

Inspiring and Training the Next Generation



2021/2022

Inspiring and Training the Next Generation

The Faraday institution is committed to developing a dynamic and diverse pool of talent for the fields of energy storage and battery technology. The national need for energy storage researchers is evident and growing to support research and development for a UK domestic battery manufacturing industry and its value chain. Aware that next-generation energy storage technologies will come from future scientists and engineers, the Faraday Institution is committed to developing a dynamic and diverse pool of talent.

The organisation plays an active role in inspiring and attracting young people, particularly those from groups historically underrepresented in STEM (science, technology, engineering and maths), to consider careers in the field. It is building the talent pool at a number of levels:

- By providing a range of **continuing professional development** opportunities for early career scientists and engineers as they build their researcher identity and forge their career pathways.
- By delivering a bespoke **PhD training programme** to enhance researchers' skills, knowledge and aspirations, equipping

them for future careers in academia, industry or policy making.

- Through an **undergraduate attraction programme** via quality internships.
- **STEM outreach**, inspiring young people early about STEM careers to help influence career aspirations.

For more details of the Faraday Institution's training programmes, please contact Fran Long (fran.long@faraday.ac.uk), Head of Training and Talent Development.

Inspiring and Training the Next Generation

500+

researchers in the community

280

delegates attending the Early Researcher Career Conference

71

PhD researchers through the PhD training programme

100+

additional PhD researchers affiliated with Faraday Institution projects

205

undergraduate FUSE interns

12,000+

young people engaged with through the Faraday Fully Charged Battery Box

Researcher Professional Development

Skills development lies at the heart of the work of the Faraday Institution. The past year has seen the creation of the Faraday Early Career Committee, with members advocating for the training needs of peers and supporting career progression through a range of initiatives. The Vitae Researcher Development Concordat informs best practise.

Training Budgets

The Faraday Institution has continued to provide a training budget of £2,000 per researcher per year to be spent on professional development along with an allocation of a minimum of 10 days of professional development per year. Additionally, this investment in professional career development now extends to affiliated PhD researchers, project managers and project staff members (for example, research assistants), an initiative that has been spotlighted by the Professional Research Investment and Strategy Managers (PRISM) Network as an example of good practice.



'The Faraday Institution providing a generous training budget, not just to funded PDRAs, but to anyone affiliated to the projects is both unusual and very welcome. Supporting all the members of the FI community to access the best training, not only for their current roles, but for where they see themselves in the future is invaluable to support the growing battery industry in the UK.'

Dr Alex Kersting, Faraday Institution Programme Manager, Training Champion and EDI Champion at the University of Cambridge, Degradation Project

Training Champions

Each major research project designates a Training Champion, who works with the Faraday Institution to actively promote training opportunities and professional development throughout their multi-institutional research teams. Collectively, over the past year, this group has spearheaded several retreats and workshops to further increase visibility and uptake of the training offering.

To encourage greater utilisation of training budgets, the first Faraday Career Week was held in April 2022, which raised the profile of training and professional development, and focused on the need for and benefit of career development reviews.

Individual researchers are encouraged to undertake an annual review with their supervisor following a process that facilitates discussion and planning of career goals and training needs. As a result of careers week and the increased involvement of project Training Champions, an increased proportion of researchers are benefiting from these coaching conversations and structured action plans.



The Faraday Career Week 2022 focused on researcher professional development to include increasing knowledge and skills.

Early Career Researcher Committee

The past year has seen the successful creation of a community-led Early Career Researcher Committee, with members advocating for the training needs of peers and supporting career progression through a range of initiatives. It is made up of eight early career academics, research fellows and PhD researchers from multiple universities and projects.



ECR Conference

Organised by the Early Career Research Committee, the first in-person [Early Career Researcher \(ECR\) conference and training event](#) was held in the autumn of 2022. The event, held in Warwick enabled development opportunities both for the committee and attendees, in the focus areas of networking, learning, contributing and acting.

In what proved to be an energetic, large in-person event, more than 280 ECRs were able to reconnect with their peers after two years dominated by lockdowns. 70+ researchers presented research

talks and 45 presented posters at the event, giving opportunities for many researchers to take the next step in developing their confidence at delivering presentations in a supportive environment.

The event had a strong careers focus – with insight from researchers at JLR, Rho Motion, start-ups and a careers café. Attendees also had the opportunity to participate in a choice of six high quality training workshops (including in project management, design thinking, grant writing and scientific writing from training providers [Nature](#), [BodyTalk](#), [Skillfluence](#) and [Scriptoria](#)).



