Workshop on Standards for EHS Research Needs for Engineered Nanoscale Materials
NIST, Gaithersburg, MD, USA, 20899
September 12-13, 2007

Methods for the Characterization of Nanomaterials:

Size Distribution:
**(S)TEM, SEM, SPMs (AFM,STM), Dynamic Light Scattering, Field Flow Fractionation with Multi Angle Laser Light Scattering, Ultrafine Condensation Particle Counter (UCPC) by Pulse Height Analysis (PHA), Single Particle Mass Spectrometry, Scanning Mobility Particle Sizer, Full-Pattern Powder Analysis, Low Frequency Raman Spectroscopy, Small Angle X-ray Scattering**

Agglomeration state:
**Centrifugation, Analytical Ultra-Centrifugation, Zeta potential, (electric field light scattering), X-Ray Disk Centrifuge**

Shape:
**(S)TEM, SEM, DLS and MALLS, X-Ray Diffraction, Electron Holography, SERS, Small Angle Neutron Scattering**

Crystal Structure:
**Electron diffraction, X-ray Diffraction, SANS**

Surface charge:
**Zeta potential (DLS in an electric field), Electrophoretic mobility, Ion mobility**

Chemical Composition (both spatially averaged (bulk) and spatially resolved heterogeneous) Analysis:
**NMR, X-ray photoelectron spectroscopy, Auger electron spectroscopy, X-ray Fluorescence, XRD, Atomic emission spectroscopy, absorption spectroscopy, fluorescence spectroscopy, and mass spectroscopy, NSOM, SEM/EDS, (S)TEM including (SAED, CBED, EFTEM, EELS, EDS), CFM, EBSD**

Surface Area:
**BET (Burnauer, Emmett and Teller) analysis**

Surface Chemistry:
**SERS, X-ray photoelectron Spectroscopy, Auger electron spectroscopy, CFM**

Porosity:
**BET analysis**

Solubility:
**Zeta potential, Static light scattering, Phase equilibrium measurements**