

## ADVISORY COMMITTEE ON NOVEL FOODS AND PROCESSES

## NANOTECHNOLOGY AND FOOD

**Issue**

This paper provides the Committee with an update on developments in the area of nanotechnology and nanomaterials, as applied to food, and seeks comments on the provision of public information.

**Background**

1. The Committee last considered nanotechnology in January 2005 (paper ACNFP/70/4), when it considered the conclusions of the report "Nanoscience and Nanotechnologies: Opportunities and Uncertainties" published in July 2004 by the Royal Society and the Royal Academy of Engineering. This review had been commissioned by the Government, and the Government's response to the recommendations was presented in a subsequent information paper (ACNFP/71/7) which highlighted issues of specific interest to the Food Standards Agency and the ACNFP.
2. The Nanotechnology Issues Dialogue Group (NIDG), consisting of representatives from various Government departments, agencies and Research Councils, is co-ordinating the activities described in the Government's response across departments, and enabling the responsible development of nanotechnologies<sup>1</sup>. In addition, the Nanotechnology Research Co-ordination Group (NRCG), a sub-group of NIDG, will develop and oversee the implementation of a cross-Government research programme into the potential human health and environmental risks<sup>2</sup>.
3. The Council for Science and Technology (CST), the UK Government's top-level advisory body on strategic science and technology policy, will conduct independent reviews, in 2007 and 2010, of progress with the actions in the Government's response. CST will also assess the implications of any new developments.
4. The Nanotechnology Engagement Group (NEG) has been established to support public bodies in developing a wider programme of social and ethical research and public dialogue around nanotechnology<sup>3</sup>. It will also draw more general lessons for the governance of other emerging science and technology areas.

---

<sup>1</sup> Further information is available at <http://www.ost.gov.uk/policy/issues/nidg.htm>

<sup>2</sup> Further information is available at <http://www.ost.gov.uk/policy/issues/nrcg.htm>

<sup>3</sup> <http://www.involving.org/index.cfm?fuseaction=main.viewSection&intSectionID=391>

5. There have also been a number of developments in the specific area of food safety, which are described below.

### **Toxicology – COT/COC/COM statement**

6. The three Committees that advise on chemical safety of foods and other consumer products<sup>4</sup> have issued a joint statement on the risk assessment of nanomaterials (**Annex A**). The Committees have concluded that the existing approaches to risk assessment should be appropriate for the assessment of nanomaterials, but the developing area of nanomaterial toxicology should be kept under review. Assessment of exposure to nanomaterials is identified as a priority area for research.

### **Uses of nanotechnology in food – IFST statement**

7. The Institute of Food Science and Technology has recently produced an information statement on nanotechnology (**Annex B**) which includes a commentary on current and future uses of nanotechnology in relation to food production.
  - One visible application of nanotechnology is in the field of electronics and data handling, which provides opportunities for improvements in food safety, authentication and consumer information.
  - The ability to engineer materials at the nanoscale opens possibilities for the manufacture of miniature sensors, surfaces that can repel bacteria and displays that can be applied in improved process controls and to provide information on product packs.
  - Nanotechnology is not entirely new to food science, as research into the structure and other properties of foods often involves examining and understanding components that exist in foods at the nanoscale, such as enzymes and other proteins, emulsions and foams.
  - Concern over uses of nanotechnology is potentially focussed on nanoparticles which could arise in foods in a number of ways:
    - from environmental contamination;
    - from migration from packaging;
    - by use of nanoparticles as delivery systems for active substances (e.g. nutrients or functional ingredients);
    - as ingredients added in nanoparticulate form, to aid incorporation of poorly soluble materials;
    - as surface coatings with possible anti-bacterial action;
    - as pigments with altered optical characteristics.
  - Only two examples of products currently on the market are identified:

---

<sup>4</sup> COT / COC / COM are the Committees on Toxicity / Carcinogenicity / Mutagenicity of Food, Consumer Products and the Environment.

- nanoparticulate titanium dioxide is being marketed for use in food packaging applications as a UV blocker
- synthetic nanoparticles of lycopene are reported to have been developed and tested, in order to facilitate incorporation into aqueous foods<sup>5</sup>. Note: synthetic lycopene is classed as a novel food ingredient in the EU and an application for authorisation is currently under evaluation in the Netherlands.

### Regulatory position

8. As part of the Government's response to the RS/RAE report, a government-wide review of the regulatory oversight of nanotechnology is being assembled. In the food area this involves an assessment of the status of nanotechnology and nanomaterials under several pieces of legislation including novel foods, food additives and food packaging. The Agency's regulatory review is being issued in draft for public comment for an 8-week period during March-May. Copies will be provided to the Committee when the draft is available.
9. There appear to be two situations in which nanomaterials added to food would require pre-market authorisation under the EU novel foods regulation:
  - (a) as a novel ingredient – a totally new substance that is presented in a nanoparticulate form; or
  - (b) as the product of a novel process – an existing ingredient marketed in nanoparticulate form that has significantly different biological properties to the existing material (e.g. altered metabolism or safety).
10. The Agency will seek advice from the ACNFP in the usual way if an application is received in either of these categories. In considering any aspects of the risk assessment related specifically to nanoparticles, the Committee might wish to seek specialist input from the COT.

### FSA research

11. In order to gather additional information on the implications for food safety, the Agency intends to commission an up-to-date assessment of new and potential applications of nanotechnology to food packaging. A similar research requirement has been issued in relation to food additives and novel food ingredients.

### Public information

12. In response to the continued interest in applications of nanotechnology, the Agency is considering publishing an overview of the current situation in relation to food. An outline of such a document is attached (**Annex C**) for Members' comment.

---

<sup>5</sup> Note: The IFST report (page 3 and page 6) refers to the US FDA having acknowledged the GRAS (generally regarded as safe) status of synthetic microparticulate lycopene. However, the FDA's response to the manufacturer's dossier does not mention particle size and it is not clear whether the dossier specifically mentioned nanoparticles.

## **Committee action required**

13. Members are invited to note the various developments in relation to nanotechnology and to comment on the attached outline of a public information document on nanotechnology in relation to food.

**Secretariat**

**March 2006**

### **Annexes attached:**

- Annex A** COT / COC / COM Joint Statement on Nanomaterial Toxicology (December 2005) available from <http://www.food.gov.uk/science/ouradvisors/toxicity/statements/>
- Annex B** IFST Information Statement on Nanotechnology (February 2006) available from <http://www.ifst.org/hottop45.htm>
- Annex C** Draft overview of nanotechnology in relation to food (Restricted)