

House of Lords Science and Technology Select Committee

Nanotechnologies and Food

Food Standards Agency's Response to the Committee's Call for Evidence

12 March 2009

The Food Standards Agency (FSA) is pleased to submit the following evidence to assist the Committee in its inquiry into Nanotechnologies and Food

Our response is set out under the 4 main headings in the Committee's call for evidence, prefaced by some general comments.

NANOTECHNOLOGIES AND FOOD EVIDENCE SUBMITTED BY THE FOOD STANDARDS AGENCY

General comments

Nanotechnologies may offer a range of potential benefits to consumers and industry in the area of food and food contact materials, from improving the solubility and bioavailability¹ of ingredients to extending the shelf-life of food. Nanotechnology applications for the food sector have raised a number of safety, environmental, ethical, policy and regulatory issues. The main concerns stem from the lack of knowledge about the potential effects and impacts of nanomaterials on human health and the environment.

Nanotechnology has been defined by The British Standards Institute (BSI)² as "the design, characterisation, production and application of structures, devices and systems by controlling shape and size at the nanoscale", where the nanoscale is defined as the size range from approximately 1 nm to 100 nm. . For comparison, a single human hair is about 80,000 nm wide. Similarly, a nanomaterial can be defined as any material with at least one dimension in the nanoscale³. According to this definition, the term "nanotechnology" can encompass a wide range of products, processes and applications whose sole unifying factor is that they are linked in some way to the nanoscale. For example, the term would include:

- tiny water-filled fat droplets, which are being investigated as an ingredient for use in reduced fat products such as mayonnaise
- incorporating fat-soluble vitamins into nano-sized packages (micelles) that will dissolve in water
- the understanding and modification of the fine structure of food products such as ice cream – food technologists are looking for ways to replicate the physical properties of such foods in products with a reduced fat content
- investigation of the structure-function relationships of enzymes, which play a central role in many types of traditional food processing
- nano-particles of titanium dioxide, which are used in transparent sunscreen products (no known food applications)
- nanoparticles of silver, which are used for their antibacterial properties in a range of consumer goods and which may find applications in food containers
- carbon nanotubes – thin cylinders made of carbon atoms – which are being used as a structural component of consumer products such as tennis racquets and golf clubs (no known food applications).

¹ bioavailability: the extent to which a substance can reach the systemic blood circulation and its availability at the site of action, when taken orally.

² BSI Publicly Available Specification "Vocabulary – nanoparticles" (May 2005). PAS 71:2005

³ Note: The International Standards Organisation uses the term "nano-object" to refer to a discrete object with one or more external dimensions in the nanoscale. In this usage, the term "nanomaterial" includes material which is larger than the nanoscale but which is nanostructured – i.e. it is made up of smaller, nanoscale elements.

It may therefore be misleading to discuss "nanotechnology" in relation to food as if it is a single discipline, and the applications of nanoscience are more accurately described in the plural as "nanotechnologies".

The principal area of interest and concern in relation to food appears to be engineered nanomaterials, which are specifically designed and manufactured with the intention of being incorporated into food to fulfil a particular function. It is nevertheless important to note that nanomaterials are widely found in the natural world and foods will naturally contain nanoscale structures, including individual macromolecules, micelles and crystals. For example, a molecule of haemoglobin is about 5.5 nanometres in diameter, and milk contains micelles ranging from 50 to 500 nm in diameter.

Nanotechnologies can also be applied indirectly to food manufacture, for example through the development of improved surfaces for food preparation and for food transport in factories, or rapid diagnostic tests for contaminants or pathogens in food. This type of application would not directly affect the properties of the final product but could lead to improved efficiency and improved quality control. The remainder of this document focuses on the use of engineered nanomaterials in food and in food contact materials.

In order to understand better how nanotechnologies might be applied to food, the FSA recently commissioned two research projects covering food additives and ingredients, and food contact materials. Both projects were undertaken by a panel of experts from the Safety of Nanomaterials Interdisciplinary Research Centre (SnIRC), led by the Central Science Laboratory (CSL). These projects collected information on current and future applications of nanotechnologies, considered the potential implications for consumer safety and assessed of the regulatory position. In addition, the project on food contact materials included experimental work on the potential migration of nanoparticles from two types of food container. The project reports are being published on the Agency's website and are attached as Appendices 1 and 2 respectively. The findings from this research are mentioned in the relevant sections below.

