Equipment Name: CPS Disc Centrifuge	**Category:** **C. Particle Characterisation in and ex-situ and/or** **Institute: University of Leeds** **Location: ParticlesCIC, Engineering Building, Leeds. LS2 9JT. UK** **Contact Details of Technology Expert:** **Name, Susanne Patel** **Phone, +44 113 3432378** **Fax, +44 1133432377** **E-mail k.s.patel@leeds.ac.uk**

Short technology description/Overview *(approx 300 words)*:

Differential Centrifugal Sedimentation (DCS) is based on a well known scientific principle, Stokes' law, and is capable of accurately measuring particle sizes between 2nm and ~75µm with an accuracy of 2%

An established method of determining the size of an unknown particle involves measuring the rate at which it settles in a liquid of known density and viscosity. Stokes' law is commonly [1] expressed as:

$$V = \frac{(\rho_P - \rho_F)}{18\eta} R^2 g \qquad (1)$$

Where, V is the particle velocity (ms^{-1}), ρ_P is the particle density (gcm^{-3}), ρ_F is the fluid density (gcm^{-3}), η is the fluid viscosity (Pas), R is the particle diameter (m) and g is the gravitational acceleration (ms^{-2}).

Relying on gravity to produce a settling effect takes a long time and renders the sedimentation method unsuitable for nano-sized particles. However, if a large centrifugal force is applied to the system, the experimental time is minimised and, more importantly, the lower size limit at which particles can be measured is greatly reduced. Using speeds of up to 24000 rpm particles as small as a few nanometres can be accurately sized.

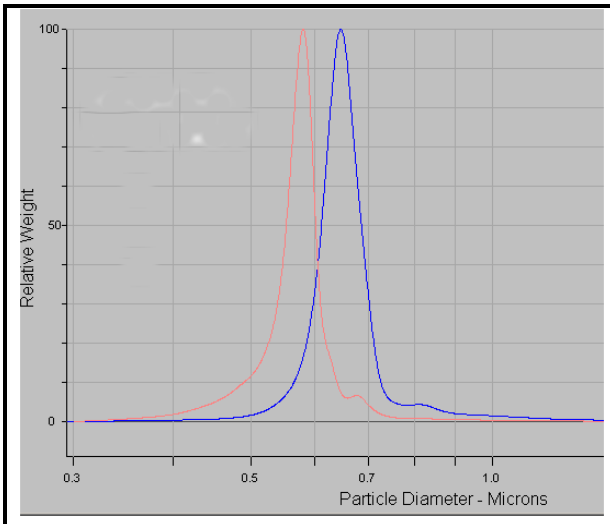
Main Features (Equipment Capabilities):

- Accurately measuring particle sizes between 2nm and ~75µm with an accuracy of 2%

Typical Samples & Images:

Because of the achievable resolution, sensitivity and reproducibility, the range of samples appropriate for analysis is wide, and includes:

- Powdered (water soluble) drugs
- Virus particles
- Protein molecule clusters and virus-like particles (to below 20 nm)
- Polymer latexes (aqueous) with any particle density
- Emulsions of oils and waxes
- Ground and precipitated calcium carbonate
- Inorganic pigments and fillers
- Ground sucrose, starch and flour



Example data showing the difference in spectra acquired from two samples with different size distributions.

Any further Information: