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CDT Conference 2021

A Series of Varied Perspectives on Our 2D Futures

15 & 16 July 2021

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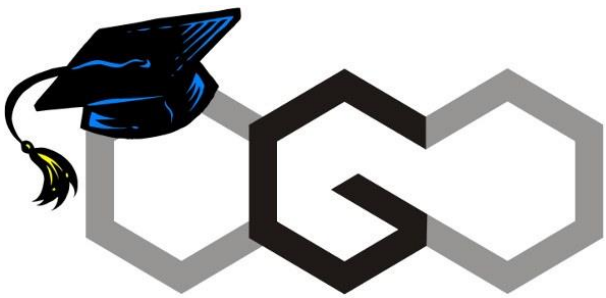


Message from the CDT Conference Organising Committee

Over the past few weeks, we have worked hard to organise an event to bring us all together, albeit virtually. In this shorter online version of our annual CDT conference, we are stepping away from the usual format of academic presentations and posters from the students. Instead, we are aiming to spark more general conversations about the field of 2D materials that will be insightful and interesting, regardless of our individual disciplines.

On the first day, we will hear from Prof Mario Caironi, who will give us a fascinating introduction to the emerging field of 'Edible Electronics'. We hope that you will find the innovation and creativity of his work inspirational. We will also have a panel discussion titled 'What is our 2D future?'. We have invited panellists from a range of academic and commercial backgrounds to share their thoughts on the future of 2D materials, and our place in that future as early career scientists.

On the second day, we will be hearing from Dr Jessica Wade who will be sharing her vast experience with public engagement and outreach. This is fundamental to the advancement of science and technology, so we hope you will find this both interesting and informative. For our final session of the conference, we have invited some of our alumni from both Manchester and Cambridge CDTs who will join us for an informal panel discussion on their varied career experiences following their PhDs.

We hope that this event will offer something a bit different to other online conferences you may have attended in the past year.

Thank you, and enjoy the conference!

Pietro, Andrew, Katie, Max, Hugo and Aayush

General Conference Information

Before the conference

As soon as possible, please register your intention to attend the conference at:
https://www.2dconference.co.uk/register.html

We have set up a Slack workspace for use before and during the conference. For those unfamiliar with Slack, it is a platform that enables group or individual discussions across different topics or 'channels'. We will be using the Slack workspace share conference information and updates. If you need help accessing or using Slack, please contact any of the organising committee.

During the conference, we will be holding two panel discussions. Information about the panel topics and panellist backgrounds can be found in this program. We would really appreciate it if you could submit questions for the panellists ahead of the conference. Questions can be submitted via the dedicated Slack channel, or emailed to any of the conference organising committee.

During the conference

This year, the conference will be held online via Zoom. There will be a single meeting ID for the entirety of the conference, which is found on the last page of this program.

The sessions will officially **begin at 2pm each day**. The Zoom meeting will be open to **join from 1.45pm** – please try to join the Zoom meeting before the 2pm start. Please ensure your microphone switched off when you are not speaking to minimise background noise.

If you have any questions for our speakers or panellists during the conference, these can be typed into the Zoom chat box. Alternatively, you can use the 'raise hand' Zoom function, and the chair of the session will invite you to switch on your microphone to ask your question.

After the conference

We may find the Slack workspace set up for this conference is a great way of improving communication between CDT students both within and between universities. The Slack workspace will continue to be accessible after the conference ends, so please feel free to make use of this!

In the (hopefully) unlikely event that next year's conference will be held online again, it would be great to hear your suggestions for improving the organisation of the event or ideas for sessions to include. These can be sent to any of the organising committee via email or a direct message on Slack.

Timetable

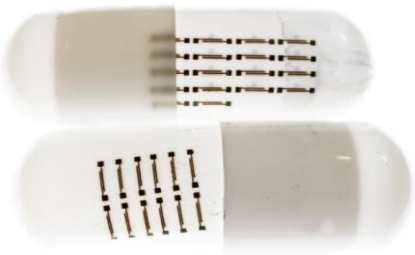
15 July 2021	
13:45–14:00	Join Zoom meeting
14:00–15:00	Welcome 'Towards Edible Electronics', talk by Prof Mario Caironi
15:00–15:15	Break
15:15–16:10	Panel: 'What is Our 2D Future?'
16:10–16:20	Break
16:20–17:00	Panel: 'What is Our 2D Future?' (Continued)
16 July 2021	
13:45–14:00	Join Zoom meeting
14:00–15:00	Welcome and message from Outreach Reps 'Science and storytelling: how who we talk about matters', talk by Dr Jessica Wade
15:00–15:15	Break
15:15–16:10	Panel: 'CDT Alumni'
16:10–16:20	Break
16:20–17:00	Panel: 'CDT Alumni' (Continued) Closing message