A. State of the science and its current use in the food sector

Potential Applications

The FSA-funded research project on food additives and ingredients identified a number of potential applications of nanotechnology in these areas including nano-sized carriers for nutrients and other food supplements, nano-sized or nano-encapsulated food additives, and nanostructured food ingredients. Practical examples included nutritional supplements, nutraceuticals and a small number of food ingredients and food additives.

The parallel project on food contact materials identified a range of potential applications including barrier layers to improve packaging properties, active antimicrobial or oxygen scavenging materials to extend shelf life, intelligent nanosensors to monitor time/temperature storage conditions and biodegradable polymer-nanomaterial composites. The researchers concluded that future applications in this area are most likely to relate to antimicrobial activity or improved barrier properties.

Current market (UK, EU and non-EU)

At least two global inventories exist and these provide some information on some of the types and numbers of nano-derived products that may be on the global market across a range of areas, including food. The Woodrow Wilson Centre's global inventory is published on the Internet⁴, as is an inventory of nanoproducts constructed by Friends of the Earth⁵. Both registers list several dozens of "food" products that have been identified. However, it should be noted that Friends of the Earth's register includes materials with a particle size greater than 100 nm, which do not fit the common definition of "nanomaterial". Also, the registers are largely based on marketing information, which may or may not accurately reflect what is actually on the market.

At present, it is not possible to provide a definitive list of nanofoods and nanoscale food contact materials on the EU market, primarily because of the absence of an EU-wide register or inventory. The Food Standards Agency is currently considering various options for developing a UK-based register of nano-derived foods and food contact materials. The European Commission has stated that it will begin work on an EU inventory of nanomaterials during 2009 (see Section C).

According to the European Food Safety Authority's (EFSA) recent opinion on nanotechnologies⁶, most nanotechnology applications for food and beverages in the EU are currently at the research and development stage or near market stage and have not reached the EU market as yet. The only UK exceptions known to the Agency are

- colloidal silver in the form of food supplements (an aqueous colloidal suspension of particles of silver with an average size of 0.8 nm in purified water, also known as "silver hydrosol"). There are claims that such products may fight infections and enhance the immune system. Silver hydrosol has recently been evaluated by EFSA in the context of establishing an EU list of authorised sources of vitamins and minerals for use in food supplements. As there was insufficient information to complete the assessment, this product is unlikely to be included in the eventual list of

⁴ Woodrow Wilson Center (online inventory)

⁵ Friends of the Earth (2008)

⁶ EFSA (2009)

approved mineral sources that will come into effect on 1 January 2010, in which case its continued use will not be permitted.

and

- food supplements comprising a nano-sized formulation of co-enzyme Q10 (micelles of approximately 30 nm diameter). It is claimed that co-enzyme Q10 is an antioxidant with the nano formulation apparently improving bioavailability when compared with powdered co-enzyme Q10 or oil-based formulations. The co-enzyme Q10 product was launched in 2006 and is manufactured in Germany. The German authorities have concluded that this type of formulation does not fall within the scope of the novel foods regulation (see Section C below), as the process for producing the micelles does not lead to a significant change in the properties of the active component..

The FSA-funded project on food contact materials revealed that little was available on the UK or EU markets. Most products were found on the American and Asian markets although some could be sourced by UK purchasers via the Internet.

B. Health and Safety

Risk assessment

Approaches to the risk assessment of nanomaterials have been reviewed by a number of national and International advisory committees. In the UK the Committees on Toxicity, Mutagenicity and Carcinogenicity of Chemicals in Food, Consumer Products and the Environment (COT, COM and COC) produced a joint statement on nanomaterial toxicology in 2005. The COT produced an addendum in 2007 following a review of healthcare nanoparticles.

The 2005 statement (attached at Appendix 3) provided a baseline review of the available toxicity data and outlined the risk assessment approach the Committees would use for the risk assessment of nanomaterials, including those in food and feed. They concluded that conventional toxicological assessment should be sufficient to identify toxic hazards from nanomaterials provided studies were designed based on the properties of the nanomaterial under investigation. Whilst the standard toxicological test batteries would detect possible effects from nanomaterials, there was as yet, insufficient information to exclude the possibility of effects not detectable by these methods. Although in 2007 the COT was not currently aware of such effects being reported.

The 2007 addendum to this statement (Appendix 4) concluded that biodegradable and non-biodegradable nanoparticles require a different risk assessment approach, since biodegradable particles are less likely to have toxicity intrinsic to their nanoparticulate state.