Faraday Masterclasses

In 2022, 9 webinars on a range of topics were led by experts for the Faraday community:

Lithium in Cornwall: The foundation for a responsible UK battery supply chain

with Rebecca Paisley of Cornish Lithium

Technoeconomic analysis of the battery sector:

An introduction for researchers

with Simon Price of Exawatt

Successfully taking batteries from the lab to the road:

An industrial perspective from Jaguar Land Rover

with Peng Xiao of Jaguar Land Rover

How can we deliver confidence in research data?

Baselining performance for the future

with Gareth Hinds of National Physical Laboratory

The power of MATLAB: Harnessing this tool for battery modelling

with Mona Faraji-Niri of WMG

Towards a zero carbon grid: Unlocking the value of batteries

with Roger Hollies of Arenko

A 200-mile race: Can we charge fast enough?

with Tom Heenan of Gaussion

Creating accessible scientific content and posters

with Ben Watson and Georgia Mann of All Able

Battery roundup of 2022

with Yen T. Yeh of Volta Foundation



The graphic features a blue background with the text 'FARADAY MASTERCLASS' at the top. Below this is a row of three images: a portrait of Peng Xiao, the Faraday Institution logo, and the Jaguar Land Rover logo. The main text reads: 'Successfully taking batteries from the lab to the road: an industrial perspective from Jaguar Land Rover with Peng Xiao'. Below this, it says 'Wednesday 23rd March, 2pm' and a list of hashtags: '#BATTERYTECHNOLOGY #PIONEERING #COLLABORATIVE #MAKINGADIFFERENCE'.

Faraday Masterclass 31: Successfully taking batteries from the lab to the road: an industrial perspective from Jaguar Land Rover with Peng Xiao

Empower

The Faraday Institution's [EMPOWER](#) programme for [women](#) led by [Skills4](#), maintains a focus on gender diversity priorities in the community. Data show that women are less well represented than men in the scientific workforce, particularly in more senior positions. This 6-month programme is now equipping a second cohort of 12 women for career success.



'The training opportunities offered by the Faraday Institution were extremely valuable during my postdoctoral research. I undertook courses in project and programme management. I also took part in the EMPOWER programme. The skills I developed during these training activities have helped me handle complex multidisciplinary projects in my new role.'

Nive Kulkarni, Ford Motor Company, formerly LiSTAR project

PhD Training Programme

To support a UK domestic battery manufacturing industry and its value chain there will be increasing need for newly qualified PhDs per year. Ongoing engagement with industrial partners affirms that the demand for PhD trained researchers with battery technology expertise, an appreciation for industrial requirements and a breadth of transferable skills that will enable flexibility and integration between university and industry efforts is present and will continue to grow.

Since launching in 2018, the Faraday Institution doctoral training programme has funded 71 studentships. A further 100+ affiliated PhD researchers are valued members of Faraday Institution research projects.

The Faraday Institution doctoral training programme leverages partner universities and encompasses technical, commercial and transferable skills with the aim of training the next generation of battery experts to become successful leaders in their fields. Graduates will become 'agents of change' in their careers, working to reduce barriers and being able to professionally bridge many divides.

Networking opportunities and bespoke battery-related courses, delivered by experts, are offered to ensure students are equipped with the in-depth knowledge and skills needed

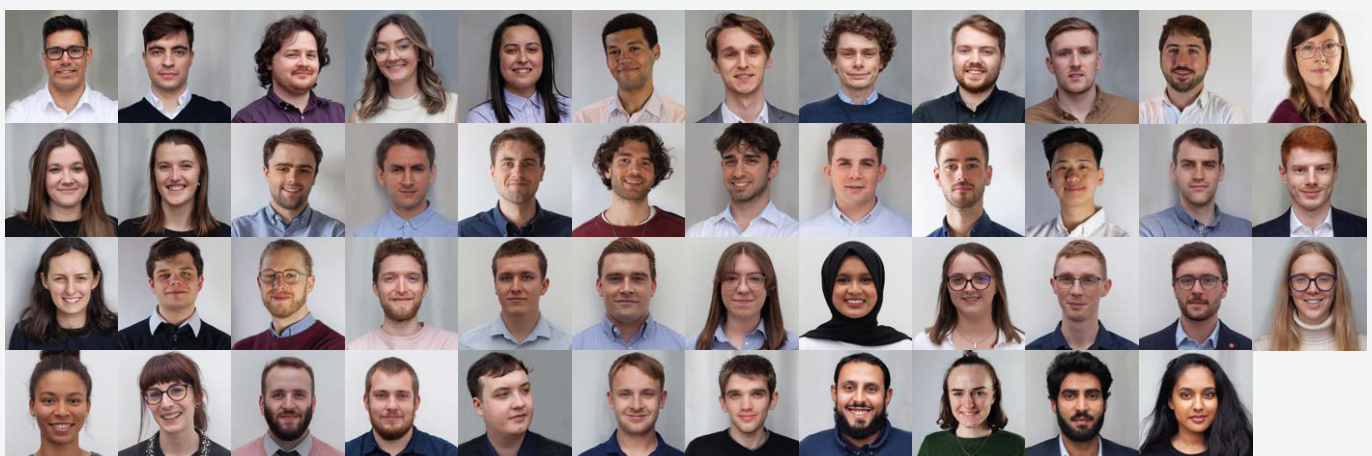
to maximise the potential of their research projects. The organisation also brings in expertise from training partners to deliver sessions in e.g., presentation skills, project management, negotiations, and thesis and grant writing.