Talk Abstracts and Speaker Biographies

‘Towards Edible Electronics’

Prof Mario Caironi
Center for Nano Science and Technology @PoliMi, Istituto Italiano di Tecnologia
mario.caironi@iit.it

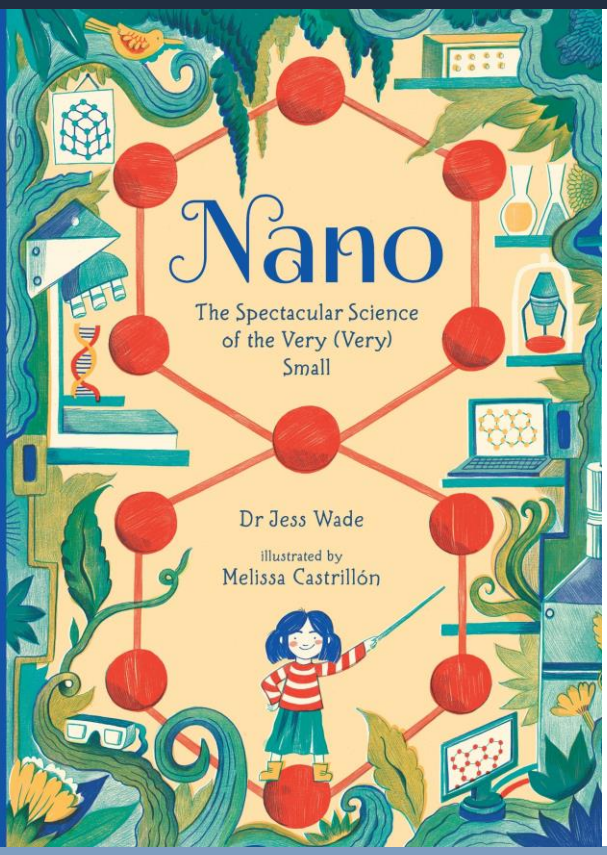
Enhanced biocompatibility and ease of processability of conjugated organic materials have spurred the work of the bioelectronics community towards the development of an increasing number of organic electronic biosensors and bioactuation devices. A further inspiring opportunity stems from the use of natural or bioinspired materials to develop edible electronic systems, composed of devices that can be safely ingested and degraded within the body after performing its function. Edible electronics could potentially target a significant number of biomedical applications, such as monitoring patients’ compliance to medications, and of applications in the food packaging as well, by providing ingestible smart tagging of perishable goods. Here I will first give an introduction to this emerging field and propose long-term opportunities in terms of environmentally friendly smart technologies, remote healthcare monitoring, along with the challenges ahead. Then, I will report on our recent progress in the development of edible circuitry and components, towards future integrated edible electronic systems.



Mario Caironi obtained his Ph.D. in Information Technology with honours at Politecnico di Milano (Milan, Italy). In 2007 he joined the group of Prof. Sirringhaus at the Cavendish Lab. (Cambridge, UK) as a post-doc, working for 3 years on high resolution printing of downscaled organic transistors and circuits, and on charge transport in high mobility polymers. In 2010 he was appointed as Team Leader at the Center for Nano Science and Technology@PoliMi (CNST) of the Istituto Italiano di Tecnologia (IIT, Milan, Italy). In 2014 he entered the tenure track at the same institution, obtaining tenure in 2019. He is currently interested in solution based high resolution printing techniques for micro-electronic, opto-electronic and thermoelectrics devices, in the device physics of organic semiconductors based field-effect transistors, in biomedical and/or implantable sensors and electronics for the healthcare. He is a 2014 ERC Starting grantee and a 2019 ERC Consolidator grantee

‘Science and storytelling: how who we talk about matters.’

Dr Jessica Wade
Department of Materials, Imperial College London
jessica.wade@imperial.ac.uk



Despite women leading the development of the Moderna, Astra Zeneca and Johnson & Johnson COVID-19 vaccines, only half of UK adults can name a woman scientist. That’s not entirely surprising given the GCSE national curriculum for science doesn’t include a single woman’s name. Jess will talk about how who we talk about matters and how we can make our science classrooms more inclusive spaces. She’ll also discuss her efforts to increase visibility of scientists from historically marginalised groups on Wikipedia, her research in materials science and nanotechnology, the power of social media for early career researchers and her new picture book ‘Nano, the Spectacular Science of the Very (Very) Small’.

