


Nanotechnology – A Challenge for the Food and Drink Manufacturing Industry

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The European Food and Drink Industry

Turnover
€965 billion
 (+3.2% compared to 2007)
 Largest manufacturing sector in the EU (12.9%)

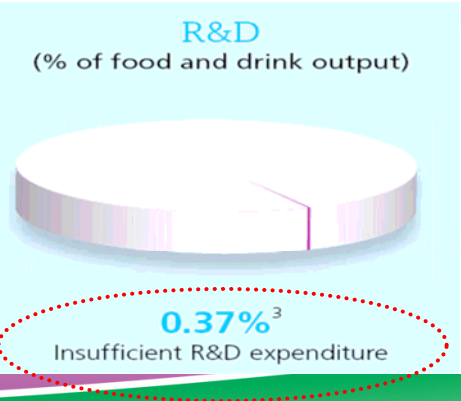


Employment
4.4 million people
 (+0.8% compared to 2007)
 Leading employer in the EU (13.5%)

Number of companies
310,000¹
 Fragmented industry
 of which over
99% are SMEs²
 the latter accounting for
48.7%
 of food and drink turnover and
63.0%
 of employment in the sector



External trade
Exports
€58.2 billion
 (+6.4% compared to 2007)
Imports €57.1 billion
 (+8.4% compared to 2007)
Trade balance €1.1 billion
Net exporter of food and drink products





CIAA and Emerging Technologies - Nanotechnology

- The Food industry supports the contribution nanotechnologies may bring to food products in order to confer consumer benefits, including :
 - Improve nutritional quality of foods
 - Longer shelf-life of fresh and processed products bringing better quality at end of shelf-life
 - Knowledge of storage history and potential safety issues (sensors)
- Application of nanotechnologies in the food industry itself is at an early stage.

Benefits of Nanotechnology

- Packaging applications are likely to come first.
 - Nanotechnology will contribute to the development of stronger, lighter and less wasteful packaging.
- Other potential benefits include:
 - Food safety improvements through the use of anti-microbial surface cleansers;
 - A greater range of 'Healthier option' food choices;
 - Better quality food by the improvement of flavour, texture, and appearance.

Innovation is THE key challenge for the Food and Drink Industry

Notably to deal with:

- major economic,
- societal,
- demographic issues,
- and to ensure that its many SMEs remain competitive.



Nanotechnology and Innovation

- As an innovative and progressive industry, the food sector is interested in science-based research and developments, including the application of nanotechnologies.
 - CIAA members, together with other stakeholders and academia, are therefore actively supporting and carrying out research in this area.
 - The Food Industry is actively involved in the European Technology Platform Food4Life, which is run under the auspices of the CIAA.
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Latest news

- 29/03/2010 ; News**
ETP Food for Life 5th anniversary stakeholder event: videos
- 19/03/2010 ; News**
Press clipping: CIAA puts three key topics on research agenda
- 3/03/2010 ; News**
CIAA celebrates five years of boosting research for competitiveness
- 15/02/2010 ; ETP Newsletters**
ETP Newsletter - Issue 8

Welcome

European Technology Platforms (ETPs) are industry-led, public/private partnerships encouraged by the European Commission to drive innovation and unite stakeholder communities in reaching strategic research objectives of key European industry sectors. The main goals of the ETPs are to strengthen the European innovation process, improve knowledge transfer and stimulate European competitiveness across the food chain.

ETP *Food for Life* was created in 2005 under the auspices of the Confederation of the food and drink Industry of the EU (CIAA), following the principles of the Lisbon Strategy.

ETP *Food for Life* addresses innovation in the agri-food sector, which is the largest manufacturing sector within the EU.

Since its establishment the ETP *Food for Life* has forged strong links with industry, academia and researchers in order to prioritise the major research needs for the EU food and drink industry and to secure the appropriate indicated what resources might be needed, where they might come from, and what other non-research issues will have to be addressed in order to ensure the European Research Area for the food sector becomes a reality.

The ETP *Food for Life* represents a unique opportunity for all stakeholders in the European food chain to increase their competitive strength and to safeguard the continued well-being and welfare of consumers across Europe.



CIAA in focus

- CIAA - Confederation of the food and drink industries of the EU
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- GDA's - The Facts. Your Choice.
-
- Nanotechnology
-
- Balanced diets, Healthy Lifestyle
-
- Managing Environmental Sustainability in the European Food and Drink Industries
-
- CIAA Congress 2010
-

CIAA and Research Activities

- The Food for Life Strategic Research Agenda, submitted under the European Technology Platform, indicates potential uses of nanotechnology that could be of interest to the food industry in the years to come.
- From 2015 – 2020 we could envisage research into:
 - Tailor-made food products, with a particular focus on the relationship between physical/chemical properties and structure;
 - Improving process and packaging design as well as process control;
 - Improving understanding of process-structure-property relationships.

