

**IOP Food Physics
2023**



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Chair's report

Welcome to the sixth newsletter of the Food Physics group!

At the start of the year we had the seventh conference in the "Food Physics" series, which was held on-line for the third year. After the turbulence of the last couple of years we were very much looking forward to a physical event. Conference chair Marco Ramaioli had arranged a great event for us at the Université Paris-Saclay. However, at the last minute we had to revert to an online event as local industrial action threatened the safety of our participants' travel plans.

Marco, with fantastic help from Jenny Griffiths from the IOP, managed to preserve the excellent scientific program as we pivoted into an online version of the conference. On behalf of the committee I'd like to thank Marco and Jenny once again for their efforts.

For Food Physics 2024 we are planning to hold a physical event at the IOP HQ in London on January 31st – February 1st – so save the date!

Bolstered by the plans to hold the conference outside the UK for the first time, we had a good breadth of international speakers at this year's conference, and we have begun discussions on future international locations for subsequent conferences. Read more in the conference report, including the prizes for best poster and best poster presentation.

Following the conference we had our third AGM. Read the AGM report for more details.

As part of the IOP Special Interest Group committee nominations in September, the committee retained its full complement from the previous year. The only change to the committee has been to the role of Chair, which I took over from John Bows. I would like to thank John for the excellent leadership he has shown in the role of Chair since the committee's inception, John remains an integral part of the committee, representing Food Physics within ProFSET (read below for a full update). On a personal note, I would like to thank the committee for entrusting me with the role of Chair, I am very much looking forward to continuing to ensure our annual conference has broad participation with relevant scientific content, that we interact openly with other learned societies and add to our repertoire of outreach and engagement activities.

We continue to encourage all readers to engage with Food Physics, whether to discuss joint workshops / conferences, link us to events perhaps outside our normal networks, or just to discuss application of interesting physics to solve food and drink innovation challenges.

Zachary J. Glover, Chair

Physics Group Purpose

Supporting research into areas of physics that impact the food sector, and encouraging collaborative research between academic and industrial physicists.

Promoting the role of physics in the food industry and ensuring that it is more widely understood that this is a field in which there are opportunities to conduct interesting and important research; promoting this fact to early career physicists and policy makers.

Providing a mechanism for physicists in the sector to feed into the IOP and have their views represented to funders and policy makers.

Activities

Organise an annual conference

Engage with physics academia / other IOP groups e.g. host joint events

Bidirectional exchange of physics and problems between industry and academia

Engage beyond IOP (e.g. IChemE, RSC, STFC Food Network+, IUK)

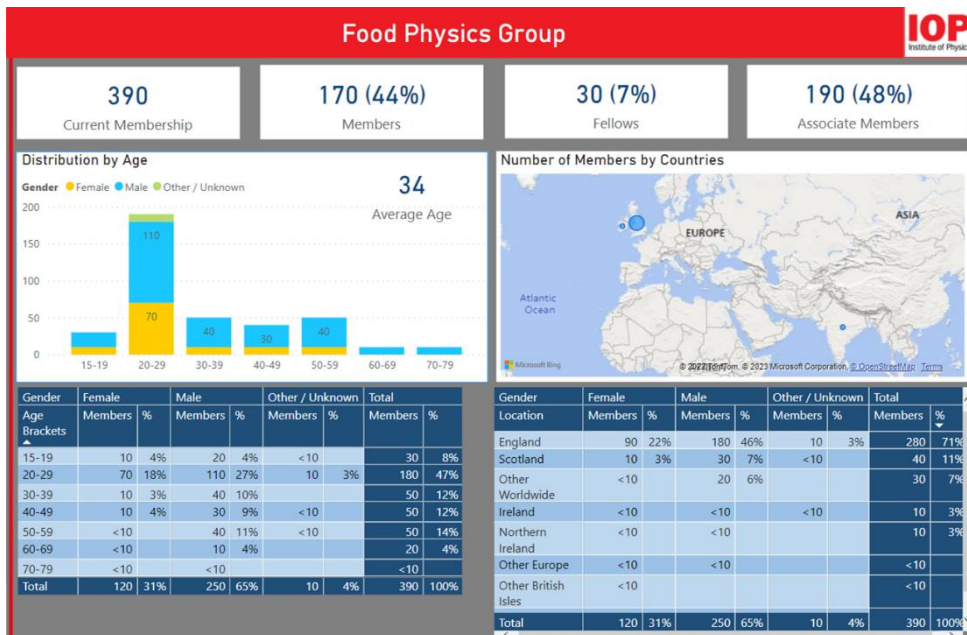
Publish newsletters

Engage early careers physicists

Outreach to schools / STEM via food physics (note [IOP Outreach Toolkit](#))

Membership Overview

As of 1st Feb 2023, Food Physics Group had 390 members (up 30 since 2022) of which 31% are Female. The Average Age is 34, more than half are under 30, with 44% being Members, 7% Fellows and 48% being Associate Members.



Report from Food Physics Conference, Jan 31st -Feb 2nd 2023

Food Physics 2023 was the seventh in our annual series of conferences (previous events have been held at Sheffield Hallam, Edinburgh, Chipping Campden, Leeds and online). As for the two previous years, the conference was on-line and supported by the IOP with Jenny Griffiths coordinating. The committee thank Jenny for her great work supporting the setting up of the conference, the web site and running the meeting and also the University Paris-Saclay Graduate Schools Biosphera and SIS for their financial support. There were on average some 60 online participants at a time, with some peaks approaching 90. As is typical, this conference has a strong focus on soft matter and included sessions on Measurement, Sustainability, Interfacial Phenomena, Rheology, Food Systems / Processing, Oral Processing and Digestion and Foams and Emulsions.

Following on from last year's success, we kept the flash presentation section for all of our 24 poster presentations.

Day 1

Our first session of the conference was **Sustainability**, chaired by Zachary Glover. As a group we believe the Food Physics community has a lot to contribute in this field. Our first keynote speaker, *Monique Axelos (INRAE)*, opened the session with a fascinating talk summarising the ways in which physics can help address the issue of sustainability in food with focusses on health and environmental issues and food waste.

Mary Okeudo-Cogan, (Univ. of Leeds) presented on the microstructure and interactions of proteins and biopolymer fibrils in sustainable meat alternatives. The study investigated the impacts on microstructure when fungal hyphae were combined with egg white or potato protein using low shear dynamic rheology, confocal microscopy, cryo-Scanning Electron Microscopy (SEM) and energy-dispersive X-ray, and Atomic Force Microscopy (AFM).

Julie Bloquet Maurras, (SOREDAB/CRPP) reported on the gelling of oil-in-water emulsions in crystallised vegetable fats as alternatives to animal derived fats. Emulsions were prepared from vegetable fat blends of cocoa butter (CB), copra oil (CO) and high oleic sunflower oil (HOSO) and gelled. The systems were analysed via granulometry, X-ray diffractometry, AFM and texturometry and provided insights into the impact of oil and surfactant on ultimate gel texture.

Next we had two sessions for each of our **poster presenters** to deliver a live pitch for up to two minutes, the poster session is reported on below.

Our second session was on **Measurements** and chaired by Peter Schuetz.

Marta Martínez-sanz, (Spanish Council for Scientific Research) delivered a talk on how scattering techniques can be used to investigate the nanostructure of polysaccharide-based gels and their behaviour throughout gastrointestinal digestion. A multimodal approach of SAXS, SANS and complimentary microscopy, spectroscopy and rheology was shown to be valuable in investigating the gelation mechanism of sulphated polysaccharides and novel nanostructures. These techniques can be applied to assess structural changes during digestion which in turn can help assess impacts on nutrition and health.

Florence Gibouin, (Laboratoire Du Futur - Solvay – CNRS) presented on the use of fluorescent molecular rotors in measuring the viscosity of fructose solutions coupled with analysis of the drop geometry. It was shown that molecular rotor probes in droplets can be used to determine droplet geometry through fluorescence and the fluorescent lifetime can be related to the viscosity within a droplet over time. The methodology presented provides additional benefits to the conventional suite of techniques applied to the study of droplets and their viscosity.

Trey Koev, (Univ. Of East Anglia) reported on the use of Chemical Shift Imaging NMR to achieve Rapid Continuous Cell Profiling, which is a novel method for measuring fermentation metabolites with minimal sampling required, overcoming limitations on the standard methodologies which are cumbersome and perturbative. It was shown that there is potential application in diagnosis of colorectal pathologies.

Giana Almeida, (Univ. Paris-Saclay) delivered a talk on the use of *in-situ* measurements during drying and modelling to understand highly deformable food products. A novel method was demonstrated to measure the mass and shape of potato and apple during drying, relating the drying behaviours to anatomical differences validated through Environmental-SEM imaging.

Christopher Garvey, (Forschungs- Neutronenquelle Heinz Maier-leibnitz (frm II)) presented on how ultra-small angle neutron scattering and contrast variation can be applied to *in-situ* studies of dairy gels. Here, U-SANS was used to probe the fractal structure of recombined dairy gels and presented a method for identifying the casein micelle network and fat globules in dairy gels that were acidified through bacterial fermentation.

Day 2

The third session, chaired by Marco Ramaioli, was on **Interfacial Phenomena and** opened with our next keynote speaker *Prof. Jan Vermant, (ETHZ)*, who delivered an interesting talk on engineering liquid-liquid interfaces and their role in food systems.

Luca Lanotte, (INRAE) reported on crack patterns induced by auto-stratification in drying droplets of dairy proteins. Optical microscopy and SEM was used to measure dried droplets, coupled with micro-indentation tests to determine the drying mechanisms of binary colloid systems.

Sébastien Saint-Jean, (INRAE-AgroParisTech UMR Ecosys) presented on rain splash dispersal of plant pathogens in cultivar mixtures. A combination of experimental and modelling data was shown to be valuable in understanding how the spread of plant disease can be minimised or prevented through the mechanism of rain droplet splashing.

The fourth session, **Rheology**, chaired by John Melrose, opened with *Gabriele D'Oria, (Univ. Of Copenhagen)* who delivered a talk on how fluid gels can exhibit a dual behaviour as both granular matter and colloidal glass. Two methods were presented to assess fluctuations in rheological properties over time and due to modulated density differences. The methods and model applied have value in supporting the tuning of fluid gel properties in future.

Julien Bauland, (Univ. de Lyon) presented our 'Best Early Career Researcher Presentation' on the link between casein micelles and the physical properties of enzymatic milk gels – read more details below on Julien's presentation.

Ruud van der Sman, (Wageningen Univ.) reported on the effects of viscoelasticity on moisture sorption of maltodextrins. It was demonstrated that viscoelastic relaxation effects cause the hysteresis in moisture sorption of different maltodextrins, as evidenced by model development, fitting and experimentation.

Session five, chaired by John Bows was on **Food Systems / Processing** and started with our third keynote speaker *Prof. Ian Noble, (Univ. of Birmingham / Mondelez)* delivered an engaging and broad talk on the future of food processes (and how physics could help).

Safia Bedre-dine, (INRAE) reported on mechanisms of expansion and energy-saving perspectives in the context of partial vacuum baking of double layered flat bread. A method of evaluating the delamination level of double layered breads was applied to various recipe and process conditions, to understand the physical

mechanisms required for high quality products. It was demonstrated that the use of partial vacuum can reduce baking temperatures significantly and has relevance to industrial manufacture.

Clement De Loubens, (Lrp, Cnrs, Uga) presented on gelation of protein aggregates, osmotic phenomena, and core-shell objects: why protein isolate gelation in the presence of a calcium gradient was observed via microscopy with fluorescently labelled proteins used to measure protein concentration. An understanding of the gelation mechanism allowed the production of protein fractal fibres and core shell objects with varying properties.

Julien Dupas, (Nestlé) delivered a talk on caking triggering near glass transition of amorphous food powders, where the combination of glass transition temperature ranges and particle size distribution improved the predictability of caking in a range of powders. Insights on the impact of powder composition, sucrose vs protein or fibres was also presented.

Gabriela Zanghelini, (Univ. Paris-Saclay) reported on the role of recycling during distillation on the aroma composition of freshly distilled cognac. It was demonstrated that computational modelling can be a valuable tool in determining the aroma and ethanol retention during cognac distillation based upon significant data collection, model development and validation.

Rob Farr chaired Session six on **Oral Processing and Digestion**;

Miodrag Glumac, (INRAE) delivered a presentation on the application of a custom-manufactured biomimicking tribometer, which can be used to evaluate tongue roughness-induced friction during oral processing of food. In this talk, a custom-manufactured oral tribometer was used to evaluate artificial tongues of varying roughness with glycerol lubrication and can be used to better inform future studies of oral tribology.

Rémi Lecanu, (Univ. Paris-Saclay) presented a study on the effect of the rheology of texture modified drinks and food on the flow in the syringe test used in the framework of the International Dysphagia Diet Standardisation Initiative (IDDSI). The outputs could be applied to tailor drink flow properties, enhancing pleasure and swallowing safety for people suffering from swallowing disorders (dysphagia).

Olivier Vitrac, (INRAE) reported on a multiscale and *in silico* method for assessing molecular transport of hydrophobic compounds during food digestion. Three modelling modalities were combined to model the digestion of vitamin A from a molecular level to adsorption of bile salts. Multiscale modelling was shown to have

the potential to tailor controlled release of bioactive compounds and the ability to replace animal models.

Day 3

The seventh and eighth sessions were on **Foams / Emulsions** and were chaired by Eddie Pelan who introduced our final keynote *Emmanuelle Rio*, (*Univ. Paris-Saclay*) who delivered an insightful talk on the impact of physical chemistry in the context of the stability of surface bubbles.

Elizabeth Tenorio Garcia, (*Univ. of Leeds*) presented on Pickering stabilisation of W/O emulsions using solely cocoa butter crystals. Water-in-oil emulsions stabilised with cocoa butter crystals were analysed using cross-polarised light microscopy, cryogenic SEM and CLSM, alongside crystal analysis using SAXS, WAXS and SDC with rheological analysis over time. It was shown that Pickering stabilisation can replace surfactants completely and support clean label products.

Noémie Ourvois-Maloisel, (*Institut de Physique de Rennes – CNRS*) delivered a talk on a multi-scale approach to the foaming and emulsifying properties of soybean co-products: showing comparisons and synergy with protein solutions. Two fractions of soybean were foamed and emulsified and compared to egg white and pea protein solutions, demonstrating that the properties of foams and emulsions can be fine-tuned, especially when in combination with different vegetal products.

Svenja Schmidt, (*Univ. Of Adelaide*) presented on how a microfluidic-made beverage nanoemulsion for the encapsulation of nutraceuticals and nutrients could be applied to a novel astronaut food system. A method was presented based on microfluidics to personalise a beverage with hydrophobic flavour and nutrient compounds without the need for surfactants.

Peter Schuetz, (*Unilever R&D Colworth*) reported on a comparison between theory and experiment on how quickly ice cream becomes icy? The temperature dependence of ice crystal formation has been shown using synchrotron X-ray tomography in ice cream samples. Experimental data was used to validate a mathematical model based on crystal diameter, cooling rate and weight fraction of sucrose.

Maxime Touffet, (*Cargill R&D Centre Europe*) delivered a talk on modelling of oil dripping during deep-frying. Experimental and multi-scale modelling data were presented to highlight the stages of cooling, dripping and oil penetration during deep-frying with insights into how oil uptake may be reduced significantly, which in turn has potential health implications through dietary improvements.

Interactions

The approach to this year's conference was markedly different to the previous online conferences as it was expected to be a physical event, and the group's first outside the UK. As such, there was excellent engagement from international speakers and participants, particularly in the Paris area.

We are all aware of the limitation of an online format vs physical events with respect to the informal networking opportunities and social potential. As a group we will endeavour to provide physical events in the next couple of years to compensate, and then strike a balance between physical and online formats in future years.

In the 2023 conference we had a good balance of presenters between our invited keynotes, scientific talks and early careers presenters. The poster session was particularly well subscribed to and the option to allow the presenters to deliver their pitch live worked effectively and ran on time, so this should be preserved in all future formats. The poster drop-in sessions feel like there is still some missing potential, despite them being the most technologically complicated parts of the agenda. Building on 2022 the focus areas of sustainability and food systems / processing have provided a natural home for agricultural topics, an important area for food physics. There remains further potential to engage with small-medium enterprises which should be considered for future events alongside our engagement activities and event promotion.

<https://iop.eventsair.com/food-physics-2023/>

Poster Session

This year we had 24 poster presentations! Poster presentations are an integral part of a scientific conference and often an excellent way for Early Career Researchers to showcase their research and gain experience in presenting in a formal scientific environment.

Building on the format from 2022, we gave each poster the opportunity for a flash presentation, which was presented 'live'. To boost the exposure level of the poster presentations and to offer Early Career Researchers an opportunity to present we had planned for these flash presentations to be delivered at the physical conference. When moving to the online format we prioritised keeping the flash presentations as 'live' presentations to best emulate the experience our presenters would have had at a physical event. We had the poster presentation split over two sessions, each of which was followed by a 'breakout' session, where participants could drop into virtual rooms to discuss the posters with the presenters. We have aimed to make the most of the technology available to us over the past three years to allow the conference participants and all presenters to interact as much as possible.

One prize was awarded for the 'Best Poster Presentation'. This was awarded to Taranvir Singh Bedi from the University of Nottingham, UK who presented "Keeping it Short and Sweet": A Study of Moisture and Sucrose Crystallinity in Shortbread Baking'. Taranvir stuck to his title and delivered a very sharp, concise and informative flash presentation, alongside a clear and visually appealing poster. Taranvir impressed the committee with his level of engagement in the breakout discussions: well done Taranvir!

Further details from the prize winners follow.

Zachary Glover



Poster Presenters Session 1

Wednesday 1 February at 10:20 am – 11:20 am (Central European Time (UTC+1))

1. [Giana Almeida](#), Université Paris-Saclay, INRAE, France
'Towards to numerical simulation of 3D food printing'
2. [Maria Julia Amundarain](#), University of Bielefeld, Germany
'A biophysical approach to understand the role of gliadin peptides aggregates in celiac disease'
3. [João Araújo](#), University Of Minho, Portugal
'Development of customizable functional foods using emerging technologies: A nanotechnological and 3D food printing approach'
4. [Fayas Asharindavida](#), Ulster University, Northern Ireland
'Spectral Data Analysis for Food Fraud Investigation: Use of Miniature Devices and Impact on Health and Economy'
5. [Alejandro Avila-sierra](#), Université Paris-Saclay, INRAE, France
'Improving the in vitro swallowability of minitables using a novel binary granular mixture of high packing density by adding cellets'
6. [Reine Barbar](#), Institut Agro Montpellier- UMR IATE, France
'Impact of grinders loading modes and settings on hydration and rheological properties of wheat bran powders'
7. [Eric Rondet](#)
'Mechanical approach for the evaluation of the crispiness of food granular products'
8. [Yurixy Bugarin-Castillo](#), Université Paris-Saclay, INRAE, France
'Natural salivary substitutes based on seed extracts: rheological characterization and in-vitro swallowing performance'
9. [Léa Couvidat](#), Université Paris-Saclay, INRAE, France
'Powder floating behaviour when poured on an stirred liquid: effect of particle and bulk powder properties'
10. [Guy Della Valle](#), Université Paris-Saclay, INRAE, France
'Assessing changes in lentils texture during hydrothermal treatment'
11. [Maude Dufour](#), BIA-INRAE, Nantes, France
'Tackling the gluten network structure to anticipate dough mechanical behavior in baking industry'
12. [Miodrag Glumac](#), Université Paris-Saclay, INRAE, France
'Ultrasound imaging assisted monitoring of the deformation of artificial tongues during compression and shear of food gels'
13. [Marine Haas](#), Université Paris-Saclay, INRAE, France
'Adsorption study of molecules with surface-active properties on the interface of milk fat globules: application to high pressure homogenization process'

IOP Food Physics 2023

31 January–2 February 2023
Université Paris Saclay, Palaiseau, France



Poster Presenters Session 2

Wednesday 1 February at 12:20 am – 11:50 am (Central European Time (UTC+1))

14. Hannah Harris, Quadram Institute Bioscience, UK
'The impact of psyllium gelation behaviour on in vitro colonic fermentation properties'
15. Adam Hayward, University of Birmingham, UK
'Structure and dynamics of aqueous mixtures of alcohol and sucrose'
16. Megan Holdstock, University of Leeds, UK
'Understanding non-aqueous dispersions of hydrophilic particles'
17. William Jenkinson
'Application of meshless simulation methods to study the micromechanics of flows in food systems'
18. Anaïs Lavoisier, INRAE, France
'Impact of salivation during milk ingestion on the rheological properties of in vitro gastric contents'
19. Alexy Brunel, Institut de Physique de Rennes – CNRS, France
'Gelled waters for elderly persons: rheological characterization and sensorial analysis'
20. Thoithoi Tongbram, University of Nottingham, UK
'Soluble short-chain amylose elevates gelatinisation point of waxy corn starch'
21. Mohamed Noemen Tounsi, Tunis University, Tunis
'Characterisation and comparative analysis of some edible active films based on sodium alginate, flaxseed, polyethylene glycol; coated with some Mediterranean essential oils'
22. Christelle Turchiuli, SayFood, INRAE
'Study and prediction by dimensional analysis of the evolution of the drop size distribution in a spray generated by a bi-fluid nozzle'
23. Mónica Umaña, Umr Sayfood and Universitat de les Illes Balears
'Optical microscopy and image analysis vs a particle size analyzer in the evaluation of oil-in-water emulsions with different microstructure'
24. Taranvir Singh Bedi, University of Nottingham, UK
'"Keeping it Short and Sweet": A Study of Moisture and Sucrose Crystallinity in Shortbread Baking'