Dr Jess Wade is an Imperial College Research Fellow working in the Department of Materials at Imperial College London. Her research considers new materials for optoelectronic devices, with a focus on chiral organic semiconductors. She previously worked as a postdoctoral researcher in the Fuchter group at Imperial College London, where she optimised these chiral systems such that they can absorb/emit circularly polarised light as well as transport spin-polarised electrons. For her PhD Jess concentrated on new materials for photovoltaics and the development of advanced characterisation techniques to better understand their molecular packing. Outside of the lab, Jess is involved with several science communication and outreach initiatives. She is committed to improving diversity in science, both online and offline.

Panel 1: ‘What is Our 2D Future?’

During this panel, we aim to discuss the future outlook of the field of 2D materials, and more importantly, the consequences of this to us as early career researchers. We will also hear the panellists’ thoughts on the current job market in the field and how PhD graduates can make themselves standout. Our panellists have a range of backgrounds and experiences, so we are excited to hear their various perspectives on these topics.

Prof Irina Grigorieva

Professor of Physics and Director of Graphene NOWNANO CDT

Irina Grigorieva is Professor of Physics at the University of Manchester, leading an experimental research programme on electronic and magnetic properties of two-dimensional materials and their heterostructures. Her current research is focused on atomically thin superconductors, either exfoliated from bulk superconducting crystals or made into superconductors by intercalation, and applications of graphene and other two-dimensional crystals in spintronics. She is also closely involved in research on the properties and applications of atomically thin membranes and nanochannels created using van der Waals assembly. Every year since 2017 she has been named as a 'highly cited researcher' in physics, in the top 1% worldwide by citations in her research field.

Irina joined the Condensed Matter Physics group at the University of Manchester in 2001, having completed her PhD in Condensed Matter Physics in 1989 at the Institute of Solid State Physics (Russian Academy of Sciences, Chernogolovka, Russia) which was followed by several postdoctoral positions in the UK, Belgium and the Netherlands.

She is the founding director of the North-West Nanoscience Doctoral Training Centre (2009-2013) and of the EPSRC Centre for Doctoral Training in Science and Application of Graphene and Related Nanomaterials (Graphene NOWNANO) that started taking students in 2014.

Sir Kostya Novoselov

Professor (Department of Materials Science and Engineering) and Nobel Laureate

Sir Kostya Novoselov graduated from the Moscow Institute of Physics and Technology with a MSc degree in 1997, and was awarded a PhD from the Radboud University of Nijmegen in 2004 for work supervised by Andre Geim. He is best known for isolating graphene at The University of Manchester in 2004, and is an expert in condensed matter physics, mesoscopic physics and nanotechnology. In 2010, he won the Nobel prize in physics jointly with Andre Geim for isolating graphene. He was knighted in 2012, and is a fellow of the Royal Society. Since 2019, he has been a Professor at the Centre for Advanced 2D materials at the National University of Singapore.

He has been awarded with numerous prizes, including the Nicholas Kurti Prize (2007), International Union of Pure and Applied Science Prize (2008), MIT Technology Review young innovator (2008), Europhysics Prize (2008), Bragg Lecture Prize from the Union of Crystallography (2011), the Kohn Award Lecture (2012), Leverhulme Medal from the Royal Society (2013), Onsager medal (2014), Carbon medal (2016) and Dalton medal (2016), among many others.

Adrian Nixon and Rob Whieldon

Directors, Nixene Publishing

Adrian Nixon and Rob Whieldon are directors of Nixene Publishing Ltd. They regularly present about graphene and 2D materials at high profile public and private events. NASA recently invited them to present at the commercial space lecture series hosted by the AMES Research Center.

Adrian Nixon is the Editor of the Nixene Journal. He is a Chartered Chemist and Member of the Royal Society of Chemistry and has over 20 years' experience working in Industry. Adrian is a Board member of the International Space Elevator Consortium (ISEC).

Rob Whieldon was introduced to the world of graphene and 2D materials in 2017 becoming the Operations Director of Nixene Publishing Ltd. in 2018 looking after the operational side of the business. He was a judge for the first Graphene Hackathon at the Graphene Engineering Innovation Centre and more recently he has been tutoring on the Commercializing Innovations module at the NowNano Centre for Doctoral Training at the University of Manchester.