In the European Union, the Scientific Committee on Emerging and Newly Identified Health Risks (SCENIR) has recommended strategies for the risk assessment of nanomaterials in 2006 and 2007⁷. Although there are some differences in emphasis due to the questions being addressed and the remit of SCENIR, the strategy is consistent with that of the UK advisory committees.

In March 2009 the Scientific Committee of the European Food Safety Authority published its opinion on the risk assessment of engineered nanomaterials, specifically in relation to food and in animal feed. The Scientific Committee also agreed that the general risk assessment paradigm (hazard identification, hazard characterization, exposure assessment and risk characterization) can also be applied to the risk assessment of engineered nanomaterials in the food and feed area. The risk assessment of engineered nanomaterials has to be performed on a case-by-case basis and needs to consider the specific properties of nanomaterials in addition to those common to the equivalent non-nano forms of the same chemical substance.

There is currently limited information in several areas which leads to uncertainties in the risk assessment of nanotechnologies and their possible applications in the food and feed area. Specifically there are difficulties in characterising, detecting and measuring engineered nanomaterials in food, feed and biological matrices. This limits the ability to assess actual exposure from possible applications and products in the food and feed area. There is limited data on oral exposure to specific nanomaterials and any consequent toxicity; the majority of the available information on toxicity of nanomaterials is from *in vitro* studies or from *in vivo* studies using other routes of exposure. These limitations in the database need to be reflected as qualitative and quantitative uncertainties in the risk characterization step of any risk assessment.

⁷ SCENIR (2006, 2007a, 2007b)

The risk assessment of a nanomaterial in the food and feed area requires comprehensive identification and characterisation of the material, information on whether it is likely to be ingested in nanoform, and, if ingested, whether it remains in nanoform at the point of absorption. If ingested in nanoform, then repeated-dose toxicity studies on the nanomaterial are needed together with appropriate *in vitro* studies (e.g. for genotoxicity).

FSA funded research

The FSA-funded projects, mentioned above, included an assessment of implications for consumer safety and these reports are consistent with the EFSA opinion. The researchers also highlighted several gaps in knowledge and recommended further research into the physico-chemical properties, behaviour, fate and effects of nanomaterials used in food applications

The project on food contact materials included tests on migration of nanoparticles from two typical materials made of nanomaterial-polymer composites (nanoclay and nanosilver). The results showed no detectable migration from the polymer composite consisting of nanoclay embedded between PET (polyethylene terephthalate) layers and a very low level of migration of silver from food containers consisting of polypropylene-nanosilver composite. In both cases, the presence of nanoparticles did not affect the migration of other (non-nano) components. The study provided some reassurance in the safety of nanotechnology-derived food contact materials but nonetheless demonstrated that migration is likely to be dependent on the type and composition of the polymer.

Research co-ordination

The Nanotechnology Research Coordination Group (NRCG) was set up in 2005 to coordinate publicly funded research into the potential risks presented by the products and applications of nanotechnologies. Defra chairs this Group and the membership includes Government Departments (including the Food Standards Agency), Regulatory Agencies and the Research Councils. NRCG has three main aims.

- to develop and oversee the implementation of a cross-Government research programme into the potential human health and environmental risks posed by free manufactured nanoparticles and nanotubes to inform regulation and underpin regulatory standards.
- to establish links in Europe and internationally to promote dialogue and to draw upon and facilitate exchange of information relevant to the Group's research objectives.
- to consider the outputs of dialogue between stakeholders, researchers and the public (as integrated with the NIDG's wider plans for stakeholder and public dialogue) with a view to enhancing and informing research decisions.

The NRCG began by identifying a programme of 19 research objectives aimed at characterising the potential risks posed by engineered nanoscale materials⁸. NRCG published progress reports in 2006 and 2007 that provide an overview of the work that has been commissioned in pursuit of these objectives⁹. Work in these areas is primarily funded by the Research Councils under their standard procedures for commissioning research. As noted above, the FSA has commissioned two reviews covering food additives and ingredients, and food contact materials.

⁸ Defra (2005)

⁹ Defra (2006, 2007)

C. Regulatory framework

The FSA has conducted a review to identify potential gaps in regulations relating to the use of nanotechnologies in the food sector. The review was published in August 2008 (Appendix 5). The main areas covered were food ingredients, food additives and food contact materials.

