

Faraday Institution Conference 2024
The Battery Breakthrough: From Research, to Scale-up, to Manufacturing
Tuesday 10 September | The Frederick Douglass Centre, Newcastle University

09:30-11:00	Registration and refreshments Ground Floor Atrium
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11:00-11:10	Welcome Address G.41, Ground Floor CEO, Faraday Institution
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11:10-11:20	Host's Welcome G.41, Ground Floor Professor Brian Walker, Deputy Vice-Chancellor, Newcastle University
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11:20-11:30	Opening Address G.41, Ground Floor The Right Hon MP Ms Chi Onwurah and Labour MP for Newcastle upon Tyne Central Shadow Minister Science, Research & Innovation
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11:30-12:20	G.41, Ground Floor Academic Plenary Talk Professor Kristin Persson, Daniel M. Tellep Distinguished Professor of Materials Science and Engineering, University of California, Berkeley
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12:20-14:00	Lunch Ground Floor Atrium
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14:00-16:00 *Parallel Session* G.41, Ground Floor
Session | Next Generation Chemistries and Technologies (1)
Chaired by: Dr Yang Xu, Associate Professor at the Department of Chemistry, UCL

A revolutionary paradigm is required to design next-generation batteries, delivering step changes in achieving low cost, high energy density, high power, long lifespan, and superior safety. Coordinated efforts in fundamental research and advanced engineering are needed to address the challenges that next-generation batteries are currently facing. The UK battery ecosystem is well placed to take a leading role in taking innovations to realise an array of applications of next-generation batteries. including but not limited to sodium-ion/potassium-ion, multivalent ion, solid state, lithium/sodium sulphur, and metal batteries. This session will cover recent advances in materials discovery, mechanistic understanding, cell component designs and performance development of these batteries.

14:00-14:40	Invited talk: Professor Magda Titirici, Chair in Sustainable Energy Materials, Imperial College London <i>Beyond Li: Na and Al anodes: progress, challenges and perspectives.</i>
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14:40-15:00	Selected Talk
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15:00-15:20	Selected Talk
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15:20-15:40	Selected Talk
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15:40-16:00	Selected Talk
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14:00-16:00 *Parallel Session* G.56, Ground Floor
Session | Modelling and Engineering
Chaired by: Dr Ioan-Bogdan Magdau, Lecturer in Computational Data Driven Chemistry, Newcastle University

Computational modelling and data-driven methods play a pivotal role in overcoming energy storage challenges. This session will provide a timely discussion of the latest advances in both atomistic and continuum scale simulations and machine learning/AI approaches for improving battery performance. The underlying atomistic factors that determine the performance of battery materials and devices regarding ion transport, stability and interfaces will be assessed. The necessary advancements required in data-driven approaches to tackle the remaining challenges facing the design and development of batteries will also be presented.

14:00-14:20	Selected Talk
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14:20-14:40	Selected Talk
14:40-15:20	Invited talk: Professor Greg Offer, Professor in Electrochemical Engineering, Imperial College London
15:20-15:40	Selected Talk
15:40-16:00	Selected Talk

14:00-16:00 *Parallel Session* G.06, Ground Floor
Session | Sustainability, Recycling and Re-use (1)

Chaired by: Professor Oliver Heidrich, Professor of Civil and Environmental Engineering, Newcastle University

A sustainable battery industry requires consideration of all parts of the life-cycle of the battery – from materials choice and sources, manufacturing routes, to pathways for recycling and reuse. This session will cover recent advances in our understanding of sustainability from life-cycle analyses, sustainable materials synthesis and manufacture (including design-for-recycle) as well as progress towards the separation, recovery and reuse of materials from end-of-life cells.

14:00-14:20	Selected Talk
14:20-14:40	Selected Talk
14:40-15:00	Selected Talk
15:00-15:20	Selected Talk
15:20-16:00	Invited talk: Dr Simon Lambert, Senior Lecturer, Newcastle University

16:00-18:00	Exhibition Session Meet our exhibitors here. Ground Floor Atrium
16:00-18:00	Poster Session Kindly sponsored by CPI Rooms 117 & 118 on First Floor, Rooms 214, 215 & 216 on Second Floor
19:00-21:30	Welcome Networking Reception Kindly sponsored by Benchmark Mineral Intelligence Stephenson Building, Newcastle University, Newcastle upon Tyne, NE1 7RU Catch up with existing colleagues and make new acquaintances over drinks and canapes at our welcome networking reception held on the first evening of the conference. Located in the bright and open atrium at the Stephenson Building on the Newcastle University Campus, delegates will be treated to an evening of networking in the newly refurbished centre where future engineers, researchers, designers, and visionaries come together to collaborate and tackle world challenges together.

