

Novel Technologies for Food & Nutrition

Speaker Profiles

The Road to Good Nutrition - Perspectives for New Approaches and Novel Technologies

Prof Manfred Eggersdorf, Professor for Healthy Nutrition & Senior Vice President Nutrition Science & Advocacy, DSM Nutritional Products

Biography: Manfred Eggersdorfer studied chemistry at the Technical University Munich and did his PhD in organic chemistry in the field of synthesis and characterization of unusual amino acid. He was post-doc at the Stanford-University, California working with Carl Djerassi on the isolation and characterization of sterols from marine origin. He joined Roche in 1999 as Head of R+D Vitamins and Fine Chemicals which was acquired by DSM. Prior to Roche, Manfred Eggersdorfer was working for BASF, Ludwigshafen in different positions including Head of Research and Development Fine Chemicals. Further Manfred Eggersdorfer is active as member of the Advisory Board of the Johns Hopkins Bloomberg School of Public Health, of the Strategy Board of the Institute of Food Science University Hamburg, and several other boards.

Abstract: Nutrition, healthy nutrition is essential for life and optimal health. The link between a sufficient intake of essential nutrients and long term health, a healthy development from child to adulthood and healthy aging is more and more supported by science, nutrition societies and health organizations. Healthy ageing is high on the agenda of individuals, health insurance companies and governments. The European Union has defined a nutrition strategy to add two healthy life years to the population till 2020. This provides new opportunities for science, for innovation and differentiation for consumer goods companies.

It is well established and documented that in low income countries people suffer from malnutrition and vitamin deficiencies. However people do not expect and realize that malnutrition and inadequate nutrient intake is also an issue in industrialized countries, as there is plenty of food available. There is convincing evidence from food intake surveys in many countries - like the United Kingdom, Germany, the Netherland, the USA, just to name a few - that a sufficient intake of nutrients is not reached according recommendations from nutrition societies and authorities. This is true for the general population and especially for specific population groups like pregnant women, children and elderly. In addition new insights on polymorphism provide information on nutrient requirements for specific groups. Reasons for the inadequate intake are manifold, e.g. changes in life-style and eating patterns, along with increasing dependency on pre-cooked and processed foods.

Inadequate nutrient intake has serious health consequences for individuals and a wider impact on societies, economies, and healthcare and welfare systems. As the insufficient intake does not result in immediate consequences like deficiency symptoms the impact and long term effects on health, wellness and healthcare costs are often neglected. Assessments by different research groups indicate that the financial burden on direct and indirect health care costs can be in the range of billions of dollars.

This offers room for new approaches and opportunities for the food and supplement industry: providing diagnostic tools to measure nutrient status, individualized diet

Novel
Technologies for
Food & Nutrition

23rd October 2013
London

advice via apps, product formulations with improved bioavailability of nutrients, improved nutrient - energy density and last but not least new ingredients with health claims.

The presentation will provide an overview on societal developments, nutritional needs, the role of new technologies and opportunities by new nutritional ingredients.

Nanoparticles in the gastrointestinal tract: exposure, absorption and utilisation are normal physiological processes but imposters take advantage

Dr Jonathan Powell, Head of Cellular & Molecular Sciences, MRC Human Nutrition Research

Biography: Jonathan was appointed as Head of Department (Cellular & Molecular Sciences) in 2011 and, prior to that, Head of Section and Director of Studies in 2003 at MRC HNR (Cambridge), as well as visiting Professor in the School of Medicine at Kings College London. He was made a Fellow of Hughes Hall College, the University of Cambridge, in 2008. His major research interests are the biology and biochemistry of minerals, especially nanominerals, and the absorption and immune-potentiating activities of such particles in the gastrointestinal tract. He has an active research programme in these areas and also in novel synthetic nanomineral development for therapeutic and nutritional applications. Diseases of interest are iron deficiency anaemia and Crohn's disease, as well as ulcerative colitis, liver disease and osteoporosis. His previous positions were Senior Lecturer in Nutrition and Medicine at Kings College London, from April 1999, Visiting Assistant Professor, Dept. of Immunology and Rheumatology, University of California at Davis, California, USA from April 1998 and MRC fellow/Honorary Lecturer, Dept. of Gastrointestinal Research, Rayne Institute St Thomas Hospital, London, from August 1995.