No major gaps in legislation were identified by this review and, on the basis of current information; it was found that most potential uses of nanotechnologies that could affect food would require some form of approval process before being permitted for use. Manufactured nano-derived ingredients, additives and food contact materials will be captured by the general safety requirements of the EU Food Law Regulation (Regulation (EC) 178/2002), which requires that food placed on the market is not unsafe. Additionally, more specific legislation exists in 3 major areas that cover all the likely applications leading to engineered nanomaterials being present in food:

(i) novel foods and food ingredients

The European regulation on novel foods (Regulation (EC) 258/97) applies to foods and food ingredients (other than food additives) that were not consumed in the EU prior to 15 May 1997. It establishes a mandatory pre-market approval system for all novel foods and processes and is legally binding across all twenty seven EU Member States. Nanoparticulate forms of a food ingredient that has a history of use will also require authorisation under the novel foods Regulation due to the difference in the production process employed, if the net result is that the nanoparticles have different properties to the existing ingredient.

In January 2008 the European Commission published a proposal to revise and update the 1997 regulation. The European Parliament has proposed that any new regulation should explicitly apply to all nanomaterials, in order to eliminate any doubt as to their status under this legislation. This proposal is still under discussion by Member States and the European Parliament

(ii) food additives

Nano-derived additives are considered within the scope of Food additives legislation. Food additives are controlled in the UK by the Sweeteners in Food Regulations 1995 (as amended), the Colours in Food Regulations 1995 (as amended), and the Miscellaneous Food Additives Regulations 1995 (as amended), with smoke flavourings being specifically controlled by the Smoke Flavourings (England) Regulations 2005. A recently agreed amendment to food additives legislation specifies that where an existing food additive is produced through nanotechnology, it should be assessed by EFSA as a new additive.

(iii) food contact materials

Migration of nanocomponents into food from, for example, packaging would be considered in the scope of Regulation (EC) 1935/2004, which provides the overall framework for the regulation of food contact materials. Provision exists for the Commission or Member States to request the EFSA to conduct an independent, expert human health risk assessment of any substance or compound used in the manufacture of a food contact material/article. Specific materials such as plastics are subject to additional measures and within these measures it is possible for a nanomaterial to be treated separately from the normal scale substance from which it is derived. It would therefore be possible for a nanocomponent to

be authorised only following a risk assessment by the EFSA. The regulation of nanoscale substances in food contact plastics is currently being clarified in preparation for an updated European regulation, and the European Commission has proposed that any substance with a deliberately altered particle size should not be used, even behind a specific migration barrier, without a specific authorisation.

Animal Feed

EU legislation on animal feed covers the additives (vitamins, colourants, flavourings, binders, and so on) authorised for use in animal feed; the maximum levels of various contaminants (e.g. arsenic, lead, dioxins); ingredients that may not be used in feed; nutritional claims that can be made for certain feeds; the names and descriptions which must be applied to various feed materials; and the information to be provided on feed labels.

The Agency is not aware of any specific applications in the pipeline with respect to the use of nanotechnology directly in animal feed. However, current procedures would allow a proper risk assessment to be performed on such products if and when they appear, including the manufacture of currently authorised additives and bioproteins by new methods.

Imported foods

Food imported from countries outside the EU can only be marketed if it meets food safety and food standards requirements that are at least equivalent to those for food produced in the UK and elsewhere in the EU. Food businesses are legally responsible for ensuring the food they import complies with these requirements, and UK enforcement authorities have powers under food safety legislation to check all imported food for compliance.

However, food products ordered from a non-EU country by members of the public in limited quantities for their personal use, for example over the Internet, may not be subject to the protection of UK food safety requirements¹⁰.

Intergovernment cooperation

At EU level, DG SANCO¹¹ organised a workshop in October 2008, the 2nd Nanotechnology Safety for Success Dialogue, which provided a platform for presentations and discussions between relevant stakeholders in the nanotechnologies field, including industry, academia, NGOs, Government departments and Commission Officials. The Director General of DG SANCO subsequently identified ten priority actions to address the key points raised during the workshop (listed in Appendix 6), grouped under the following headings: dialogue and governance, market intelligence, scientific knowledge and gap filling; and risk assessment and guidance. Several of these action points will encompass applications of nanotechnologies in the food area and will involve collaboration between EU Member States and the Commission.