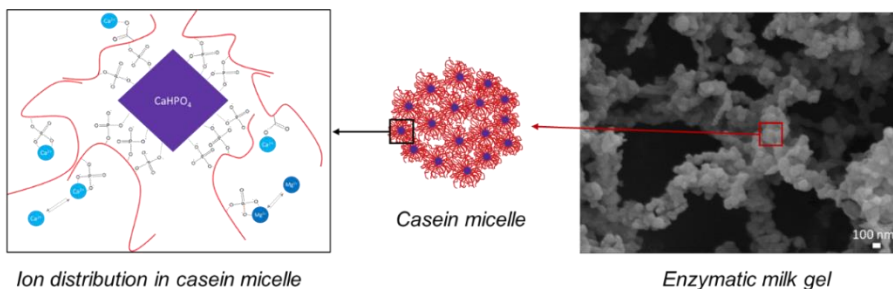
Prize Winners

Best Early Career Research Prize: Julien Bauland, Université de Lyon

Relation between the physical properties of enzymatic milk gel and its building blocks: the casein micelles

Milk is a stable suspension of casein micelles (CMs) which are natural colloids resulting from the complex association of milk proteins, the caseins, and milk minerals, mainly calcium and phosphorous. CMs can be viewed as dynamic protein microgels, whose properties depend on the physico-chemical conditions of milk. Upon enzymatic destabilization, CMs aggregate and form a weak colloidal gel, which is the first step of cheese manufacture. Controlling the structure and the rheological properties of the enzymatic milk gel is essential for its further processing into cheese. Thus, the physical properties of the gel would be ideally predicted from the physico-chemical conditions in which milk gelation takes place. However, the way CMs properties affect the ones of the enzymatic milk gel is not fully understood.

In this study, we aimed to tackle this problem by first studying a large set of enzymatic milk gels with various ionic contents and/or pH to tune the CMs properties. From this experimental set, we have found that the rheological properties of the gels, i.e., G' , G'' and $\tan(\delta)$, were perfectly correlated with the ionic content inside CMs, revealing a direct link between the properties of the colloids and those of the gels. Then, making use of atomic force microscopy to indent individual CMs under selected conditions, we have related the changes in ionic contents in CMs with changes in their Young's modulus. Using electronic microscopy, we observed that the "soft" CMs displayed a higher degree of fusion after aggregation. Finally, the ageing kinetics of the gels, characterized by rheometric tests and confocal microscopy, was related to rigidity of CMs and their ability to fuse after aggregation. Our results show that the ageing kinetics of the gel and its microstructure can be qualitatively predicted from the ion distribution in CMs. However, the viscoelastic spectrum of the gels could not be directly related with the



CMs properties, highlighting the difficulty to link the structure and rheology of colloidal gels.

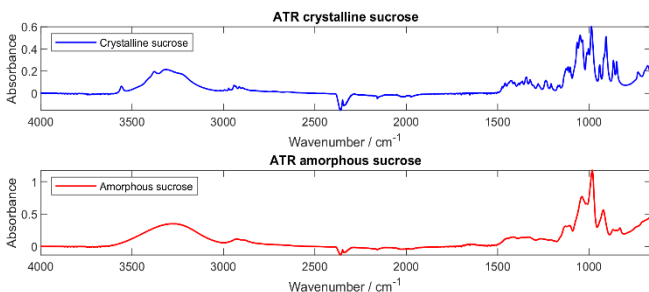
Best Poster Presentation: Taranvir Singh Bedi, University of Nottingham, UK

“Keeping it Short and Sweet”: A Study of Moisture and Sucrose Crystallinity in Shortbread Baking

Taran is a final year PhD candidate in the Mike George Group, School of Chemistry, University of Nottingham in the UK. Taran's PhD is sponsored by Mondelez International and the BBSRC. Prior to his PhD, he completed a BSc in Chemistry at the University of Nottingham. He is passionate about FTIR spectroscopy, Raman spectroscopy, amorphous materials, and sugars.



In biscuit manufacture, breakages commonly occur due to mechanical, or physicochemical processes. This is why it is of importance to understand factors relating to biscuit integrity. Moisture migration is known to be linked to compromised structural integrity. The water gradients are likely a causation of sugar phase changes. Sucrose plays a vital role in biscuit structure and provides cohesion.

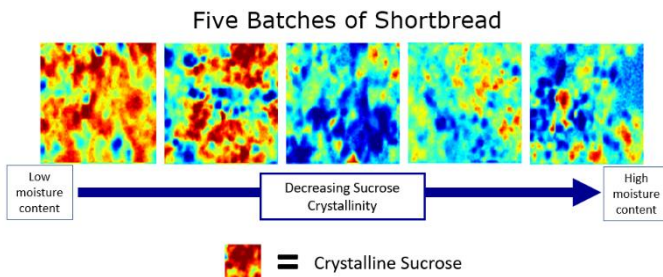


This study probes how sugar crystallinity can be used to tune biscuit integrity, this was done by varying moisture in shortbread doughs. A powerful approach was used whereby vibrational spectroscopy was coupled with rheology.

