Agency for Innovation by Science and Technology.

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Novel techniques for inspection and engineering of food (micro)structure based on X-ray computed tomography

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Novel techniques for inspection and engineering of food (micro)structure based on X-ray computed tomography

Food microstructure is defined as the organisation of food constituents at the microscale and their interaction. Most solid foods, including bakery products, fruit, vegetables and dairy foods, are microstructured.

Many properties of foods which are relevant to process engineering or quality are related to their microstructure. Microstructure affects food quality attributes such as texture, but also relates to the occurrence of internal defects, as well as affecting food stability and shelf life. Examples include sponginess of bread, texture of cakes and pastry, gas and water transport properties of fruit and consistency and texture of cheeses, cream and butter. Food processing operations affects the microstructure: existing porous structures are destroyed and new ones are created.

Insight in food microstructure and how it changes during processing operations is essential to produce high quality food. In particular, consumer demands for enhanced nutritional quality (composition), sensory quality (texture, internal defects) and safety (absence of foreign materials) are driving manufacturers to optimize products and processes with respect to microstructure.

X-ray computed tomography (CT) enables the non-destructive visualisation and quantification of the internal structure of objects. Technological advances led to micro-CT (or μCT) and nano-CT systems with nowadays a pixel resolution at or below 1 micron, while fast X-ray CT scanners have emerged in the medical field.

Figure 1. Food microstructure of different food categories (dairy, fruits and vegetables, cereal based foods) will be explored using advanced micro-CT

This IWT SBO project with the acronym *TomFood* aims at

- Developing novel X-ray CT instruments for inspecting food structure and food microstructure of foods at the best possible image quality and resolution balanced to processing speed and equipment cost;
- Developing novel tomographic reconstruction and analysis methods for improved quantification of food structure parameters;
- Using X-ray CT to improve our understanding of process-structure-property relationships through advanced mathematical models;
- Develop tools for design and engineering of novel food processes and food products;
- Developing affordable online food inspection equipment in food processing plants to the benefit of the food industry in Flanders.

The objectives are realised by means of a multidisciplinary consortium combining food technology experts in specific application fields (dairy, fruits and vegetables, cereal based foods) with experts in X-ray physics and image processing and analysis.

The objectives are translated into a program of work packages for each specific objective. The aim is to force a breakthrough in each of the food domains resulting in innovations for the Flemish industry.

The outcome of this project will have a significant impact on the **food industry** capabilities to manufacture products with improved quality, and thus:

- Ensure current product consistency and limit rework
- Increased quality consistency
- Improve and ensure innovation rates
- Allow faster move towards new products

For **technology and ICT companies**, the project allows gathering in a faster way the necessary product knowledge and experience to develop new and dedicated instruments and software.