Nanoparticles Naturally Occurring in Food

- While the common use of the term ‘nanotechnology’ may be new, food is naturally and traditionally made up of nanometre scale particles
 - humans have been exposed to nanometre scale particles since their existence.
- Food naturally comprises particles in the nanometre scale, such as protein nano structures.

Which Kind of Applications Exist?

- Principle requirement for prior regulatory approval, without which no applications can go on market
 - Based on detailed guidelines for safety evaluation by EFSA
- Distinction between those that exist and the ones which are commercialised – in US v EU is necessary
- Some examples according to adverts:
 - Supplements: nano co Q 10, nano silver
 - Antibacterials in packaging (plastic food containers for domestic use)

Applications expected in the near future?

- Application in the food contact material area, for example:
 - addition of nano clays to:
 - “Biodegradable” polymers (e.g. PLA,,...) to compensate for their deficiencies such as poor moisture barrier properties and mechanical properties.
 - “Traditional” polymers (=nanocomposites) e.g. montmorillonite for the enhancement of gas barrier properties.
 - Addition of nanoparticles to coatings for antimicrobial, corrosion resistant surfaces
 - Nanostructured coatings for the enhancement of barrier properties.
 - Intelligent packaging : nanosensors, labels,...



Challenges ahead



The Need for Definitions (1)

What are we talking about?

- Several definitions/characterisations have been adopted for various purposes. Food obviously is more difficult.

Why?

- Food is naturally nano-structured so too wide a definition ends up encompassing much of modern food science, and even some aspects of traditional food processing.

The Need for Definitions (2)

Can we make any distinction?

Yes!

A distinction can be made between *engineered nano materials* and naturally *self-assembled nanostructures*

Engineered nano materials :

- Engineered nano *materials* are covalently bonded, and thus are persistent and generally rather robust, though they may have important surface properties such as catalysis, and they may be prone to aggregate.
Examples of engineered nano *materials* include titanium dioxide nanoparticles.

Naturally occurring nanostructures:

- Naturally occurring nanostructures, where the molecules are held together by **w**weak forces, such as hydrogen bonds and hydrophobic interactions. The **w**weakness of these forces renders them mutable and transient;
Examples include soap micelles, protein aggregates (for example the casein micelles formed in milk).

Need for definitions (3)

- Using the ISO terminology, the definition should be limited to nano-objects and their aggregates and agglomerates.
- In order to avoid inconsistencies and ambiguity, the term “engineered nanomaterial” (ENM) should be used in the definition section of regulatory documents.

Need for definitions (4) – an example

- Draft Novel Food Regulation definition:
- *“nanomaterial” means any intentionally engineered material that has one or more dimensions of the order of 100 nm or less or is composed of discrete functional parts, either internally or at the surface, many of which have one or more dimensions of the order of 100 nm or less, including structures, agglomerates or aggregates, which may have a size above the order of 100 nm but retain properties that are characteristic to the nanoscale.*
- *Properties that are characteristic to the nanoscale include:*
- *(i) those related to the large specific surface area of the materials considered and/or*
- *(ii) specific physico-chemical properties.”*

Need for definitions (5) - Enforcement


- The method to measure the size should be unequivocally fixed as any definition can only be meaningfully applied if the test methods needed are developed, validated, and suitable for the application in practice.



Other Challenges

- Missing guidelines
- Knowledge gaps in the biological properties of these materials (DG Research)
- Life-cycle analysis – incomplete knowledge of fate of NM in environment
- Innovation bottlenecks because of regulatory system

How would you resolve them?


- Need for EFSA Guidelines on how to conduct safety evaluation which will address remaining knowledge gaps
 - Streamlining regulatory processes
 - Holistic approach in policy to facilitate Life-cycle analysis Industry to engage with available knowledge expertise/providers incl. DG Research and EFSA
 - Upstream dialogue with Commission and EFSA
- 

CIAA Nanotechnology – Benefits, Risk, Governance...

- Potential applications should have consumer benefits
- Clear and unbiased information for consumers is needed, for example functionality labelling

Which problems do you identify? How do you solve them?

Need for:

- Independent sources of information and education
 - Science-based decision-making
 - Multi-Stakeholder dialogues
- 


Safety aspects

- Nanomaterials are not *per se* hazardous and size alone does not imply a specific risk.
- Need to distinguish between the natural occurrence of nanomaterials (such as in protein, fat or sugar molecules), their presence through conventional processing techniques (such as milling, homogenising and emulsifying) from those
- Where particle size has been deliberately engineered to behave differently to its conventional counterpart.
- Need for adequate safety assessment on a case-by-case basis where the use of nanotechnology gives rise to changes in existing products or processes.

European Commission Communication on 'Regulatory Aspects of Nanomaterials' COM(2008) 366 Final

- Considers “current legislation covers to a large extent risks in relation to nano-materials and that risks can be dealt with under the current legislative framework. However, current legislation may have to be modified in the light of new information becoming available, for example as regards thresholds used in some legislation.”
- Documents that support implementation may have to be modified e.g. EFSA Guidance on Risk Assessment.