Nixene Journal

About Nixene Publishing

Nixene Publishing is an affiliate member of the Graphene Engineering Innovation centre (GEIC), Manchester UK. Nixene Publishing is the global leader in the aggregation and analysis of 2D material research and commercialisation worldwide and publishes the Nixene Journal every month since its founding in 2017.

Our monthly Journal is subscription based, with some of the world's biggest companies as customers. Nixene Publishing maintains an independent position that allows us a unique and unbiased perspective on graphene innovation, application and technology.

We also publish special editions. Recently we completed a commission for a Political Action Committee in the US to create a journal edition to brief Senators, Representatives and policy makers of the US Government - Graphene: Manufacturing Applications and Economic Impact.

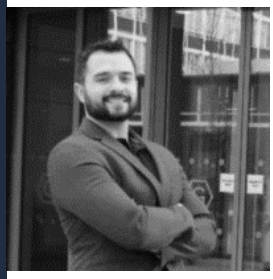
Alex Corrêa and Danilo Mariano

Gerdau Graphene

Alex Corrêa is the General Manager of Gerdau Graphene. In this position, he has full P&L responsibility over the company, leading its overall strategy, product development and global sales.

Alex has an ambidextrous background, having passed through commercial and operational roles in large and small scaled companies, national and multinational. In his previous position at Suzano, also an intra-entrepreneurial front, Alexandre led its Fluff Business Unit between 2015 and 2020 promoting the conversion of its first factory and its global sales. Previously he also served as the COO of Lacoste in Brazil and had an 8-year career at Unilever.

Alex holds a degree in Electrical Engineering from Poli-USP and a specialization in Finance from FEA-USP. He holds an MBA from Fundação Dom Cabral, with a specialization module at Cheung Kong Graduate School of Business (CKGSB - China).



Danilo Mariano is a mechanical engineer with an specialization on automotive, master's in management and technology in productive systems and MBA in business management.

Working since 2007 in the product development, research and businesses development for the automotive and steel industries, Danilo has worked for major auto parts organizations. With years of international experiences - living / working in the UK, Germany, USA and Japan - he had the chance to assimilate different cultures and the opportunity to constantly adapt and value diversity, as well as studying at excellent institutions such as the University of Michigan in the USA, the Technical University of Munich in Germany and USP in Brazil. Currently responsible for project management in the R&D team at Gerdau Graphene, he works from the GEIC where he has the chance to implement, develop and test many material technologies through innovation and collaboration using graphene.

About Gerdau Graphene

Gerdau Graphene is a company launched by Gerdau through Gerdau Next, its new business arm. In 2021, we began operating with a focus on the development and sale of products with graphene applications, seeking to create more value for our products and clients by drawing on the mechanical properties of the nanomaterial.

It all started in 2019, when Gerdau formed a partnership with the Graphene Engineering Innovation Centre (GEIC) at the University of Manchester, UK to conduct research on graphene. At the time, the company joined a select global group of companies with exclusive chairs at the research institute that is a global reference on the subject.

Today, Gerdau Graphene already is positioned as a major producer of graphene in the Americas. Based in São Paulo and with a branch office in the United States, the company is planning other technological solutions for industrial sectors in Brazil and countries in North America.

Panel 2: CDT Alumni

Our CDT Alumni panellists have taken various career paths following their PhD, including academic research, and commercialisation of science. In this informal panel, we will hear about how they got to where they are now, and how their PhD's set them up for their careers. We will learn what aspects of the CDT they have treasured the most, as well as what we can do to make the most of our time at the NOWNANO CDT.

Dr Robyn Worsley

Research Fellow, Advanced Materials Research Group, University of Nottingham

Robyn Worsley received both her MEng and PhD degrees from the University of Manchester. Her background is multidisciplinary, beginning with a Chemical Engineering undergraduate and master's programme, during the course of which she worked for 12 months as a Process Engineer within a Cadbury manufacturing plant. She subsequently joined the Graphene NOWNANO CDT, expanding into PhD research within the field of Nanoscience. Her industrially-funded doctorate project, which was centred around the inkjet printing of two-dimensional materials for the fabrication of flexible electronic devices, developed her research interests across the subjects of Chemistry, Engineering and Physics.

