Equipment Name: Thermogravimetric Analyzer	**Category C: Particle characterisation *in situ* and *ex situ*** **Institute: University of Leeds** **Location: Institute of Particle Science and Engineering, University of Leeds, LS2 9JT,UK** **Contact Details of Technology Expert:** **Name, Prof. Yulong Ding** **Phone, +44 (0)113 3432747** **E-mail y.ding@leeds.ac.uk**

Short technology description/Overview:

Thermogravimetric analysis (TGA) is used to determine changes in weight in relation to a temperature program in a controlled atmosphere. TGA is commonly used to determine characteristics of materials such as polymers, to determine degradation temperatures, absorbed moisture content of materials, the level of inorganic and organic components in materials, decomposition points of explosives, and solvent residues.

This instrument allows for analyses to be carried out even faster, more accurately, and across an extended temperature range compared to other thermobalances. No time-consuming baseline determinations need normally to be carried out with the TG 209 **F1** Libra® prior to a measurement. The unique BeFlat® function of the Libra automatically compensates for any external factors influencing the measurement. This cuts work hours by up to 50%, leaving more time available, for example, for further measurements. It not only allows for a wider sample temperature range of up to 1100°C, but also for heating rates of up to 200 K/min. The user can thus receive the results of the analysis – even at highest temperature – within a few minutes, i.e. 16 times faster than for other thermobalances. Endo- and exothermal reactions can now be detected and show, for example, the melting point of the sample, in the evaluation. This yields considerably more information on the sample behavior without having to carry out further measurements.

- Temperature Range: (10C) 20C to 1100C
- Weight Range: 2000 mg
- Weight Resolution: 0.1 ug

Uses for nanoparticle characterisation:

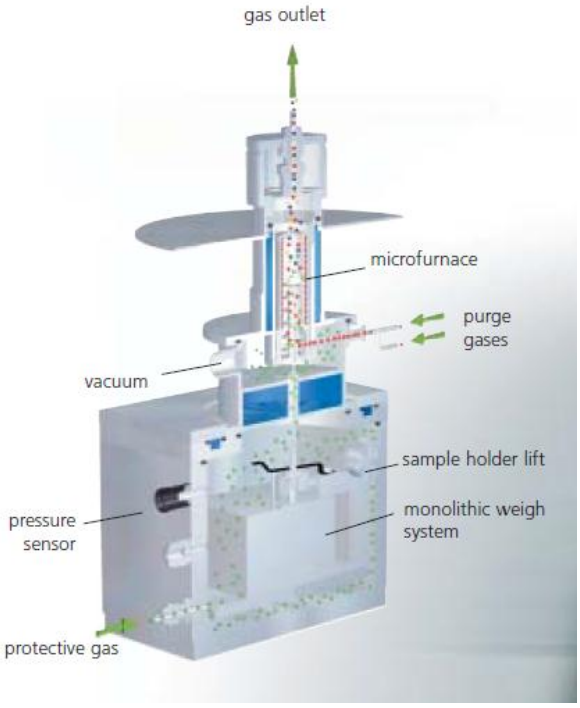
Characterisation of the relative ratio of inorganic and organic components in e.g. coated nanoparticles

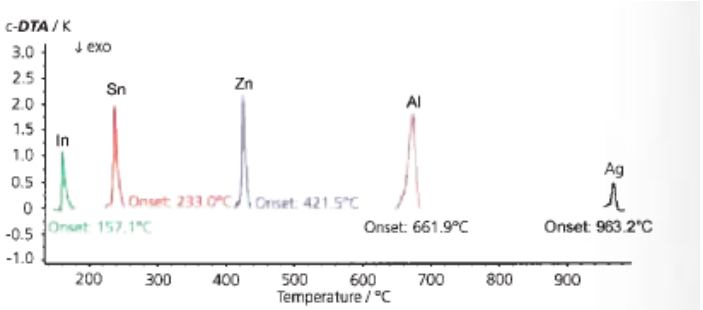
Characterisation of changes in protein (biomolecule) stability following binding to nanoparticles. The thermal stability can be determined by measuring the weight change of sample in the temperature range of 20 C to 1100 C.

Main Features (Equipment Capabilities):

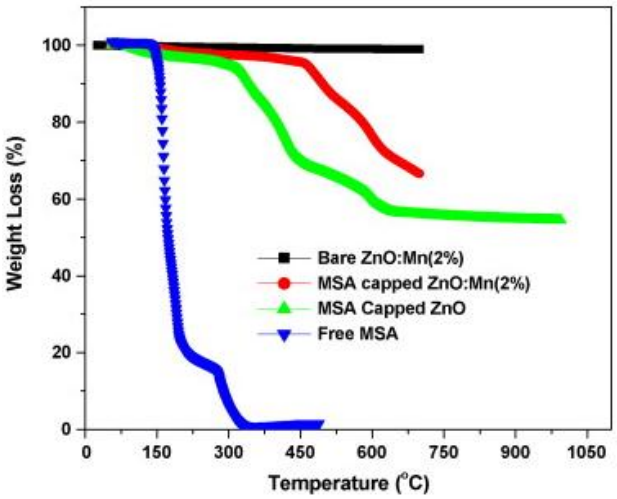
- Measure the degradation temperatures,
- Test absorbed moisture content of materials,
- Analyze the level of inorganic and organic components in materials,
- Measure the decomposition points of explosives, and solvent residues.

Typical Samples & Images:





Melting peaks (raw data) of reference metals for temperature calibration with c-DTA®



TGA plots of MSA capped undoped and 2% Mn doped ZnO nanoparticles showing substantial weight loss due to evaporation of capping agent (Sharda, K. et al, 2009)

Any further Information: