SOFI CDT
EPSRC Centre for Doctoral Training in Soft Matter and Functional Interfaces

SOFI² CDT
EPSRC Centre for Doctoral Training in Soft Matter for Formulation and Industrial Innovation

NEWSLETTER

July 2020

CDT students, past and present from SOFI, CP3, Formulation Engineering and Additive Manufacturing at the end of the 2nd student-led InterCDT conference. Featuring a SOFI stress ball ™, courtesy of Seth Price.
See the conference article on page 4!

EPSRC Engineering and Physical Sciences Research Council
Durham University
THE UNIVERSITY of EDINBURGH
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Note from the Editor (and Manager)

Hi everyone! I bet you forgot the newsletter was a thing! Apologies that this edition is so late. I'm sure you can appreciate the reasons why – Lian said I should blame him. For the historians reading this newsletter in the future, google 2020 and grab a coffee. I hope that, despite everything, you are all trying to look after yourselves and are coping the best that you can.

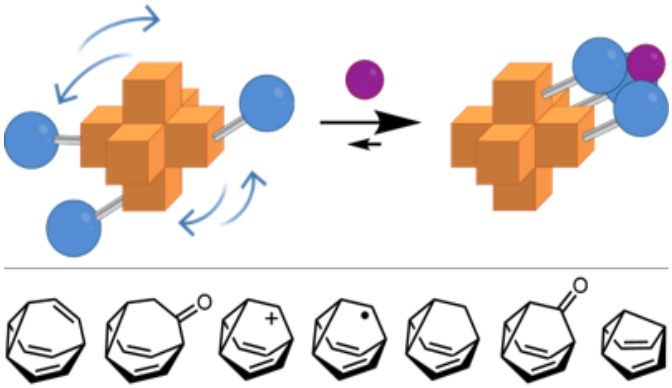
A few of the news pieces in here are now hazy memories, but since you lovely people have taken the time to write these articles, I'm publishing them now - better late than never. Make sure you read through to the last page for the current stuff (a reminder for the online SOFI Showcase, 9th/10th July and some thoughts for the next newsletter), as well as arguably the best article of this edition...

Shapeshifting Molecules: Burhan's Recent Publication

Burhan Hussein (Cohort 5) has recently collaborated on a publication in Chemical Science along with his supervisor, Paul McGonigal, and co-workers. The paper is entitled, 'Shapeshifting molecules: the story so far and the shape of things to come' and is described in the abstract below.

Shapeshifting molecules exhibit rapid constitutional dynamics while remaining stable, isolable molecules, making them promising artificial scaffolds from which to explore complex biological systems and create new functional materials. However, their structural complexity presents challenges for designing their syntheses and understanding their equilibria.

We have recently published a minireview showcasing recent applications of highly dynamic shapeshifting molecules in sensing and distinguishing complex small molecules and detailed insights into the adaptation of tractable bistable systems to changes in their local environment. The current status of this field is summarised and its future prospects are discussed.



A. N. Bismillah, B. M. Chapin, B. A. Hussein P. R. McGonigal. Shapeshifting molecules: the story so far and the shape of things to come. *Chem. Sci.*, **2020**, *11*, 324–332. DOI: 10.1039/c9sc05482k

Image left: Abstract image from the Bismillah et al. paper. (Top) schematic representation of shapeshifting scaffold. (Bottom) series of shapeshifting molecules discussed in review.

Media and Communications Workshop in Edinburgh

Cohorts 3 and 4 of SOFI took part in a Media and Communications workshop at the University of Edinburgh, run by Gareth Mitchell from Imperial College London. Over two days, the cohorts gained insight into how the media works and practised media techniques such as interviewing, script-writing and editing. Inter-cohort teams created their own TV and radio news clip and wrote a press release about their own research to target non-specialist audiences. The workshop culminated in the opportunity for the cohorts to record a podcast at BBC Scotland in Glasgow on their current PhD research. As communication is a key professional skill, this workshop was particularly useful, but it also helped the cohorts gain a deeper insight into how research is taken from the laboratory into the living room.

*Written by **Rashmi Seneviratne***

Sophie Ayscough & Natasha Rigby at the Media & Communications Workshop.