This meant that chemical changes could be correlated with structural properties.

Shortbread biscuits were baked from five batches of dough with increasing moisture contents. ATR-FTIR spectra collected of the raw shortbread ingredients found that the 3558 cm⁻¹ peak

(ν(OH)) could be used to track the concentration of crystalline sucrose, this peak was unique to the crystalline phase. FTIR-Imaging visualised the decreasing sucrose crystallinity with increasing dough water content.



The final moisture content of the baked shortbreads was found to be very similar despite the varying water content in the doughs. This confirmed that spectroscopic observations were not due to varying water contents.

The 3-point bend test showed that as the water content added to the doughs increased, biscuit hardness decreased and fracturability increased. Biscuits became easier to break and more brittle.

Overall, we found that increasing water content in biscuit dough leads to less crystalline sucrose in the baked biscuit, and lower crystalline sucrose content led to weaker and more brittle biscuits. We hypothesised that adding more water increases sucrose dissolution in the dough, leading to higher amorphous content. In this study, we have shown the effectiveness of coupling spectroscopy with rheology to provide insights into biscuit breakages.

Food Physics AGM

AGM of IOP Food Physics SIG 2023

Wed. 2nd Feb 2023, Zoom call following the 2023 on-line conference close.

MINUTES

Present: Committee: Zachary Glover (Chair), John Melrose (Treasurer), Rob Farr (Secretary), Martin Whitworth, John Bows, Becky Smith, Marco Ramaioli, Megan Povey, Daniel Hodgson, Peter Schuetz, Eddie Pelan, Arwen Tyler. Others: 10 conference attendees (total 21 on Zoom).

The Chairman welcomed all to the AGM

1. Previous AGM mins. The 2022 AGM minutes were approved.

2. Chairperson's report. Zachary Glover thanked Marco and Jenny for an excellent conference, organised under challenging circumstances, as the original plan for an in-person event had to be changed to online after the announcement of transport strikes. The room also thanked Zak for his role in making FP2023 such a success.

There were no personnel changes in the committee since the last AGM. Successes from last year included the continuing work of ProFSET (see later), and Megan Povey's taking the proposal for a "sustainable food manufacturing hub" bid through its first stage. The next stage of this process will be an interview, to be held on 8th February, and Megan pointed out that the process has highlighted what a need there is for research in sustainable food manufacturing. If the bid is successful, the work itself will start in April of this year.

Zak informed the AGM that there would be a Summer focus on engagement activities, including an effort to interact more with group members (there are 300 in the FP SIG, but only 65 attended this conference), and also some communication (for example to schools and universities) about "Who are food physicists?".

3. Reflections on the conference. As noted above, we had a very successful and enjoyable conference, with 65 attendees. There was some discussion on how to increase attendance. Peter Schuetz pointed out that many of his colleagues in manufacturing feel themselves to be engineers rather than physicists, even though the technical problems they face are often the same. Zak pointed out that wider engagement across discipline boundaries may be facilitated by our outreach activities.

The venue for the 2024 conference was discussed. Although it was felt that a mainland European venue would broaden the appeal outside the UK, this may be hard to organise for 2024. Rob Farr therefore proposed that the committee would

try to book the IoP headquarters in London for the FP2024 conference (seconded by Peter, and approved by the room).

At the suggestion of Eddie and Peter, the committee will investigate Wageningen as a possible venue for FP2025.

4. External relations and outreach. Zak presented the role and vision of the Food Physics group, “To support research into areas of physics that impact the food sector, and encourage collaborative research between academic and industrial physicists. To promote the role of physics in the food industry and ensure that it is more widely understood that this is a field in which there are opportunities to conduct interesting and important research; promoting this fact to early career physicists and policy makers. Finally, to provide a mechanism for physicists in the sector to feed into the IOP and have their views represented to funders and policy makers.”

The composition of the Food Physics Special Interest Group is still quite UK-biased, with more than 90% of members in the UK. The male:female:other ratio is 65:31:4. It was suggested that the plan to have the conference on mainland Europe in alternate years would help with the balance of nationalities.

John Bows talked about the growth of the ProFSET group to bring together the food branches of a wide range of professional bodies to be, “a single informed voice to influence and support government; provide opportunities for collaboration, and promote industry as an exciting career path”. ProFSET represents 12000 members, and aims to have an inaugural event in 2023.

Megan pointed out that ProFSET has already been extremely helpful in helping to bring the manufacturing hub proposal to its current stage. She also suggested that we should look to engage mathematics departments, particularly in the areas of systems theory and artificial intelligence.

