

Santa spotted in Glasgow, captured by Phoebe Lowy, Cohort 6



Note from the Editor

Hello All! Over at Newsletter HQ we thought we'd treat you all to some early Christmas reading for the holidays, and haven't you all been busy! This is a newsletter of successes! The SOFI/SOFI² lot have had fellowships and grants flying at them and we've got publications coming out of our ears! We also have all the goss from September's outreach training in Durham and October's public communication of science training in Edinburgh. As well as massive shout out to Cohort 8 who are making their way through the case studies at the moment! So sit back with a hot chocolate in front of the open fire (fan heater for us students) and enjoy!

Fellowship success!



Dr Jenni Garden (Dept of Chemistry, Edinburgh University) is absolutely delighted to be awarded a UKRI Future Leaders Fellowship. This will assist her in pursuing her research into sustainable plastics, via new strategies to convert plastic waste into useful materials. This exciting opportunity will enable her to diversify her research and establish collaborations with academic and industrial researchers.



Dr Clare Mahon (Dept of Chemistry, Durham University) is been working in partnership with Procter and Gamble on a project aims to transform the performance/environmental footprint of an essential human activity – the cleaning of textiles and hard surfaces. The PolyForm team will develop the fundamental capabilities for sustainable, high-performance cleaning by developing new tools, models and synthetic routes to generate novel sustainably-sourced polymers for formulation within consumer goods products.



Prof Halim Kusumaatmaja's research (Dept of Physics, Durham University) focuses on the 'wetting' behaviour of liquids on solid surfaces. An important challenge is to design surfaces that repel any kind of liquid. Taking inspiration from nature, a promising approach is to harness rough, textured or porous surfaces impregnated by wetting lubricants, commonly termed as liquid infused surfaces (LIS). The aim of his EPSRC Fellowship project is to provide the much needed step change in our understanding of the physics of LIS, leading to better ways to engineer such surfaces.

EPSRC



Future
Leaders
Fellowships

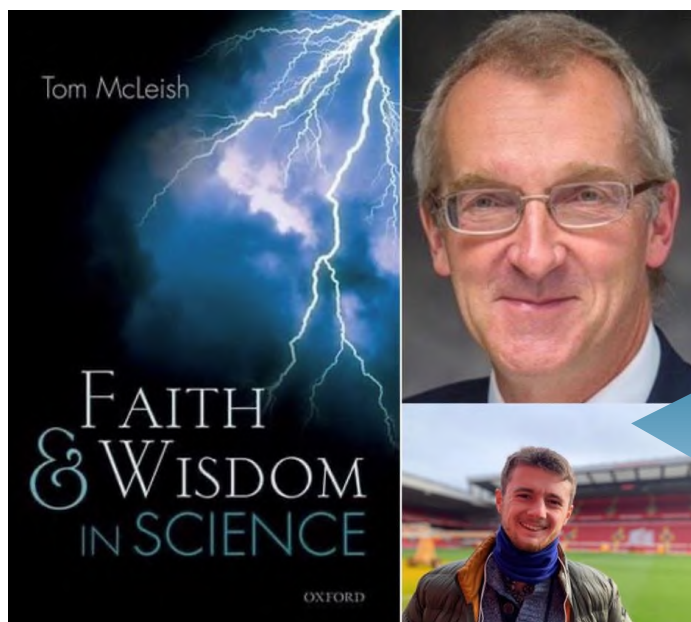
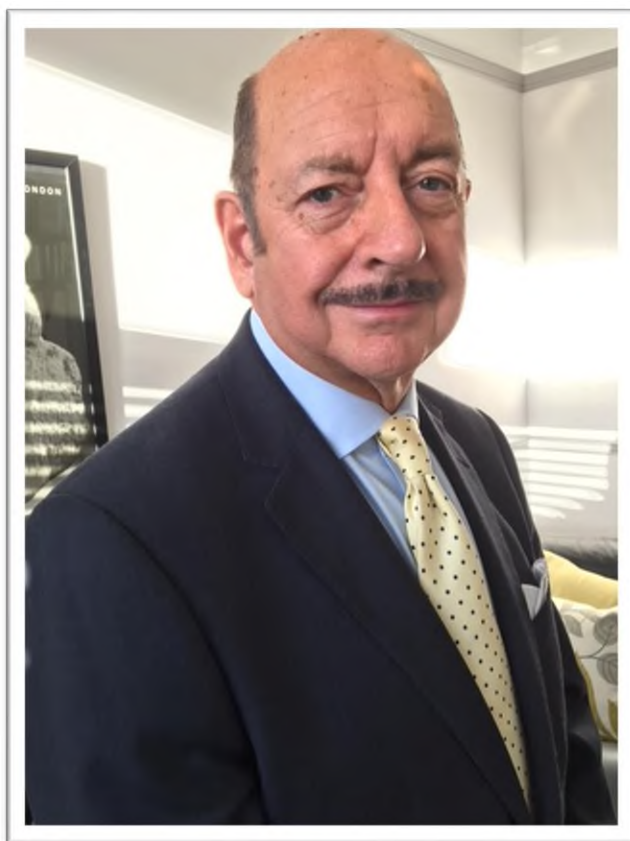
Three of SOFI/SOFI² academic staff (above) have been awarded prestigious Fellowships for their research! Jenny and Clare have been awarded the UKRI Future Leaders Fellowship worth £1.7 M and Halim has been awarded an EPSRC Fellowship worth £1.15 M. Here is what they have to say about their research and what the fellowship will mean for them.

