and to minimise diffusion losses in the instrument. Another goal is to gain information about the original size distribution in the sample using Pulse Height Analysis (PHA). This technique exploits the fact that the pulse heights from an optical detector increases with particle diameter for particles smaller than about 10 nm in diameter [2]. The relationship can be used to compute the original size of a particle.

1. McMurry, P.H., *A review of atmospheric aerosol measurements.* Atmospheric Environment, 2000. **34**(12-14): p. 1959-1999.
2. Saros, M., et al., *Ultrafine aerosol measurement using a condensation nucleus counter with pulse height analysis.* Aerosol Science and Technology, 1996. **25**(2): p. 200-213.