5. Treasurer’s report. John Melrose presented the 2022 accounts. These were approved by the room (proposed by Rob Farr, seconded by Zachary Glover).

6. AOB. ZG noted that September 2023 will be the next opportunity for nominations for committee positions.

The IoP business awards are open ([Business Awards | Institute of Physics \(iop.org\)](#))

The national food strategy was also published in 2022 by the UK government ([The National Food Strategy and food security - House of Commons Library \(parliament.uk\)](#))

Rob Farr

Food Physics Committee at external events during 2022

- John Bows presented on ProFSET progress at the KTN Food Sector Group at their 4 Oct 2022 and 31 Jan 2023 meetings.
- John Bows attend the UK Metamaterials Network Conference (May 2022) and presented an overview of IOP Food Physics group.
- As a group we met several times to discuss opportunities to boost engagement in Food Physics. We discussed engagement of high school students going into STEM subject at A-level and degree level, then engaging STEM students in food topics and applications, then graduates in careers in the food industry. The entry point for this will be to prepare some materials that can be hosted on our website to steer people towards. See below for a call to action to find out how you can help with this topic.

Who are Food Physicists?

What do they do?

Can I be one too?

As a group, we would like to help aspiring scientists and engineers to answer these questions through our personal stories and experiences.

This year, we will prepare a document headlining who we are, what we do and why we believe Food Physics is a fantastic area to contribute to. However, to make this more impactful - *we need your help!*

If you are interested in completing a short form to tell us more about yourself so we can add your profile to our material [please register your interest here.](#)

Note: we plan to omit any company specific detail to avoid any conflicts of interest

Help us redefine what it means to work in physics!
Click the logo to find out more...

BIN THE BOFFIN



ProFSET Activities



John Bows and Martin Whitworth continued to represent the IOP Foods Physics group on the ProFSET (Professional Food Science, Engineering and Technology) group committee.

ProFSET's goal is to act as the group representing members of scientific, technical and engineering professional bodies in food and drink through these objectives:

- Being a single, informed voice to influence and support government, media and the public
- Providing opportunities for collaboration, knowledge sharing and cooperation across industry and academia
- Promoting the industry as an exciting career path and supporting the development, education and training of professionals

During 2022, three workstreams were established to drive the strategy behind each objective, and progress updates were provided by John Bows to the KTN Food Sector Group. These updates will be published on the ProFSET website, currently under construction. ProFSET has a [LinkedIn page](#).

An inaugural launch event is in preparation for November 2023 at the IOP HQ in London, on the theme of how ProFSET can support the vision of healthy, desirable and affordable food for all. This vision is set out in more detail in the newly updated KTN document "Creating a Sustainable UK Food System 2023". After a high-profile keynote speaker, each ProFSET group will connect their area to a theme shown the wheel below. The event will close with a facilitated panel discussion.



Source: Creating a Sustainable UK Food System 2023 - Innovate UK

ProFSET currently consists of 10 learned societies:



John Bows

IOP | Institute of Physics
Food Physics Group

FOOD PHYSICS 2024

SAVE THE DATE

January 31st- February 1st, 2024

IOP HQ, 37 Caledonian Rd, London N1 9BU

Physical event!



Finally Physics

Finally, we highlight exciting food physics stories, experiments, features ...

<http://large.stanford.edu/courses/2017/ph240/nag2/>

<http://aip-info.org/1XPS-85F5A-A873C983708029FBC9O6PYB9C597B1FE96ED8D/cr.aspx?b=12>

<https://aip.scitation.org/doi/pdf/10.1063/5.0131565>

<https://phys.org/news/2023-01-chocolate-good-lubrication.html>

https://www.rsc.org/images/IYPT2019_food_periodic_table_tcm18-252034.pdf

<http://blog.physicsworld.com/2016/11/01/physics-of-food-the-november-2016-issue-of-physics-world-is-now-out><http://trm-food.iopconfs.org/home>

Group Committee: Spanning industry & academia



Zachary
Glover
Arla Foods
(Chair)



Rob Farr
Jacobs Douwe
Egberts
(Secretary)



John Melrose
Consultant
(Treasurer)



John Bows
PepsiCo



Arwen Tyler
Leeds Uni



Daniel
Hodgson
Edinburgh
Uni



Eddie Pelan
Birmingham
Uni



Megan
Povey
Leeds Uni



Marco
Ramaoli
INRA



Beccy
Smith
Mondelez



Martin
Whitworth
Camden BRI



Gleb Yakubov
Nottingham
Uni



Peter
Schuetz
Unilever