Staff Profile: Dr David King

Dr David King is the SOFI² CDT Entrepreneur in Residence and Professor in Practice at Durham University. He is a highly experienced business executive and entrepreneur with an outstanding track record in product and process development, manufacturing, and business development. He spent over 35 years in the USA in executive level roles with major chemical and petrochemical companies including Exxon Mobil.

David's areas of expertise include research and development, business and marketing development, manufacturing and process improvements, plant start-ups, business incubators and business start-up, IP and patents, licensing, JV's and alliances. He also possesses a significant concept to commercialization track record in a range of next generation polymer products and processes. Educated in the UK and USA he holds a PhD in polymer chemistry and an MBA from Harvard Business School. His core activity will be to identify and accelerate impact within the CDT, building on three years' experience in an analogous role as Royal Society Entrepreneur in Residence based in the Chemistry Department at Durham

He has met with local impact champions and the CDT leadership team at each University to establish "rules of engagement" and has spent time in discussion with SOFI² PhD students (and supervisors) at all three sites to familiarise himself with the nature and scope of projects across the CDT, and to assist students/supervisors to develop and implement an impact plan for their research. Follow-up meetings will occur as frequently as deemed necessary/possible.



Tune in to the SOFI Sessions student podcast!

The SOFI Sessions is back with a new episode on soft matter, faith, and poetry! Seth is joined by Prof Tom McLeish, the former director of SOFI CDT, who has a lot to say about creativity, art, and theology in the life of a scientist. He also gives an exclusive performance of his new soft matter poetry...

You can listen to the SOFI Sessions via this link <https://www.podbean.com/ew/pb-n8a4m-11039d5>

SOFI² initiations: Piero and white water rafting

Arriving in Durham in late September sparked a new beginning for all of us in Cohort 8. We'd previously only talked via a Facebook group chat, so we were excited and a little nervous to meet each other in person for the first time. Introduction week was quite the change of pace compared to the summer. The amazing Piero hit us with a crash course in team building including making shapes with wooden planks as fast as possible; solving maths and colour related problems; and several engaging talks on group dynamics, which really put a lot into perspective. This was then rounded off with raft building and archery which we all really enjoyed.

Sadly, not all of our cohort made it to Durham straight away, but despite these circumstances it feels as if we've all known each other for far longer than 2 months! Mahya is still waiting for her visa and is yet to arrive in the UK but (via the power of MS Teams) has been incredibly engaged at all opportunities. We all eagerly await her arrival and plan to have a welcome meal paid in part by the prize group 3 won in the first case study.

Since then, our group has successfully completed 2 case studies! The first developed our understanding of the world of plastic recycling. Split into 3 groups we competed (in a very friendly way of course) to present a new solution to the plastic problem; and complete the "polyparrot challenge" which I shan't reveal too much about. The second case study was all about the soft matter of food, particularly ice-cream! It really demonstrated the intricacies that go into food production but I'm not sure I will ever be able to look at ice-cream the same way again. The first few weeks have been incredible, and I think I speak for all of cohort 8 that we are thankful for the hard work of Lian, Linda and everyone else for making this all possible particularly with the potential challenges that covid could bring. We look forward to exploring new challenges and perspectives in the upcoming case studies.

