ELSEVIER

Trends in Food Science & Technology 25 (2012) 54–55

TRENDS IN FOOD SCIENCE & TECHNOLOGY

Conference Report

2011 EFFoST Annual Meeting, Berlin

Ronan Gormley*

UCD Institute of Food and Health, University College Dublin, Room L2.16, Science Centre South Belfield, Dublin 4, Ireland (Tel.: +353 1 716 2495; e-mail: ronan.gormley@ucd.ie)

The 2011 European Federation of Food Science and Technology (EFFoST) conference took place in Berlin, Germany on 9–11 November. The conference programme centred on food process–structure–function relationships and the content was closely allied to the research agenda of the European Technology Platform: Food for Life. There were 16 keynote/review lectures, 38 other oral presentations, 260 posters, and close to 300 attendees. The oral sessions corresponded to the process–structure–function themes as did the poster sessions.

Food process

The keynote address described an innovative, integrated approach for the analysis of food processes, (i) embracing a generic scheme coupling the process with structure and resulting processed food properties, (ii) a detailed description of consumers' requirements by their PAN-profiling (Preference-Acceptance-Need), and (iii) an incremental reverse engineering approach along the processing cascade from food factory to the human body. Five review papers followed. The first (fermentation) described the use of anaerobic bacteria (e.g. *Eubacterium rectale – Blautia coccoides*) as probiotics for humans. Problems include lack of suitable growth media and extreme oxygen sensitivity. The second (extrusion) reported on structure-property functions of alginate hydrogels for the design of innovative microcapsules as carriers of hydrophilic compounds, e.g. cyanocobalamin. A laboratory scale batch coaxial encapsulation unit was used and release of cyanocobalamin was quantified by spectrophotometry. The third (membrane processing) outlined the development of a model describing interactions between membrane surface and already deposited proteins and newly arriving proteins at the deposit surface. Further results were presented characterizing the deposited layer structures using X-ray beams. The fourth review (homogenisation) showed that pressure levels of 350–400 MPa are achieved in piston-gap-type homogenisers using high pressure technology and ceramic/diamond homogenisation valves. Ultra-high pressure homogenisation (UHPH) at ≥200 MPa gives more efficient particle size reduction compared to classical homogenisation and lower microbial load in the processed fluids. The fifth (freezing) presented innovations based on the application of (i) physical disturbance (static or fluctuating pressure, ultra sound, external electric field, pulsed electric field) and (ii) implementation of ice nucleating agents to minimise freezing damage.

The six presentations were supported by 10 oral lectures on non-thermal process innovations and 10 on assembled food systems. The former included membrane fouling during ultra-filtration, effects of pulsed light processing on milk proteins, supercritical CO_2 processing of hams, protein isolation in the milk fat globule membrane, radiofrequency freezing of meat, oil-in-water emulsions, pulsed electric field treatment of fruit juices, use of temperature biosensors in high pressure reactors, UV reactor for water treatment, and feature extraction of non-uniform food products. The latter embraced nutritive value of cookies, optimising lycopene bioavailability in tomato products, food and health research in Europe, particle characteristics in carrot suspensions, water activity versus water mobility, gas exchange in CA stored fruit, anti-pectin antibodies for assessing pectin structure-function, linkages between genetic manipulation and recent nuclear power debacles, studying volatiles release using a model mouth, and use of mobile fluorescence for detecting porphyrin-based contamination in fresh meat.

Food structure

The keynote address described a toolbox for microstructure characterization. Understanding the dynamics of structure formation and breakdown is necessary in order to tailor-make processes and products. Mastering the heterogeneity and complexity of food products globally as well as locally is essential. Global properties are obtained by NMR, diffusometry or rheology. New developments in predictive science allow micrometre and nanometre scales to simulate flow and diffusion. This will facilitate the development of new generation structured biomaterials with tailored mass transport properties and related functionalities.

* Corresponding author.