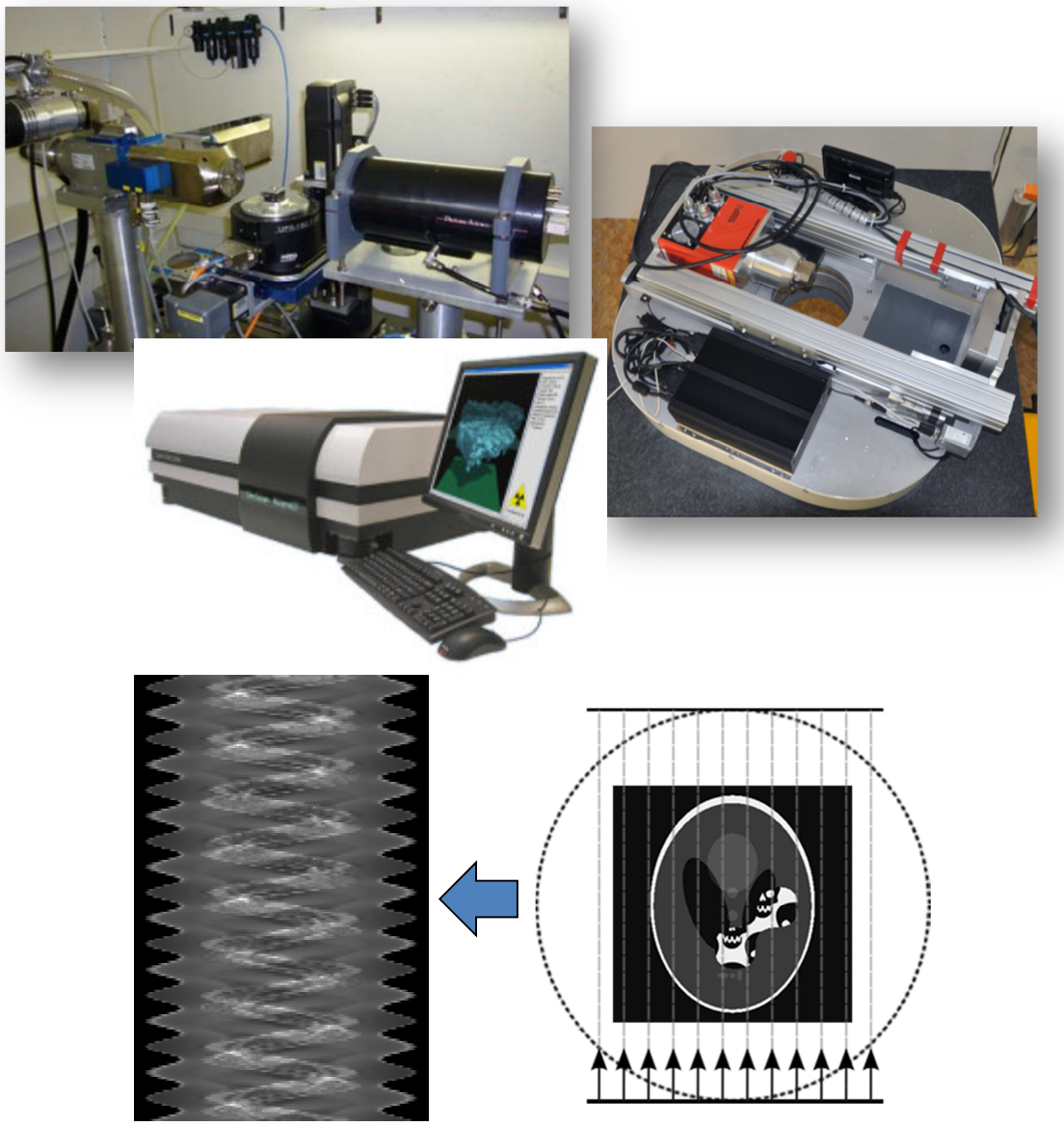

Figure 2. X-ray CT hardware and software is optimized and applied to explore food structures at a wide range of scales and for different processes

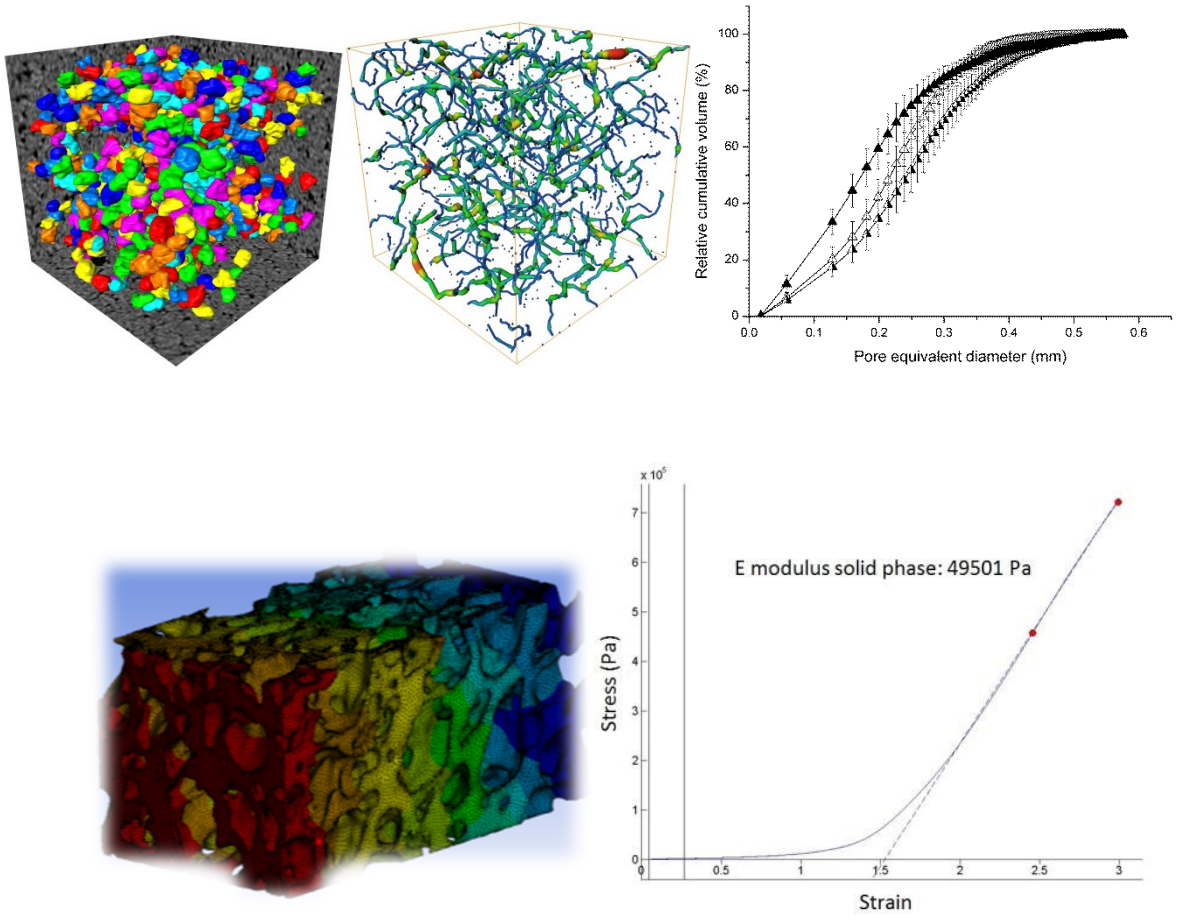

Figure 3. Image processing and modeling is applied to understand functional properties of foods in relation to 3D microstructure

TomFood events:

User group IWT-SBO 120033 TomFood
17 september 2013 11.00u
Universiteit Gent, Vakgroep Fysica en Sterrenkunde, Proeftuinstraat 86, 9000 Gent, Gebouw N3, leszaal op de tweede verdieping

To attend, please contact:
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