The Organisation for Economic Cooperation and Development also provides a forum for international co-operation on nanomaterials through its Working Parties on Manufactured Nanomaterials and on Nanotechnology, although these are not specific to food and its current risk assessment projects are focussed on materials with no direct food connection, such as carbon nanotubes and cerium oxide.

¹⁰ The applicability of UK legislation will depend on issues such as where the contract between the seller and purchaser is made.

¹¹ DG SANCO: the European Commission's Directorate General for Health and Consumers

The Swiss-based International Risk Governance Council (IRGC) recently completed a report on nanotechnology applications in food and cosmetics¹², which included a discussion of regulatory approaches in the USA, Europe and Japan. IGRC noted that the regulatory responses to nanotechnology have been similar in each of these jurisdictions, in that existing regulations are thought to be adequate sufficient to cover nanoscaled materials in general. In each case, however, questions have been raised about the adequacy of current test methods and the ability of regulatory bodies to monitor and control measurements and risk assessments.

¹² IRGC 2008

D. Public engagement and consumer information

Public Engagement

In late 2008 the Food Standards Agency commissioned an evidence review in relation to public attitudes to emerging food technologies, including nanotechnologies. The report of this review is expected to be published in March 2009. The main findings in relation to previous studies on attitudes to nanotechnologies were as follows:

- Awareness of nanotechnology is low, particularly in relation to food.
- Although general attitudes towards nanotechnologies seem fairly positive, attitudes towards its use in food are less positive. Whilst people are concerned about the risks of nanotechnology in all its forms, they seem less convinced about the potential benefits of food applications than other uses and are sceptical about why these are being developed.
- In general, use of nanotechnology in food packaging may be seen more positively than its use in food.
- Concerns about nanotechnology *in general* include effectiveness, long-term side-effects and the ability of regulators and others to ensure safety and to ensure that developments benefit the general public.
- Other factors affecting attitudes towards nanotechnology, which are often better predictors than socio-demographics, include their scientific knowledge (e.g. experience of previous technological innovations), their general outlook / worldview and where they have received information from (people are more positive towards sources deemed to share a similar view point to them).
- The review uncovered no evidence of how people's views on nanotechnology affect their food behaviour or choices, mainly due to lack of food products on the market.
- The review highlighted that nanotechnology is an extremely active area of research which will be covered under FP7 (The Seventh Framework Programme (FP7) combines all research related EU initiatives, it is a key pillar of the European Research Area) but at the time of writing, awards were still pending. Research in the pipeline included looking at how consumers weigh up the risks and benefits of the technology and the psychological underpinning of differing attitudes.

Effective engagement and public information

The evidence review identified a consensus from the existing body of work that public opinion is in the process of being formed and there was little information currently available to the public on which they can formulate their views.

Future public engagement

As the issues arising from the breadth of nanotechnologies and nanomaterials are complex, more time and resources need to be provided for the public to learn and understand the pros and cons in terms of any consumer or societal benefits and any potential risks. Developing a range of engagement activities to engage the public rather than using a 'one size fits all'

approach will ensure that a wider spectrum of the public are provided with an opportunity to be involved.

Any materials provided for the public need to be prepared with the public in mind i.e. in plain English.

Lessons learned from engagement

Effective engagement needs to be developed upstream of any important decision making. The public should be involved in the framing of the discussion so that their questions are answered. As an example, the FSA commissioned research on cloned animals in 2007/8, which took the form of reconvened workshops with the general public across the UK. This showed that the public were less concerned with how the technologies and science work, and their focus was on the 'why' and what the consequences may be. This was closely connected to the drivers behind the development and a perception that the motives were about increasing profit above other factors.

Good public engagement needs to be based on more than just scientific evidence and needs to take account of wider societal issues i.e. environmental, ethical, moral and economic. The worldview that consumers' hold and the channel used to provide information is as important as the content.

Some issues, like nanotechnology, are not on everyone's radar and are not part of their everyday life. To engage effectively the subject should be brought to life and the public need to see the relevance to their lives. Bringing scientists and the public together in the same room and talking on the same level can foster good relationships and can have a positive effect on the outcome.

Good public engagement will have feedback built in at the planning stage. It is good practice to let people know how their input has made a difference. This need not be more complicated than sending an email or updating websites.

Consumer information

A fundamental principle of food labelling legislation is that consumers should be provided with sufficient information to make informed choices about the foods that they eat. Information must, by law, be clear and not misleading. There is also a limit to the amount of information that can sensibly be provided on a food label.