Currently employed as a Research Fellow at the University of Nottingham, she works between the Advanced Materials Research Group and the Centre for Additive Manufacturing, as part of the Intelligent Structures for Low Noise Environments partnership. Her work is focused on the use of continuous hydrothermal production techniques to explore the scalable synthesis of nanoparticles with compelling electronic properties, and the subsequent incorporation of such materials into 3D-printable ink formulations for the additive manufacturing of smart components with embedded functionalities.

Dr Fiona Porter

Johnson Matthey

I joined the CDT in 2015 and worked with Dr Peter Quayle and Prof Steve Yeates in the Department of Chemistry. I had a great time doing my PhD but had always been interested in the commercialisation of science so I moved onto the commercial global graduate programme at Johnson Matthey in September 2019. The grad programme consisted of three 8-month rotations in the business. I started in the business development and innovation team where my objective was to build a business case for whether JM should invest in green hydrogen technology. I got to travel to different sites in the UK, went to a research centre in The Netherlands and even went to Department for Business, Energy & Industrial Strategy to advise on green hydrogen. The project was a success and kicked started the Green Hydrogen Start-Up. My other major project was implementing IT systems in the Fuel Cells business, which is quite different from chemistry! But I've gained experience in project management and how to manage difficult relationships and conflicting stakeholders. From September I will be moving into a permanent role in the Green Hydrogen Start-Up doing a customer facing role in commercial strategy.

Dr Sebastian Leaper

Founder and CEO, Watercycle Technologies

Seb is a CDT alumni and Founder & CEO of University of Manchester spin-out company, Watercycle Technologies. He has spent the majority of his career in Manchester, having been drawn to the city by its music scene, nightlife and an interesting new material that had just brought the city the 2010 Nobel Prize in Physics.

He moved to Manchester in 2011 after hearing about this and enrolled on an MEng in Materials Science & Engineering at the University. He spent his third year working as a packaging technologist for Mars Drinks in Basingstoke and spent his final year making and testing graphene oxide hydrogels. Following this, he was encouraged to stay at Manchester to start a PhD and was later awarded a place on the CDT.

After winning the Eli & Britt Harari Graphene Enterprise Award in his first year, Seb's research direction was steered towards commercialising his graphene-based membranes for applications including desalination, lithium extraction and wastewater treatment.

Now actively raising investment, he is looking to build out a team to work on a collaboration project with Cornish Lithium (UK) aiming to build and install the first carbon neutral lithium extraction system at their R&D facility in Penryn.

Dr Julio Ríos de le Rosa

Innovation Manager, Biomedical Research and Innovation Institute of Cadiz

Julio was born in Algeciras, southern Spain. He spent his university years in Seville and Barcelona, where he developed an interest in nanomedicine. This led him to complete a PhD in Nanoscience and Pharmacy at the University of Manchester as part of the NOWNANO DTC, where he researched drug delivery strategies for RNA therapeutics (siRNA, mRNA). He then went into an AstraZeneca-sponsored postdoc on nanomanufacturing with a vision of jumping to industry. Six months later he joined Highlight Therapeutics - a nano-immune-oncology, clinical-stage spin-off from the Spanish National Cancer Research Centre. Having worked closely with the company's patent attorney and business development team, Julio decided to move away from the bench to specialise in technology transfer. He worked at two world-leading offices: Manchester Innovation Factory (formerly UMIP; University of Manchester) and Cambridge Enterprise (University of Cambridge). Currently he is the Innovation Manager of the Biomedical Research and Innovation Institute of Cadiz (INiBICA), which covers the activity of the 5 hospitals and all primary care centres across the Cadiz province. He also provides advisory and mentoring services to Oxentia (Oxford's Global Innovation Consultancy), supporting cohorts from LATAM to help their projects contribute to the United Nations sustainable development goals.

Panel 2: CDT Alumni

Cambridge Alumni TBA

Useful Links and Contacts

Link for Registration

Please register your intention to attend the conference at:

https://www.2dconference.co.uk/register.html

Slack workspace

An invitation to join the conference Slack workspace will be emailed out after registration is complete. Slack can be accessed via both web browsers and the mobile app. The Slack workspace can be joined using this link:

https://join.slack.com/t/graphenecdtco-xze3417/shared_invite/zt-sprwtkv7-dTrJ6PSFxLDmBP9deqdyWg

Zoom link

The Zoom link for the conference is:

https://zoom.us/j/96460487568

Password: conference

This will be used for all sessions of both days.

Contact information of the organising committee

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