SOFI Staff Profile: Robert Pal

I am a Royal Society University Research Fellow and Associate Professor in the Department of Chemistry, Durham University. My multidisciplinary research is mainly physical chemistry working on the border of organic chemistry and biophysics. My group's research portfolio is centred around bio-imaging and is uniquely diverse. It capitalises on and embraces organic and organo-metallic chemistry, physical chemistry and biophysics and we strive to take advantage of our recent research interests in the design and study of targeted light activated molecular nanomachines (Nature, 2017).

My own research activities are an important part of my teaching as they provide an excellent opportunity to transmit knowledge and inspire the next generation of scientists. My favourite teaching aspect is public engagement. As chair of the department's public engagement committee and member of the Royal Society Summer Science Exhibition committee, the ethos of public engagement has always been to 'Educate and Entertain'. We are very fortunate to provide popular outreach activities such as 'NanoBattlebots', and we have over 10 000 participants attending them per year.

Outside of work. I enjoy spending time with my family, especially going on mini-expeditions with my 10-year-old son, Tobi, which mostly involve chasing our elusive finned friends.

Dr Robert Pal chasing elusive finned friends.

SOFI Student profile: Adele Parry

Hi! I'm Adele Parry from Cohort 5. I'm based in Leeds and work with Helen Gleeson, Stephen Evans and Richard Bushby investigating the use of liquid crystal droplets as biosensors. I'm currently exploring the effect of membrane-disrupting toxins on the lipid monolayer of our liquid crystal droplets. A disruption of the monolayer should cause a change in alignment of the liquid crystal, visible under crossed polarisers. I have also previously investigated the immobilisation of liquid crystal droplets in hydrogels and the potential for this to be used in a biosensing device. I have loved my time in SOFI Cohort 5 so far and am looking forward to undertaking my new role as the SOFI outreach representative!

SOFI Alumnus: Rahul Chacko

My PhD was based at Durham University under the supervision of Prof. Suzanne Fielding. I studied dense, non-Brownian suspensions. These are systems composed of solid particles immersed in a fluid, with particles large enough for Brownian diffusion to be negligible on experimental timescales. Materials of this kind can exhibit interesting behaviours, such as a discontinuous increase in viscosity as a function of shear rate (as seen when running across corn starch in water). Importantly, the absence of Brownian motion means that many of the tools, grounded in statistical physics and used to study other soft materials, cannot be applied to dense suspensions. In the absence of theoretical tools, phenomenological approaches can be used to develop models for these systems, and most of my PhD involved the study of such models.

I am currently working as a post-doc for Prof. Andrea Liu at the University of Pennsylvania on the dynamics of avalanches in glasses as part of the Simons Collaboration on Cracking the Glass Problem. Glasses are disordered solids with extremely long relaxation times. I am using simulations to study the process by which plastic events in a glass influence the occurrence of future plastic events by altering the system structure.

SOFI at the 2019 Inter-CDT Conference in Durham

This year's inter-CDT conference, the second time round for this student-centred event, was expanded to 4 different Centres for Doctoral Training (CDTs). Hosted by SOFI, with special thanks to Natasha Rigby, Rachel and Sarah Goodband, the conference was held in Durham in the Department of Chemistry. With PhD students from SOFI, CP3 (Complex Particulate Products and Processes), Formulation Engineering and Additive Manufacturing, this year's conference was set to include a huge variety of topics and themes for us to learn about. The two-day event included longer 20-minute talks as well as five-minute flash talks and a poster presentation.

After-dinner quiz at the Marriott hotel.

Notable talks include the prize-winning flash talk by our own Daniel Day (Cohort 3) about his work on self-assembling block copolymers in selective solvents, which had a sly Christmas theme running throughout, as well as the 20-minute talk by prize-winner Chris Jones (Formulation Engineering) who talked about his study of the deposition of solid enhancers onto clothes using positron emission to track tracer particles in an imitation drying machine. A special mention must also go to Seth Price (Cohort 5, SOFI), who confused the audience for several minutes as he presented an almost completely black slide in order to introduce the relevant application of his work into modelling an evaporating droplet in a pixel.

Our last set of talks of the conference were from a graduate from the Formulation Engineering CDT, now working at Johnson Matthey, followed by a talk from the founders of Plastech (from SOFI!), both discussing the pros and cons of their different careers post-CDT.