[The Faraday Institution PhD Training Programme Guide](#)

Meet the Faraday Institution PhD researchers

To find out more about the research activity, skills and career aspirations of all the Faraday Institution PhD researchers, see the [Faraday Institution Cluster PhD Researchers](#) area of the website.



PhD researchers



The 2022 Graduation Celebration Event held at the Royal Society

First Cohort Success Stories

In May 2022, the achievements of the first 13 Faraday Institution PhD researchers were recognised at a graduation celebration. Achievements of the cohort include:

- 65 papers published
- 1354 citations
- 2 patents filed
- 1 start-up launched

The group brings passion, skill and innovative ideas to the battery sector, which is richer for their talents. To hear the first-hand accounts of their PhD journeys, watch the [Faraday Institution PhD cohort 1 successes video](#).



Faraday Institution Cohort 1 PhD researchers socialising at a networking event



Daisy Thornton sets up a new lab at Imperial College London during her PhD

Internships

As part of the training programme, PhD researchers are encouraged to undertake a three-month internship to explore opportunities that further their skills, grow their networks and/or showcase future battery related careers and enhance their projects.

To date, internships have been linked to academia, industry and policy making, and include:

- | | |
|---|---|
| AMTE Power | Benchmark Mineral Intelligence |
| Jaguar Land Rover | Exawatt |
| Williams Advanced Engineering | Rho Motion |
| Parliamentary Office for Science and Technology | Lambda Energy |
| UKRI Policy Internship at the House of Commons – Environment, Food and Rural Affairs (DEFRA) Select Committee | Finden |
| | Gaussian |
| | Warwick Manufacturing Group (WMG) |

To find out more read, [PhD internships: equipping researchers for career success](#)



'I became aware of opportunities and options that I didn't realise I had.'

Victor Riesgo Gonzalez, PhD Researcher, Degradation Project, University of Cambridge

PhD Career Pathways

Dana Thompson

To industry



Faraday Undergraduate Summer Experience (FUSE) intern 2018

Faraday Institution PhD Researcher at the University of Leicester

Project: ReLiB
Specialism: Recycling
Project Title: Selective dissolution and recovery of metals from mixed metal oxide systems

[Battery researcher profile video](#)

[Completed a 3-month internship at Jaguar Land Rover](#)

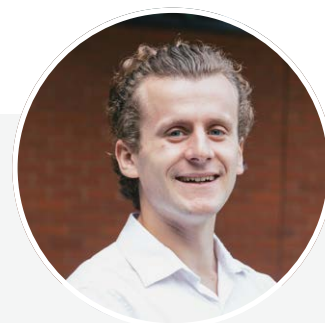
Battery Cell Developer at Jaguar Land Rover

'Being part of the Faraday Institution has been pivotal in securing my position as a Battery Cell Developer at Jaguar Land Rover.'

Dana Thompson

Kieran O'Regan

To spin-out



Faraday Institution PhD Researcher at the University of Birmingham

Project: Multi-scale Modelling
Specialism: Battery chemistry
Project Title: Bridging electrochemistry experiments with models

Including an internship at [Benchmark Mineral Intelligence](#)

Faraday Institution Entrepreneurial Fellowship

Co-Founder of [About Energy](#), a spinout with battery modelling capability to speed-up battery development in the UK

Awarded a Faraday Institution Entrepreneurial Fellowship – [watch the video](#)

Place on the [Advanced Propulsion Centre UK Technology Developer Acceleration Programme \(TDAP\)](#)

Analyst at Benchmark Mineral Intelligence

'The Faraday Institution funded PhD has provided the opportunity to work closely with scientists whose research has real impact on battery technology and electrification. The PhD training programme has been significant in giving me the skills and confidence to pursue a similar path. I am now commercialising my PhD research through About:Energy, with the aim of transforming battery development around the world.'