0924-2244/$ - see front matter
doi:10.1016/j.tifs.2011.12.001

The first of four review presentations dealt with structure engineering. Focus was on how conventional thermal and novel pressure based processing technologies influence pectin structure and thereby product texture and micronutrient bio-accessibility in solid plant based food systems. Disintegrated plant based food systems consisting of a particle phase and a serum were also discussed. The second review was on effective micro-encapsulation of sensitive bioactive substances using a twin screw extruder and low temperature/low shear conditions. The third review dealt with new methods for fat reduction including the use of emulsions, Pickering emulsions, double or duplex emulsions and water-in-water emulsions. Increase in the incidence of obesity challenges food scientists to develop colloidal foods that are sensorically acceptable, contain fewer calories and are digested slowly. Modelling was the topic of the fourth review presentation and listed applied mathematical procedures for assisting in food structure simulations and development.

The five presentations were supported by nine oral lectures on structure/function innovations in real foods and nine on non-thermal and thermal process innovations. The former embraced sensing and imaging devices for controlling food microstructure, pick-and-place as a tool to create structure from disarray, beta-carotene stability in freeze-dried solids, process analytical technology (PAT) in the dairy industry, food layered manufacture, electro-spinning of hydrocolloids, multiple emulsions, protein aggregation by phase separation, and membrane concentration of skim milk. The latter included ham cooking by dielectric spectroscopy, effect of pressure levels on strawberry juice quality, a nanotechnology approach to structure behaviour in cereal-based foods, simulation of thermo fluid dynamic effects in extruded starch-based products, effects of pressure and temperature on spore germination/inactivation, evaluation of apple quality by shock waves, single droplet trials for thermal processing of functional foods, predicting growth probability of *Listeria monocytogenes* in real foods, and pulsed electrical field treatment of French fries.

Food function

The keynote address centred on function generation and how this led to improved and targeted product physical, sensory and nutritive properties and to final acceptance by consumers. The first of four review lectures was on gut function and probiotics. The physical nature of food delivery systems has a profound effect on the stability of live probiotics during gut transit. Environmental stresses during processing include drying temperature, oxidation, osmosis and food matrix stresses. Approaches for protecting viability include manipulation of bacterial cell physiology, application of pre-lethal stress to cultures, selecting appropriate drying conditions, and optimising reconstitution conditions post-drying. Sensory management was discussed in the second review with emphasis on the lack of focus on mechanoreceptors related to tactile perception. Tactile sensory attributes (hard, thick, tough, brittle, sticky, rough, slimy, smooth, dry, slippery, gritty, creamy, coating, astringent) are strong indicators of product quality. Tactile perception was discussed in the context of the forces exerted on the tongue surface and the sensitivity of mechanoreceptors. The third review was on satiety management in the context of the effects of food texture on food intake regulation and weight management. Tests were conducted on the role of viscosity, hardness, rate of eating and other food characteristics on spontaneous food intake. Foods used were milk, custards, meat replacers, candies and sausages, and the focus was on eating rate, bite sizes, frequencies and amount of food eaten. Texture differences in solid foods did not affect food intake but in milk and custards there was a decrease of 30% in intake in going from milk (liquid) to custard (semi-solid). Oral sensory exposure has a major role in this effect since lowering eating rate and increasing oral processing time decreased food intake. The influence of fermentation and cell-wall degrading enzymes on nutrient accessibility in wholegrain foods was the subject of the fourth lecture. Enzymes and microbes play an important role in changing properties of food matrices. The structure and mechanical properties of the bread matrix are important for digestibility and are influenced by modulation of the properties of cell wall polymers. Fermentation and enzymatic processing also modify the gastrointestinal degradation of cereal cell walls by gut bacteria, and enhance fermentation of dietary fibre as well as bio-accessibility, bioavailability and bio-conversions of associated small molecular weight bioactive compounds.

Poster presentations

These covered a wide range of topics and complemented the oral presentations. They are broadly divided in 11 subgroups within the framework process-structure-function as follows: UV/UHT/ultrasound/pulsed electric fields/cold atmosphere pressure processing (21); high pressure processing (17); other processes/food engineering (52); food function/functional properties (37); general food science/technology (28); sensory properties (21); nutritive value (20); food structure/microstructure (19); bioactives/antioxidants (17); food safety (17); physical techniques (11).

The conference gave ample opportunity for networking and there was active discussion after each oral presentation and at the poster assembly sessions. Keep in touch with EFFoST and details of the 2012 conference (Montpellier) via the website at www.effostconference.com.