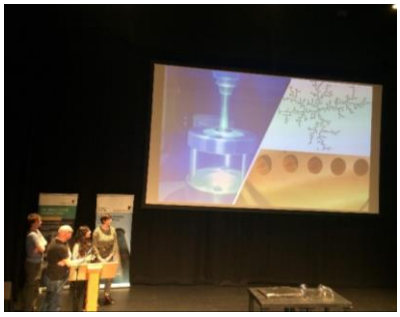
As well as the many interesting and varied talks, we enjoyed a night of revelry with dinner and a quiz at the Marriott hotel. I'm sure we will never forget that 364 gifts were given in the 12 days of Christmas carol, that 'Elvet' means 'swan' and what a close-up photo of a sponge looks like.

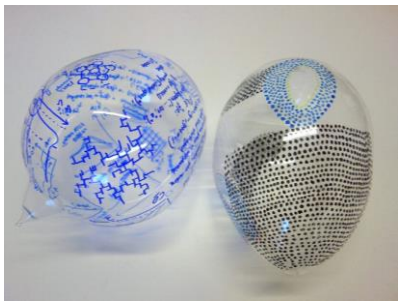
CDT students, past and present from SOFI, CP3, Formulation Engineering and Additive Manufacturing at the end of the conference.

Thank you to everyone who spoke and presented posters during the event, as well as a big thank you to the SOFI organisers and other CDT reps (Emma Jones and Christopher Jones from Formulation Engineering and Bradley Tyson from CP3). The 2020 inter-CDT conference will be held in Leeds, hosted by the CP3 CDT, so hopefully we'll see you all there next year!

Written by
Charlotte Pugsley

Leeds Creative Labs: Bringing Art and Science Together





My colleagues, Dr Ben Hanson and Christa Brown, and I in the Dougan research group at Leeds, took part in a programme to stimulate collaborations between researchers and creative professionals. The programme, known as 'Leeds Creative Labs: Bragg Edition', pairs up keen academics and artists with mutual interests and subsequently leaves them to explore an unstructured space and see where it takes them. There is no expectation of an output, so the outcome of the collaboration at the concluding showcase could take any shape!

We were matched with the visual artist, Steve Hurrel, and the collaboration brought about wide-ranging discussions with a focus on the sheer amount of 'negative space' in the tangible work of the researchers and even how this extends to human social networks. For Steve, the idea that "most of everything is nothing" posed a conceptual challenge that he wanted to try and visualise. One result of this was the materialisation of workings on glass baubles (pictured bottom right), the objects of which, themselves, are predominantly 'empty' space. After presenting our outcomes at the summative showcase (pictured top right) along with the other partnerships, our team ended with the provocation, "*Without focusing on the negative space, how many connections are we not making?*".

Check out this article to better understand this abstract collaboration and find out more about the Creative Labs!

*Written by **Kalila Cook (Cohort 5)***

Photo top right: Me summarising my work alongside Ben Hanson, Steve Hurrel and Christa Brown at the Creative Labs showcase. Photo bottom right: Workings on blown-glass forms by me (L) and Steve Hurrel (R).

SOFI Showcase 9th/10th July via Zoom

The showcase is going ahead (online) and will feature an exciting series of talks from SOFI students, external invited speakers and hopefully alumni. There will also be a virtual poster session with cash prizes! If you haven't already, you can still register for the event here.

SOFI/SOFI² in Lockdown: Life Goes On…

Believe it or not, SOFI/SOFI² under lockdown has still been active. Cohorts 4, 5 and 6 each came together virtually to take part in a project called 'Survival in Extraordinary Times' (facilitated by team-building guru, Piero Vitelli) with some fantastic outcomes. Outreach is still going on, with activities such as #homesofting challenges from SOFI in Leeds and the strange toilet roll phenomenon, #LOOminaries (created by Prof. Lorna Dougan and Dr Paul Beales), really taking off.

We hope to have a lockdown edition soon with further details on these activities and more! I am sure that some of you will also have lockdown stories that we'd love to feature. So please keep the submissions coming (contact below) and keep an eye out for the next newsletter!

Keep up with all the SOFI news online! Find us on

SOFI CDT SOFI² CDT www.dur.ac.uk/soft.matter/soficdt/

Facebook: facebook.com/softmattercdt/
Twitter: twitter.com/sofi_cdt.
Instagram: instagram.com/sofi_cdt/

Feedback and submissions for future issues welcome!
Please contact Kalila Cook at py13kc@leeds.ac.uk