Kieran O'Regan, Co-Founder About:Energy

Alice Llewellyn

To academia



Faraday Institution Affiliated PhD Researcher at UCL

Project: Battery Degradation
Specialism: Electrochemistry
Project title: In-situ x-ray diffraction methods for understanding the degradation mechanisms in lithium ion batteries

[Researcher spotlight](#)

Attended WMG Battery School

Research Fellow at UCL

Working on the Faraday Institution Seed Project, Operando pair distribution function computed tomography for advanced batteries

'Being part of a national project has allowed me access to an extensive network of researchers to collaborate with...I am really excited to be part of the seed project and I am hoping the technique we are developing for operando battery studies will be successful.'

Alice Llewellyn

John-Joseph Marie

To policy



Faraday Institution PhD Researcher at the University of Oxford

Project: SOLBAT
Specialism: Materials synthesis
Project Title: Electrochemistry of solid-state cells

[Battery researcher profile video](#)

Included an internship at [Rho Motion](#)

Energy Storage Analyst in the Faraday Institution head office team

'The relationship that the Faraday Institution has with industrial partners is extremely beneficial to members of the PhD cohort, presenting us with many opportunities to work directly with industry. These opportunities have allowed me to explore different areas of the battery industry and have helped me decide where to go next. Since August 2022, I have been working with the Faraday Institution as an Energy Storage Analyst, where I can combine my interest in policy making and energy storage research.'

John-Joseph Marie

Diversifying the pool of talent in the PhD cohorts

By building a research community of people from a multitude of backgrounds, research disciplines and career stages, with the range of ideas, opinions, life experiences and knowledge they bring, research excellence will flourish. As such there has been a commitment to widen participation and diversify in the Faraday Institution PhD cohorts.

The organisation embedded best practice for advertising and recruitment across the research programme, which, along with successful undergraduate attraction initiatives, has led to

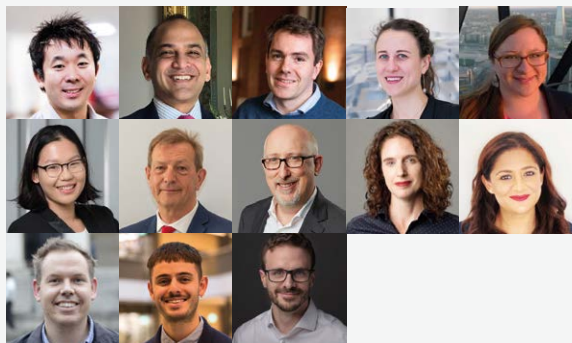
increased diversity. For example, with regards to gender, 15% of cohort 1 were female with this rising to 50% in 2020 and 67% in the 2022 cohort.

2018	2020	2022
15% female	50% female	67% female

Training and Diversity Panel

The Faraday Institution’s Training and Diversity Panel advises the organisation on how best to achieve its ambitious aims of creating a dynamic, diverse, driven pool of talent to work in the battery technology sector of the future. The panel brings a wealth of knowledge and expertise from academia, industry and the public sector.

In March 2022, multiple panel members came to the end of their term, and following an open recruitment process, the Faraday Institution formed a refreshed and diverse panel led by Dr Billy Wu of Imperial College London. The panel brings new voices, perspectives and a wealth of expertise that will inform future planning.



Faraday Institution Training and Diversity Panel

The Faraday Student Committee

Representatives from each of the Faraday Institution cohorts meet 3-4 times a year to share the student voice and advocate for topics identified by their peers. The committee also leads on undergraduate attraction initiatives such as [Battery Day](#).

PhD Training Partners

The PhD Training Programme is supported by a wealth of specialist training providers including: [Skillfluence](#), [BodyTalk](#), [Newcastle University](#), [Warwick Manufacturing Group \(WMG\)](#), [Imperial College London](#), [Kindred](#) and [IMECHE](#).

Talks and tours are provided by: [Williams Advanced Engineering](#), [Diamond Light Source](#), [ISIS Neutron and Muon Source](#), [Envision](#), [Nissan](#), [Jaguar Land Rover](#), [Turntide](#), [UKBIC](#) and [CPI](#).