Abstract: The Biomineral Research Group at MRC HNR (Cambridge, UK) has focused its past 10 year's efforts on human oral exposure to, and gut acquisition of, nanoparticles- specifically in the form of nanominerals. For both nutritional and immunological requirements, there are purposeful pathways for nanomineral uptake in the GI tract. Regular epithelial cells can endocytose very small nanoparticles- a few thousand atoms in composition and only a few tens of Angstroms in diameter. This is exemplified for iron oxo hydroxide, derived from various dietary/digested sources, in the proximal small bowel yielding desirable iron utilisation. For larger nanoparticles- again, in practice, meaning natural nanominerals- the more specialised particle-scavenging M-cells of gut lymphoid follicles are the portals of entry. Particle sizes of 20-250 nm appear to be optimal for nanoparticle uptake via this route. In this case the naturally occurring processes revolve around mineralised calcium, more so for immunological than nutritional processes we suspect, and our work continues in this fascinating area. However, recent 'nano additions' to the human diet- namely excipients in drugs or nutraceuticals or even toothpaste, as well as nanomineral food additives- can be seen to hijack these important entry ports for natural nanoparticles: these imposters are not yet associated with human disease but for how long will this remain the case?

Future Opportunities for Novel Technologies in Food Manufacture

Prof Sam Millar, Director of Technology, Campden BRI

Biography: Prof Sam Millar is the Director of Technology at Campden BRI where he leads a team with expertise across the entire food supply chain.

Sam represents Campden BRI on a number of professional committees which

Novel Technologies for Food & Nutrition

23rd October 2013
London

include the BRC Global Standard for Food Safety Technical Advisory Committee and the Biotechnology and Biological Sciences Research Council Crop Improvement Club Steering Group. He is the UK National Delegate for the International Association for Cereal Science and Technology (ICC) and a Special Professor of Cereal Processing in the School of Biosciences at The University of Nottingham.

Abstract: It is widely recognised that the next few decades will be pivotal for the future of food supply to the global population. The combination of significant pressures on food supply, associated natural resources and the environment, allied to the demands of a developing global consumer population will lead to significant changes in the supply and manufacture of food. In turn, the ways in which individual companies organise their activities and those of their suppliers to access and supply global markets will continue to evolve. It is expected, therefore, that the need for and expectation from new technologies within food manufacture is going to increase in the future. In addition to these external drivers, the early and successful adoption of technology can also give individual companies a significant competitive advantage. As a result, the development and adoption of new technologies is anticipated to be a key enabler for the food industry in the coming years.

As part of its long-running New Technologies project, Campden BRI practically evaluates new approaches for food manufacturing. In many cases, the underlying driver for the work undertaken is maintaining or enhancing product safety while improving product quality, whether nutritional or organoleptic. Technologies which have been evaluated and shown to have potential for food manufacturers include high pressure processing, pulsed electric fields, pulsed light, power ultrasound and cold plasmas. Each of these represents a response to different challenges but all have the potential to address the needs of consumers, suppliers and manufacturers and thus develop an effective food supply chain addressing future needs.

Emerging Micro & Nano Technologies for Manipulation of Ingredient Functionality

Kathy Groves, Consultant Microscopist, Leatherhead Food Research

Biography: Kathy joined Leatherhead Food Research as a food microscopist after graduating in Biochemistry at the University of London. She now manages the food microscopy and analysis team within Food Innovation.

Kathy has over 30 years' experience in relating food structure to properties covering research into a wide range of products including protein functionality, meat product quality, emulsions and confectionery products.

She is one of the key drivers of the nanotechnology initiative at Leatherhead and a Fellow of the Royal Microscopical Society.

Abstract: The size and arrangement of ingredients, especially if present as solid particles, are important factors that influence the functional properties of a food product. Dependent upon the conditions associated with crystallization through nucleation and their growth, certain compounds can crystallize with different crystal structures. Calcium carbonate (a fortificant) and sucrose (used extensively in confectionery) exhibit such polymorphic properties with regards to shape, melting point, dissolution rate and overall stability. This presentation gives examples of research in this area looking at self-assembly of these ingredients.