Regulatory Aspects for the Food Industry

- A comprehensive regulatory framework for nanotechnology is in place which, if implemented effectively, sets the highest safety standards across all industry sectors.
 - The framework covers, *inter alia* novel foods, food additives, flavourings and food contact materials.
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CIAA members template letter to suppliers

Regulatory compliance of raw material or packaging material using or containing intentionally engineered nanomaterial

Dear (insert contact name of supplier)¹

Nanotechnologies are enabling technologies with potential benefits to the food industry. The food industry recognises its responsibility under the existing EU regulations.

Given the questions raised by this new technology especially with regard to the production and the manufacture of food and food packaging, our company needs to be accurately informed on the use of nanomaterials in any supply we purchase from you, in order to comply with our mandatory requirement to exercise due diligence and to be able to make an informed choice.

We request information on any use of engineered nanomaterials, in the supplied material and that you confirm you are placing on the market products that are compliant with EU regulations and meeting all the required safety criteria.

If product **xxxx** could be considered as a nanomaterial or as containing such materials, i.e. materials intentionally and newly engineered to be at the nano scale as to modify their physical and chemical properties compared to bulk materials², please respond with its comprehensive specification and confirm its regulatory compliance.

Signature

¹ All sections in yellow should be adapted according to individual needs and habits of individual companies

² In the absence of legal definition, we note the proposal of the Czech Presidency in the context of the revision of the Novel Foods legislation, which aims at capturing the opinions of EFSA and SCENIHR: *"nanomaterial" means any intentionally engineered material that has one or more dimensions of the order of 100 nm or less or is composed of discrete functional parts, either internally or at the surface, many of which have one or more dimensions of the order of 100 nm or less, including structures, agglomerates or aggregates, which may have a size above the order of 100 nm but retain properties that are characteristic to the nanoscale.*

Properties that are characteristic to the nanoscale include:

*(i) those related to the large specific surface area of the materials considered and/or (ii) specific physico-chemical properties.**



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Openness and Transparency

- The European Food Industry seeks:
 - Collaboration with food chain partners and is therefore involved in a Cross Industry Platform.
 - Open debate with different stakeholders and has to date arranged three stakeholder dialogue meetings, an activity which will be continued.
 - Details can be seen on the dedicated website:
<http://nanotechnology.ciaa.eu/>

CIAA

Nanotechnology

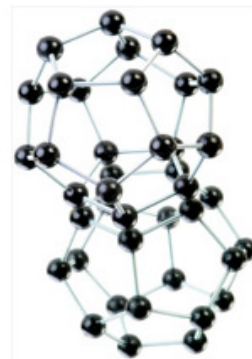
Confédération des Industries AgroAlimentaires

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Welcome

CIAA nanotechnology introductory statement

CIAA supports the use of nanotechnology which has widespread industrial applications, including uses in food products, processing and packaging. Application of nanotechnologies in the food industry is at an early stage.



As an innovative and progressive industry, the food sector is interested in science-based research and developments, including the application of nanotechnologies. CIAA members, together with other stakeholders and academia, are therefore actively supporting and carrying out research in this area.

There is a need to distinguish between the natural occurrence of nanoparticles (such as in protein, fat or sugar molecules), their presence through conventional processing techniques (such as milling, homogenising and emulsifying) and where particle size has been deliberately engineered to behave differently to its conventional counterpart. We believe there is a need for adequate safety assessment on a case-by-case basis where the use of nanotechnology gives rise to changes in existing products or processes.

The [Food for Life Strategic Research Agenda](#), submitted under the [European Technology Platform](#), indicates potential uses of nanotechnology that could be of interest to the food industry in the years to come.

CIAA Activities

[Stakeholder Dialogue Group](#)

Quick links

[EFSA](#)[Nanotechnology Homepage of the European Commission](#)

CIAA in focus

[CIAA website](#)

GDA

[Guideline Daily Amounts](#)[Balanced diets, Healthy Lifestyle](#)[European Technology Platform](#)[Managing Environmental Sustainability](#)[CIAA Congress 2010](#)

Conclusion

- Safety is paramount.
- The European Industry believes in innovation as a driver for social, technical and economic progress.
- Nanotechnologies can contribute to solving the challenges of our time.
- Openness and transparency are key.
- A comprehensive regulatory framework is in place, which, if effectively implemented has the capacity to govern the production, use, and disposal of nanomaterials. This framework sets the highest safety standards and crosses all industry sectors.
- A common working definition for nanomaterials is crucial.
- Europe cannot afford to miss the “nanotechnology train.”

To find more information about CIAA

www.ciaa.eu

Access to news, positions and
publications

CIAA position about nanotechnology

<http://nanotechnology.ciaa.eu/>

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