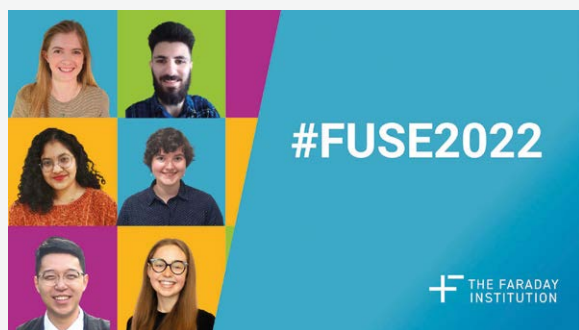
PhD researcher Ruihe Li, Research Associate Dr Mayur P Bonkile and FUSE intern Shengyi (Amelia) Hu at Imperial College London

Undergraduate Attraction

The battery sector needs the diverse skills and talents of many, across a wide range of STEM subjects – from physics to mathematics, chemistry to engineering. A range of Faraday Institution initiatives serve to attract and inspire undergraduates toward energy storage careers and to showcase the opportunities the battery sector has to offer.

Faraday Undergraduate Summer Experience (FUSE) Internship Programme

Over the past 4 years, the Faraday Institution has funded a total of 205 FUSE internships, giving undergraduate students the opportunity to undertake paid 8-week placements with battery researchers. Alongside the research, FUSE interns have a series of in-depth cohort calls focusing on an introduction to the Faraday Institution, a day in the life of a battery researcher, a discussion on what it is like to undertake a PhD focusing on battery technology, and why batteries are an exciting field in which to work. At the end of the placement, students produce scientific posters detailing their work.



Poster prize winners for 2022

In 2022, the FUSE cohort consisted of 55 students from 13 universities, with gender parity reached in this intake. The poster prize winners for 2022 were:

Scientific content and context

Maud Tregear

University of Oxford, SOLBAT

Eliminating the anode: the next step for solid-state batteries?

Research progress and findings

Punit Jivan

University of Leicester, ReLiB

Debondable adhesives for improved pack disassembly

Visual appeal

Zayd Islam

University of Leicester, ReLiB

The importance of design for disassembly of lithium-ion batteries

Student Science Communicator

Reka Keresztes

Imperial College London, Multi-scale Modelling

Environmental impact and economical analysis of sodium and lithium-ion battery manufacturing

Condition	1	2	3
10 wt%	-27%	+11%	+3%
25 wt%	-6%	+15%	-5%
50 wt%	-20%	+15%	-8%

Condition	1	2	3
10 wt%	+1day	+1day	+1.5day
25 wt%	+1day	+1day	+10minutes
50 wt%	+1day	+1day	+10minutes



'I have thoroughly enjoyed my summer as a FUSE intern and found it to provide a great insight to the research being conducted in the battery sector. I feel like I have grown as a scientist and massively improved my skill set.'

Tabitha Seymour, University of Birmingham, Chemistry



'It is a growing industry which is instrumental for a greener future, so definitely a potential career. For me it was a varied internship experience, which exposed me to both the battery industry and a start-up environment.'

Sigurd Bjerkhaug, Imperial College London, Materials Science & Engineering



'I have gained valuable insight into the working world of academia, developed my abilities as an independent worker, and met lots of interesting and brilliant scientists.'

Benjamin Dawson, University of Edinburgh, Chemical Physics

'The FUSE internship is an extremely valuable programme, giving highly motivated and talented students a chance to improve existing skills, learn new skills, and to apply them to cutting edge research problems.'

Stephen Price, Finden

'This experience has been, for me, both a crucial insight and a rewarding journey, which I would wholeheartedly recommend.'

Arun Atwal,
University of Cambridge, Physics



'I really enjoyed the work, and it made me sure that I want to do a PhD in the battery technology field and after that, I want to pursue a research career.'

Reka Keresztes, University College London, Chemical Engineering

The FUSE internship programme is proving an effective feeder programme for the Faraday Institution PhD Programme with 20% of cohort 5 having undertaken a FUSE internship in a previous summer and others taking up PhD opportunities within the Faraday Institution community.

'I was inspired to pursue a career in the battery sector after having undertaken a Faraday Undergraduate Summer Experience (FUSE) Internship in 2021 looking at electrolyte materials.'