Novel Technologies for Food & Nutrition

23rd October 2013
London

Novel Technologies for Fat Reduction in Food

Isabella Van Damme, Material Science Programme Manager R&D, Mars Chocolate

Biography: Isabella Van Damme is the Material Science Program at Mars Chocolate based in Slough, UK. She has worked in the R&D departments of several major confectionery companies and has gained extensive expertise in the scientific aspects of chocolate behaviour. Her main focus is now on developing novel materials for applications in confectionery.

Abstract: Fat reduction is a top priority to produce healthier food with reduced calories. This presents many technological obstacles as fat plays a crucial role in the texture and flavour perception of food. This presentation will explore new technologies available to formulate reduced fat products.

Technology Strategy Board's Activities in the Food Sector

Nick Bassett, Lead Technologist – BioSciences, Technology Strategy Board

Biography: Nick is the Lead Technologist for Biosciences within the Enabling Technologies Team, and led on the Nutrition for Life – providing safe and healthy food Competition. Nick joined the Technology and Strategy Board from the Research Councils UK Shared Service Centre (RCUK SSC) where he held a number of roles across the organisation as Head of Procurement, Head of Customer Development and Interim Client Services Director. Prior to RCUK SSC, Nick worked at the Biotechnology and Biological Sciences Research Council.

Before joining the Research Council community, Nick worked in the Medical Devices Sector in various positions, most specifically immuno-diagnostic product development and production for companies such as Beckman Coulter and Dako. He is also the Managing Director and co-founder of an ImmunoHistoChemical Screening company.

Abstract: The Technology Strategy Board has multiple mechanisms available to those individuals developing technologies supporting or associated with the Agriculture and Food sectors. These opportunities are not always obvious. The aim of the presentation will be to highlight the varied TSB tools available to companies with an interest in Agrifood.

Novel Strategies for Funding Novel Technologies – Crowdfunding

Karen Darby, CEO and Founder, CrowdMission

Biography: Karen is a serial social entrepreneur. She has successfully raised finance and subsequently launched a number of businesses in a career spanning three decades and she knows firsthand the challenges and limitations of working with banks, grant providers, VC's and angel investors.

That's why she founded CrowdMission, the world's first crowdfunding platform exclusively for mission-driven business. Karen firmly believes investors and entrepreneurs with shared values can make money and make a difference.

Previously she founded SimplySwitch, the price comparison service, in one of the UK's most deprived areas. Employing over 100 staff, SimplySwitch raised £500k for charity and helped thousands of consumers save over £20m on their household bills. In August 2006 Karen sold the business to the Daily Mail for £22 million producing a x22 return for the investors and proving the model for ethical equity investment to generate both financial and social returns.

Novel Technologies for Food & Nutrition

23rd October 2013
London

Karen likes to play an active role in mentoring and supporting young entrepreneurs.

Abstract: CrowdMission is the world's first equity-based crowdfunding platform for social and environmental businesses. We challenge conventional sources of business finance, such as banks, angel investors and venture capitalists, by helping entrepreneurs secure investment from the public. Through CrowdMission, people can invest from as little as £10 in exciting new businesses that benefit society. Karen will discuss how CrowdMission can help businesses with novel technologies that operate for profit and have a social mission at their core raise business finance from the crowd.

Water-Water Interfaces

Dr Hans Tromp, Senior Scientist Texture, NIZO food research BV

Biography: Trained as a chemist, I received my PhD in physical chemistry from the university of Leiden in 1991. I had postdoc positions at the universities of Bristol and Cambridge (UK), and started to be involved in food science at the Institute of Food Research in Norwich. From 1998 I am working as a scientist at NIZO food research (Ede, the Netherlands). I do projects on the structure formation and stability of food systems. In 2008 I became part time associate professor at Utrecht University.

Abstract: An overview will be given of experimental studies of water-water interfaces.

Interfaces between phases of coexisting thermodynamically incompatible aqueous solutions are called water-water interfaces. Their most common occurrence is between phase separated aqueous polymer solutions, such as solutions containing polysaccharides and proteins. Water-water interfaces represent a method to structure water, and may offer opportunities to replace oil-in-water emulsions by low caloric water based alternatives.

