Food Additives & Contaminants: Part A

Virtual Special Issue on Nanotechnology Related Papers

FOREWORD

This virtual Special Issue is dedicated to papers published in Food Additives and Contaminants from 2008 to date referring to the topic of Nanotechnology. The papers show not only the application potential of nanotechnology in the food and consumer products sector but also describe the challenges in the measurement of nanoparticles.

It is widely accepted that nanotechnology as an enabling technology has a great potential to solve future challenges that we are facing today with respect to e.g. supply of energy and clean water, health care and the need for innovative products to maintain competitiveness. It is expected that nanomaterials will also increasingly be found in food and consumer products such as textiles and cosmetics. Everyday consumer products may be made less fragile, lighter, cleaner, more effective and efficient and intelligent food packaging material may serve better the consumers to ensure safety of food also when carried home from the supermarkets. The applications and implications of nanotechnologies for the food sector have been already described in a paper authored by Chaudry et al. in 2008 (FAC, Part A 25:3, 241-258). This review article did not only give an overview and prospect of applications but also identified a number of uncertainties and gaps in the relevant regulatory framework.

The rapid developments in nanotechnology have driven scientific and regulatory activities aimed at maximising the benefits of products containing e.g. nanomaterials while minimising their potential risks to consumers’ health. In this respect, a safety-by-design approach is of utmost importance, even if there is to-date only a limited amount of scientific evidence to suggest that nanomaterials pose a health risk. With regards to the recent European Union definition of nanomaterials, there is now an urgent need for appropriate and fit-for purpose analytical methods to assess whether a product contains nanomaterials in order to comply also with future labelling requirements. More information on this urgency can be found in the recent paper on detection of nanomaterials in food and consumer products, with the need on bridging the gap from legislation to enforcement, that was authored by Stamm et al. in 2012 (FAC, Part A 29:8, 1175-1182).

The analysis of nanomaterials in real and complex matrices is challenging. Efforts in this respect have now been recognised to be important and therefore the development of appropriate analytical methods – especially in view of the new definition – has just started. The recently proposed definition by the European Commission states that “nanomaterials means a natural, incidental or manufactured material containing particles, in an unbound state or as an aggregate or as an agglomerate and where, for 50 % or more of the particles in the number size distribution is in the size range of 1 nm-100 nm”. The challenge for analysts is the proof of compliance with future labelling requirements especially in view of the particle size distribution.

A comprehensive paper in FAC authored by Tiede et al. (FAC, Part A. 25:7, 795-821) reviewed the analytical tools available for the detection and characterisation of engineered nanoparticles in food and the environment. Since 2008 when this paper was published little progress has been made so far
especially for having to hand validated and fit-for-the-purpose methods. This has been confirmed by a recent review on the aspect of measurement of nanoparticles size distribution in food and consumer products authored by Calzolai et al. in 2012 (FAC, Part A. 29:9, 1183-1193).

As already mentioned above, there is a huge potential for applications of nanotechnology and nanomaterials in food packaging. This is illustrated by three papers in FAC all published in 2011.

Nanosilver has a special potential also due to its antimicrobial activity. Lin et al described the determination of silver in nano-plastic food packaging (FAC, Part A. 28:8, 1123-1128) whereas Song et al. report on the migration of silver from nanosilver-polyethylene composite packaging into food materials (FAC, Part A. 28:12, 1758-1762). However as the authors state, more work needs to be done, especially on the migration of nanoparticles into real food products.

A study on the migration of nanosized layered double hydroxide platelets from polylactide nanocomposite films has shown that the material properties were in compliance with the migration limits as set down in European legislation for food contact materials. The authors Schmidt et al. concluded that there are however still other factors to be considered before such materials can be seen to be suitable for use as food contact materials (FAC, Part A. 28:7, 956-966).

There is now a huge effort in many research and control laboratories worldwide to develop the appropriate methodology not only for safety assessment of nanomaterials but also for their detection and quantification of nanoparticles in complex matrices such as food, cosmetics and other consumer products. The editors of FAC are looking forward to receiving papers describing solutions to overcome these manifold challenges. Appropriate tools to be made available to the scientific community and control bodies will facilitate the acceptance of innovative products on the market.

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