Emmanuelle Hagopian,
Faraday Institution PhD Researcher, Cohort 5





Battery Day 2022

National Battery Day provides an opportunity for the Faraday Institution research community to showcase battery careers to undergraduate students. In February 2022, a series of online and in-person events were held to inform and inspire students about the sector with the Faraday Student Committee taking the lead. 100 people joined the call live and 443 people have viewed the recording of the event.

Formula Student

Formula Student is an undergraduate engineering competition, organised by the Institute of Mechanical Engineers (IMechE) and held annually at Silverstone. Student teams from around the world design, build, test, and race a small-scale Formula-One style racing car. In a new collaboration for 2022, the Faraday Institution sponsored the electric vehicle garages

and presented the Best Newcomer EV award. The event was attended by over 135 teams with 3,046 students overall.

The judging team of members of the Faraday Institution and industry partners, Williams Advanced Engineering, were delighted to present the Best Newcomer EV award to the Southampton University Formula Student Team. The judges commented that they were incredibly impressed with what they had achieved in one year, with their motivation and clear planning to realise their ambitions. The team showed resilience to overcome challenges and continued to learn in the process.

'It was profoundly rewarding to see everybody's hard work recognised.'

Adomas Lebedys, Head of Hardware,
[Southampton University Formula Student Team](#)



The judges with the winning Southampton University team

STEM Outreach

Research shows that inspiring young people early about STEM careers helps to build science capital and raise STEM career aspirations. To date, the Faraday Institution has trained 57 PhD researchers as STEM Ambassadors, to equip them with the skills to present about their research in a relatable, engaging and creative way to a wide range of audiences. As society races to solve the challenges faced in reaching Net Zero, the opportunities for young people to forge fulfilling careers in the battery sector and help to find pioneering solutions are abundant.

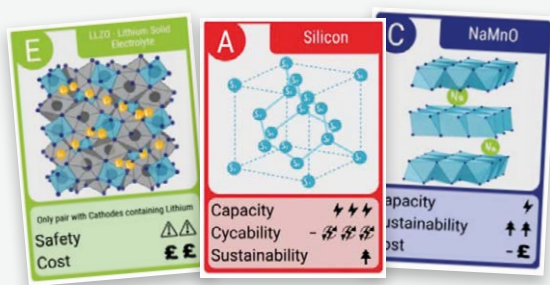
Battery-Related STEM Resources

Over 12,000 young people have now had the opportunity to learn about batteries through engaging with the [‘Faraday Fully Charged Battery Box.’](#)

A wealth of other creative, high-quality battery STEM [resources](#) have been designed by Faraday Institution researchers, interns and other groups to support outreach activities.



Faraday Fully Charged Battery Box



2021 FUSE intern Catie Kohler designed and built a battery card game as a curriculum-linked resource for secondary school students

‘It’s important to bring the work we do as researchers into the classroom. Yes, we’re scientists but it’s vital to tell people what we do so it’s not hidden away, so that it’s out there for the children to see. That’s powerful.’

Elizabeth Driscoll, University of Birmingham

Royal Institution 13+ event ‘For Your Inspiration: Powering our sustainable future.’

Aimed at 13-17-year-olds, but accessible to a wide audience, in March 2022 an interactive careers event, co-curated by the Royal Institution and the Faraday Institution, gave attendees the opportunity to learn about the need for better batteries alongside showcasing the range of skills that can contribute and career opportunities available. Fran Long, Head of Training and Talent Development at the Faraday Institution, Dr Billy Wu, Senior Lecturer at Imperial College London, and a panel of four PhD researchers gave an engaging exploration of the world of batteries.

[A video of the theatre event](#) has been published with amplification into schools through partner organisations.



Faraday Institution PhD researchers inspiring the next generation in the iconic Royal Institution lecture theatre

Public Engagement and STEM Outreach Award

As part of the Faraday Institution Community Awards, announced in November 2021, researcher Elizabeth Driscoll at the University of Birmingham was recognised for her creative work reaching a wide audience through input as a STEM Ambassador, with partners including the Royal Society of Chemistry. [Watch the video](#) to learn how Elizabeth is inspiring the next generation of battery scientists.



Elizabeth Driscoll conducting outreach activities at St Nicholas First School

Making an Impact

The Faraday Institution is a collaborative, multidisciplinary research community, bringing scientists and engineers together across the UK. As a national programme and a delivery partner for the Faraday Battery Challenge, we are focused on accelerating breakthroughs in energy storage technologies to benefit the UK in the global race to electrification.

● **University partners**

▲ **Industrial partners**



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