The tension of water-water interfaces is extremely low (typically a few $\mu\text{N/m}$ or less). These interfaces are therefore highly deformable and difficult to investigate by classical methods (e.g. the Wilhelmy plate method). Water, salt and, in the case of polydisperse polymers, low molar mass fractions of the polymers can freely diffuse across the interface.

The particular case of an aqueous solvent has the extra dimension of (partial) permeability for salts and the subsequent possibility of Donnan potentials across the interface. The partial permeability makes water-water interfaces comparable to semi-permeable dialysis membranes.

From Open Innovation to Global Commercialization – SODA-LO™ Salt Microspheres

Susan Butler, Senior Research Scientist, Wellness NPD, Tate & Lyle

Biography: I received my M.S. Organic Chemistry in 2006 from Western Illinois University. I have worked in the food industry for 11 years including 7 years in new product development. Since joining Tate and Lyle, I have been involved in the development of several innovative new products including PROMITOR Soluble Gluco Fibre, TASTEVA Stevia Sweetener, and most recently I led the development effort for SODA-LO Salt Microspheres.

Abstract: This talk will present key findings and hurdles associated with bringing in an exciting invention through our open innovation process and developing it sufficiently for global commercialization. Various aspects of development including,

Novel Technologies for Food & Nutrition

23rd October 2013
London

technical, nutritional, regulatory and manufacturing will be discussed. Current applications work and sensory analysis will also be described.

Societal Acceptance of Emerging Agrifood & Nano Technologies

Prof Lynn Frewer, Professor of Food & Society, School of Agriculture, Food and Rural Development, University of Newcastle

Biography: Lynn J Frewer is Professor of Food and Society at Newcastle University in the UK. Previously Lynn was Professor of Food Safety and Consumer Behaviour Wageningen University in the Netherlands. Lynn is a social scientist and has interests in all areas of food and society, for example in relation to consumer acceptance of agrifood technology in relation to food and nutrition security.

Abstract: Consumer acceptance of emerging technologies applied in the agrifood sector, or enabling technologies and their applications needs to be understood early in product development. The issue of perceived personal benefit as well as risk is relevant to the commercialisation of products produced using novel technologies. Personal benefit must be perceived to outweigh personal and societal risks if consumers are to purchase novel products developed using enabling technologies such as nanotechnology. Historically, research into the determinants of public acceptance of emerging technologies has occurred *subsequent* to public rejection of a particular application. Indeed, the European public's rejection of genetic modification of food and crops is frequently interpreted as representing the normative societal response to new technology. However, determinants of consumer acceptance identified in the literature are better predictors of consumer *rejection* than of *acceptance*. Thus more is known about why consumers will reject agrifood technologies than accept them. In the case of nanotechnology applied to food production, experts appear to be more convinced of societal rejection of agrifood applications than consumers. The latter are more concerned about specific applications characterised by societal negativity in the past, independent of whether nanotechnology has been applied to their development (e.g. they are more concerned about smart pesticides than nano-encapsulation). Understanding consumer preferences early in the development process of nanotechnology will deliver applications where benefits are perceived as desirable by consumers. Recently synthetic biology has become the focus of societal attention. Relevant learnings regarding societal responses to existing technologies will be identified and applied to this emerging area of application.

Safety of Food produced by Novel technologies

Dr Anne Constable, Senior Food Safety Scientist, Nestle Research Centre, Switzerland

Biography: Senior Scientist and Manager within the Chemical Food Safety Team in the Quality and Safety department at Nestle Research Centre, Switzerland.

Over 20 years experience in the food industry and provides support and assessments of chemicals and ingredients for new and existing food products to Nestle R&D communities and to quality management.

Originally a microbiologist and molecular geneticist, having studied at Liverpool and Manchester Universities, with post-doctoral work at EMBL in Heidelberg.

Chaired the ILSI Europe Novel Foods Task Force 2003 – 2010, and has contributed to several activities in the area of approaches to novel food safety and chemical risk assessments.

Novel Technologies for Food & Nutrition

23rd October 2013
London