Written by Toby Read, Cohort 8



Cohort 8 enjoying the annual white water rafting

A new look for the Newsletter

After the roaring success of our rename competition, we decide to run another contest for our staff and students to come up with a new logo for the Newsletter. Both of the entries were brilliant (pictures to the right!)

But, we had to pick a winner so a big congratulations to Jay Marsden from Cohort 7 for the winning entry! With a special mention to Eugénia Delacou from Cohort 6 for her amazing logo too!



Communication Training

In mid-October, cohorts 5 and 6 travelled to Edinburgh to take part in the 'Researchers and the Media' workshop. The training, run by Gareth Mitchell, Robert Sternberg and Claire Ainsworth, was designed as a brief masterclass into the world of science communication. Gareth and Robert are lecturers in the Science Communication Unit at Imperial College London, and Claire Ainsworth is a science journalist, who has previously worked as a reporter and editor at *New Scientist* and *Nature* before going freelance. Split into groups, the PhD students from SOFI/SOFI² journeyed into the realm of radio, TV and news journalism for the first two days of training. In a single day, they were able to record a radio show and film a TV segment about a randomly selected news topic. This primarily entailed running around the University of Edinburgh pretending to be Professors, mad scientists, or concerned members of the public. Thankfully, Gareth and Robert were on hand to pull together the assorted audio/visual snippets into a radio show and TV piece, which can now be viewed upon request! The second day focussed on their own research, with Claire providing insightful advice on how to write an engaging piece of journalism. Differences between various news outlets were discussed, in which the students acted as pretend editors in the newsroom. On the final day of the workshop, the students travelled to the BBC radio studios in Glasgow for the main event – a session in the studio, recording their very own radio show as if 'live on air'. Afforded precisely 20 minutes, cohorts 5 and 6 performed under pressure to deliver. One of each group acted as the producer alongside Gareth, behind the sound-desk, prompting the radio show hosts *via* an ear-piece. If you are keen to hear the outcome of the workshop in Glasgow, the SOFI sessions podcast has published segments of the recordings, which can be found *via* the following URL: <https://www.podbean.com/ew/pb-sdvt-113681c>. In summary, the 'Researchers and the Media' training course was 3 days well spent. Being able to use the 'inverted triangle' to succinctly explain scientific concepts to a lay audience is a valuable skill that could prove very useful to the SOFI students in the future.

Written by Charlotte Pugsley, Cohort 5

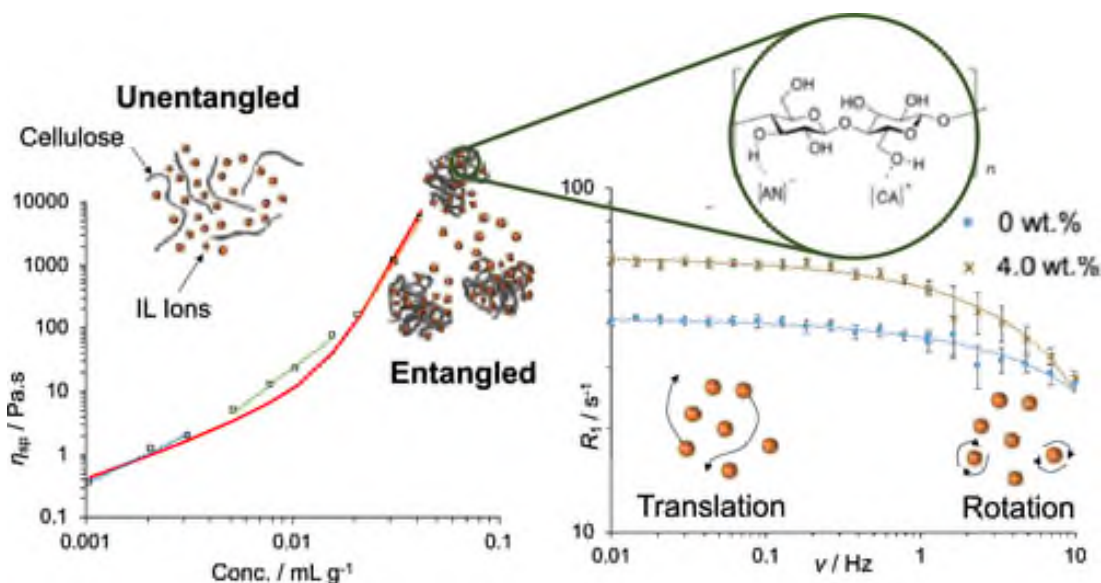


Cohorts 5 and 6 enjoying BBC Scotland recording studios where they produced their own podcasts with the help of the amazing Science Communication team!

