ANALYSIS OF NANOPARTICLES IN FOOD: FROM CHALLENGE TO ROUTINE?

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A number of recent reports and reviews have identified the current and short-term projected applications of nanoparticles for food and beverages. These include nano-sized or nanoencapsulated ingredients and additives for food, beverages, and health-food applications as well as the use of engineered nanoparticles for the improvement of food contact materials with view to mechanical properties, gas permeability or antimicrobial activity. Although potential beneficial effects of nanotechnologies are generally well described, their potential (eco)toxicological effects and impacts have so far received little attention. A prerequisite for toxicological, toxicokinetic, migration and exposure assessment is the development of analytical tools for the detection and characterisation of nanoparticles in complex matrices such as food. Given the huge diversity of engineered nanoparticles (and conventional materials with a size distribution extending into the nano-range) for use in the food and feed sector in terms of chemical composition, size, size distribution, surface modifications and potential interaction with food matrix components (e.g. proteins) this is a challenging task requiring tailored solutions.

In recent years a number of institutes and projects (i.a. NanoLyse) have started to develop methods that are capable of detecting and quantifying nanoparticles in food matrices. The developed approaches include sample preparation aspects, imaging techniques such as electron microscopy, separation methods (e.g. field flow fractionation, hydrodynamic chromatography, centrifugation) and detection/characterisation techniques (e.g. light scattering, mass spectrometry). In 2011, the European Commission published a recommendation for a definition of a nanomaterial which was adopted by regulators for the implementation in European legislation. First respective regulations come in force for the labelling of cosmetics (2013) and food (2014). This triggers the need for reliable and validated methods that deliver traceable results and allow the decision if a product contains nanomaterials according to the EC definition.

The presentation will review recently developed approaches and evaluate their fitness for purpose with view to analytical and legislative requirements as well as for routine use in the monitoring of actual food samples. Method validation is a relevant issue (involving the availability of suitable reference materials) and results of first interlaboratory studies will be assessed.