Developing new methods to detect nanoparticles in food

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The production and characterisation of reference materials to detect silver nanoparticles in meat is feasible, a recent experiment has found. Using methods developed through the NANOLYSE project, two concentrations of silver nanoparticles were used to spike chicken meat, with the aim of producing a set of reference materials to support the detection of nanoparticles in food.

For the production of the reference materials, a suspension of nanoparticles in water was mixed with chicken meat puree and shock-¬frozen in liquid nitrogen at -150 °C. This resulted in a homogeneous material with only moderate agglomeration of silver nanoparticles.

The experiment found that aqueous silver nanoparticle (AgNP) dispersions were indeed sufficiently homogeneous to be used as reference materials. Nonetheless, certain challenges – especially the assessment of stability – remain.

Nanomaterials – which contain nanoparticles smaller than 100 nanometre – are finding their way into healthcare, electronics, cosmetics, packaging and other areas. The world market for nano-products (products containing nanomaterials) has been estimated to be worth between EUR 150 and 200 billion a year.

However, because the physical and chemical properties of nanomaterials often differ from those of bulk materials, they require specialised risk

assessment to ensure they are safe for both humans and the environment. While this is currently done on a case by case basis, risk assessment methods need to be kept up to date as the use of nanomaterials expands.

There are also legal requirements to be met; EU Regulation 1169/2011 requires food producers to inform consumers whether nanoparticles are present in their products.

The presence of nanoparticles in food is of particular concern because of the obvious risk of ingestion. Nanoparticles can contaminate food products through the seepage of additives in food packaging as well as from environmental contamination.

This was the key focus of the NANOLYSE (Nanoparticles in Food: Analytical methods for detection and characterisation) project, which ran from January 2010 until September 2013. The project sought to develop validated methods and reference materials for analysing nanoparticles across a range of food and beverages. The findings of NANOLYSE will go some way to ensuring the safety of food contact material applications that contain nanoparticles, i.e. materials used in food packaging such as metal oxide/silicate.

Priority nanoparticles were first selected as model particles to demonstrate the applicability of the developed approaches. Methods that could be easily implemented in existing food analysis laboratories were then focused upon. Researchers also built software to provide semi-automated analysis of electron microscope images, capable of reliably detecting nanoparticles in various foodstuffs.

When the NANOLYSE project began, methods for the detection and characterisation of nanoparticles in food were extremely limited. The project produced a selection of potential standard methods for the rapid and reliable identification of synthetic nanoparticles in foods which, two

years later, are continuing to inform ongoing research.

More information: For further information, please visit NANOLYSE: www.nanolyse.eu/default.aspx

"Feasibility of the development of reference materials for the detection of Ag nanoparticles in food: neat dispersions and spiked chicken meat." *Accreditation and Quality Assurance*. DOI: 10.1007/s00769-014-1100-5

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