Recognising these conflicting requirements, it is necessary when defining mandatory labelling requirements to give priority to items that are important for the safe use of the food, while ensuring that any additional labelling requirements are balanced and proportionate. Any demands for special labelling of "nanofoods" would have to be viewed against this background. At present we do not have information about whether UK consumers would value information on the use of nanotechnology in food production, and what sort of information would meet the necessary criteria of clarity and comprehension.

**Food Standards Agency
12 March 2009**

References

Defra, 2005. Characterising the potential risks posed by engineered nanoparticles: A first UK Government research report.

<http://www.defra.gov.uk/environment/nanotech/research/reports>

Defra, 2006. Characterising the potential risks posed by engineered nanoparticles: UK Government research – a progress report (October 2006).

<http://www.defra.gov.uk/environment/nanotech/research/reports>

Defra, 2007. Characterising the potential risks posed by engineered nanoparticles: A second UK Government research report (December 2007).

<http://www.defra.gov.uk/environment/nanotech/research/reports>

EFSA, 2009 - The Potential Risks Arising from Nanoscience and Nanotechnologies on Food and Feed Safety (March 2009).

http://www.efsa.europa.eu/EFSA/efsa_locale-1178620753812_1211902361968.htm

Friends of the Earth, 2008. Report - 'Out of the laboratory and on to our plates: Nanotechnology in food and agriculture' (March 2008)

<http://www.foeeurope.org/activities/nanotechnology/index.htm>

IGRC, September 2008 (International Risk Governance Council) "Risk Governance of Nanotechnology Applications in Food and Cosmetics":

<http://www.irgc.org/Nanotechnology.html>

SCENIHR, 2006 (Scientific Committee on Emerging and Newly Identified Health Risks), 10 March 2006, modified opinion on: The appropriateness of existing methodologies to assess the potential risks associated with engineered and adventitious products of nanotechnologies

http://ec.europa.eu/health/ph_risk/committees/04_scenihhr/docs/scenihhr_o_003b.pdf

SCENIHR, 2007a (Scientific Committee on Emerging or Newly-Identified Health Risks), 21-22 June 2007, The Appropriateness of the Risk Assessment Methodology in Accordance with the Technical Guidance Documents for New and Existing Substances for Assessing the Risks of Nanomaterials, at

http://ec.europa.eu/health/ph_risk/committees/04_scenihhr/docs/scenihhr_o_010.pdf

SCENIHR, 2007b (Scientific Committee on Emerging and Newly Identified Health Risks), 29 November 2007, Opinion on the scientific aspects of the existing and proposed definitions relation to products of nanoscience and nanotechnologies, at

http://ec.europa.eu/health/ph_risk/committees/04_scenihhr/docs/scenihhr_o_012.pdf

Woodrow Wilson Center, Project on Emerging Nanotechnologies: An inventory of nanotechnology-based consumer products currently on the market. Available online at:

<http://www.nanotechproject.org/inventories/consumer/>

APPENDICES:

1. Food Standards Agency research project A01057: Assessment of the potential use of nanomaterials as food additives or food ingredients in relation to consumer safety and implication for regulatory controls. (July 2007)
2. Food Standards Agency research report A03063: Assessment of current and projected applications of nanotechnology for food contact materials in relation to consumer safety and regulatory implications. (July 2008)
3. COT, 2005. UK Committees on toxicity, mutagenicity and carcinogenicity of chemicals in food, consumer products and the environment (COT, COM, COC). Joint statement on nanomaterial toxicology.
<http://cot.food.gov.uk/pdfs/cotstatements2005nanomats.pdf>
4. COT, 2007. UK Committee on toxicity, of chemicals in food, consumer products and the environment. COT Addendum to joint statement of the Committees on toxicity, mutagenicity and carcinogenicity of nanomaterial toxicology. COT Statement 2007/01, March 2007. <http://cot.food.gov.uk/pdfs/cotstatementnanomats200701.pdf>
5. Report of FSA regulatory review of potential implications of nanotechnologies for regulations and risk assessment in relation to food. (August 2008).
<http://www.food.gov.uk/multimedia/pdfs/nanoregreviewreport.pdf>
6. Letter from Robert Madelin (Director General for Health and Consumers, European Commission). Follow-up to the 2nd Nanotechnology Safety for Success Dialogue – Top ten actions to take by Easter 2009. (December 2008)