Publications: Ionic Liquids and Cellulose Dissolution: Dissolving the Insoluble

Cellulose is often referred to as the most abundant biopolymer and is the main constituent of cell walls, as well as an important dietary fibre. During my PhD project, I have focussed on trying to utilise cellulose as an ingredient for food products, which is a huge challenge due to its insolubility in most common solvents. Working with Prof Brent Murray (Food Science, Leeds) and Prof Mike Ries (Physics, Leeds), we have developed a method for producing cellulose microgels (CMGs), which are dispersible in both water and oil and therefore more suitable for use in food systems. This involved the novel use of an ionic liquid, or room-temperature salt, which can dissolve cellulose material that is then reprecipitated to form a gel.

We recently studied the cellulose-ionic liquid solutions in detail, to gain further understanding of the gel properties. To our knowledge, this specific ionic liquid has yet to be characterised. We used a combination of rheology and fast-field cycling NMR spectroscopy to unravel the properties of the solutions, allowing us to compare and contrast bulk and microscopic features. Polymeric entanglements were discovered to have a significant contribution to the solution viscosity, but almost no effect on local interactions. This work has given further insight into the properties of the CMGs and will be used to optimise our method for functionalising cellulose.



Viscosity flow curve from rheological analysis (left) showing the increase in polymer entanglements with an increase in cellulose concentration; relaxation time as a function of frequency (right), showing the contributions of translational and rotational motion across the frequency range.

Link to paper: <https://pubs.acs.org/doi/10.1021/acs.jpcb.1c02848>

Written by Kate Lefroy, Cohort 5

Dyneval – An Edinburgh Spin-out!

SOFI/SOFI² academic Dr Tiffany Wood (Edinburgh University) and her colleagues have been integral to recent success of biotechnology start-up: Dyneval. Tiffany (CEO) has secured >£1.8 million of funding from investors as the company expands its team and gears up to launch its first product (Dynescan) in Jan 2022. Dynescan will improve cattle conception rates, which have fallen by 20% in recent decades, costing the average UK dairy farmer around £37,000 per year. Dynescan is a portable instrument that provides reliable measurements of livestock semen quality. Independent analysis suggests that if conception rates can be elevated by 27%, the carbon footprint of farming could be reduced by up to 20%.



Tiffany Wood, Vincent Martinez (Dyneval) with bovine friends!

A mysterious shell: Eugénia Delacou (Cohort 6) on Swiss Radio!

Brachiopods are marine animals resembling mussels. Their shell is quite remarkable, as it goes from being hard and brittle when dry to soft and malleable when placed in water. When the shell is wet, it is even possible to



A mysterious brachiopod! fold it in two without damaging it. The process is reversible and happens in a matter of a few minutes. Understanding this bizarre behaviour took a considerable study from an international team, with researchers from 6 different countries. Our results were published in Nature Communications in September 2021:

<https://www.nature.com/articles/s41467-021-25613-4>

The secret lies in the shell composition. It is made of a hybrid material: an organic matrix and mineral nanocrystals. When the shell is immersed in water, the organic matrix swells, allowing the nanocrystals to rearrange and slide relatively to each other when under a loading stress. This adaptable material could potentially lead to innovative applications in material science.

I was contacted by Silvio Dolzan from Radio Télévision Suisse (RTS) to participate in CQFD, a radio show discussing progresses in science and medicine in an accessible way. The replay can be found on the RTS website!

A long awaited return to Durham!

In September cohorts 6 and 7 headed back to Durham for outreach and presentation skills training. The week began with three days of outreach training, each team was set the task of creating an engaging workshop for a class of primary school children on any scientific topic.

Unfortunately, due to COVID19 this had to be done via zoom which required an extra level of creativity from the teams. A wide range of different science topics were covered: from how vaccines work to the search for life on other planets. The last two days of the week were spent developing presentation skills, this included workshops on how to create and present a successful academic poster.

This week was also great opportunity for the cohorts to make up for lost time when it comes to socialising. Some of the cohort can be seen below enjoying a lovely cup of tea, back together for the first time since the pandemic.



Members of Cohort 6 and 7 meeting for the first time at the gorgeous Tealicious Tea Room in Durham

Written by Jenny Harnett, Cohort 7



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