Work package 4: Physicochemical characterisation of manufactured nanomaterials (MNs) and exposure media

The objectives of the work package are the following:

To obtain detailed physico-chemical properties of each MN at the bulk powder and individual particle level and to share data within the Joint action

To determine the influence of exposure media on MNs dispersability and to identify the optimum preparation protocols for the specifics MNs.

To test and develop suitable methods and Standard Operation procedures (SOPs) for analysis and characterisation MN's and dispersion.

To determine the intrinsique characteristics of nanomaterials selected for toxicological studies.

To test the homogeneity of the MN batches distributed.

To develop, test and verify highly suitable MN dispersion protocols to be used in toxicity testing.

Work progress

WP4 started by focusing on preliminary testing and development of the analytical methods. A work-shop was held in August 2010 to discuss different analytical techniques and analytical protocols for TEM, XRD, AFM, RAMAN, TGA, DLS, zeta-charge and dispersion and compare initial results.solution

During this first year, a batch probe sonication protocol was developed using 0.05% w/v

Bovine Serum Albumin (BSA) water. Pre-wetting with 0.5% v/v EtOH was included as a general procedure to ensure dispersion of hydrophobic MNs. Despite good results on dispersability, challenges still remain for development of a common dispersion method for nanotoxicology.

A method for calibration of different probe sonicators is currently under development.

A major effort has also been first establishment of SOPs and generationtecnai g2 spirit of the first primary physico-chemical characteristics.For example, crystallite sizes have been determined by X-ray diffractometry using a range of different models, and data were compared; SOPs have been developed for automatedor semi-automated quantitative description of particle size-distributions and morphology by Transmission Electron Microscopy (TEM); an alternative method for determination of specific surface area in both powders and liquids by Small Angle X-ray Scattering (SAXS) has been developed and will be further refined. Suitable methods and protocols for characterization of carbon nanotubes (bulk and fractionated materials) and their catalysts as well as strategies for identifying and characterising organic coatings/functionalizations are under consideration.

Deliverables:

Standard Operating Procedures for characterisation of the selected MN types

Final protocol for producing suitable MN exposure media

MN data sets with requested physiochemical properties

Associated partners working on WP4

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Collaborating partners working on WP4

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