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The Battery Breakthrough: From Research, to Scale-up, to Manufacturing

Wednesday 11 September | The Frederick Douglass Centre, Newcastle University

09:00-09:50	G.41, Ground Floor Industry Plenary Talk
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09:50-10:30	Morning Refreshments Ground Floor Atrium
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10:30-12:30 G.41, Ground Floor

Session | From Innovation to Market

Chaired by: Professor Mohamed Mamlouk, Professor of Electrochemical Engineering, Newcastle University

For battery research to have a real-world impact it needs researchers, leaders, business people and entrepreneurs who can put breakthroughs on a path to commercialisation. In this session invited speakers will discuss their inspirational journeys from research lab to successful spin out companies in the battery space. They will highlight the challenges they faced along the way, how they were overcome, their motivations and rewards, and the importance of the help they received.

10:30-11:00	Invited talk: Professor Dame Clare Grey FRS, Geoffrey Moorhouse Gibson Professor, Department of Chemistry, University of Cambridge and Co-founder and Chief Scientist at Nyobolt
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11:00-11:30	Invited talk: Dr Seb Leaper, Co-founder and CEO at Watercycle Technologies
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11:30-12:00	Invited talk: Dr Monica Marinescu, Reader and Associate Professor at The Electrochemical Science & Engineering Group at Imperial College London and Co-founder of Ionetic
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12:00-12:30	Invited talk: Dr Kieran O'Regan, Co-Founder & COO of About:Energy <i>The 0.5% - Challenges and Opportunities of Research Commercialisation</i>
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12:30-14:00	Lunch Ground Floor Atrium
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14:00-16:00 *Parallel Session* G.41, Ground Floor

Session | Next Generation Chemistries and Technologies (2)

Chaired by: Dr Pooja Kumari, Research Fellow, WMG - University of Warwick

A revolutionary paradigm is required to design next-generation batteries, delivering step changes in achieving low cost, high energy density, high power, long lifespan, and superior safety. Coordinated efforts in fundamental research and advanced engineering are needed to address the challenges that next-generation batteries are currently facing. The UK battery ecosystem is well placed to take a leading role in taking innovations to realise an array of applications of next-generation batteries. including but not limited to sodium-ion/potassium-ion, multivalent ion, solid state, lithium/sodium sulphur, and metal batteries. This session will cover recent advances in materials discovery, mechanistic understanding, cell component designs and performance development of these batteries.

14:00-14:40	Invited talk: Dr James Dawson, Reader in Energy Materials, Newcastle University <i>Beyond the Bulk: Atomistic Modelling of Ion Transport and Interfaces in Next-Generation Batteries</i>
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14:40-15:00	Selected Talk
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15:00-15:20	Selected Talk
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15:20-15:40	Selected Talk
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15:40-16:00	Selected Talk
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14:00-16:00 *Parallel Session* G.56, Ground Floor

Session | Materials, Electrode and Battery Characterisation

Chaired by: Professor Libby Gibson, Professor of Energy Materials, Newcastle University

Understanding the performance and degradation of battery materials requires complementary characterisation approaches that can separate out the complex changes that occur within different battery components and at the

interfaces between them. This session will explore the development of new characterisation tools, as well as the adoption of techniques from other fields to better understand the origins of battery performance. This will include efforts to develop in situ/operando methods, software and simulation tools to interpret the data collected, and advanced electrochemical methods for extracting key material properties. Approaches for monitoring battery health will also be covered, including integrated sensor platforms and low-cost methods for the online detection of degradation processes.

14:00-14:20	Selected Talk
14:20-14:40	Selected Talk
14:40-15:20	Invited talk: Professor Paul Shearing, Professor in Sustainable Energy Engineering and Director of The ZERO Institute, University of Oxford
15:20-15:40	Selected Talk
15:40-16:00	Selected Talk

14:00-16:00 *Parallel Session* G.06, Ground Floor

Session | Sustainability, Recycling and Re-use

Chaired by: Dr Phoebe Allan, Associate Professor in Materials Chemistry, University of Birmingham

A sustainable battery industry requires consideration of all parts of the life-cycle of the battery – from materials choice and sources, manufacturing routes, to pathways for recycling and reuse. This session will cover recent advances in our understanding of sustainability from life-cycle analyses, sustainable materials synthesis and manufacture (including design-for-recycle) as well as progress towards the separation, recovery and reuse of materials from end-of-life cells.

14:00-14:20	Selected Talk
14:20-14:40	Selected Talk
14:40-15:00	Selected Talk
15:00-15:20	Selected Talk
15:20-16:00	Invited talk: Professor Alissa Kendall, Professor in Civil and Environmental Engineering, University of California Davis

16:00-18:00	Exhibition Session Meet our exhibitors here. Ground Floor Atrium
16:00-18:00	Poster Session Kindly sponsored by CPI Rooms 117 & 118 on First Floor, Rooms 214, 215 & 216 on Second Floor
19:00-21:30	<p>Faraday Institution Conference Dinner Kindly sponsored by Benchmark Mineral Intelligence Newcastle City Council, Civic Centre, Newcastle upon Tyne, NE1 8QH</p> <p>Take advantage of more networking opportunities at the pre-dinner drinks reception, followed by a sit-down three course dinner at the Newcastle Civic Centre with up to 400 fellow attendees. The Banqueting Hall at the Civic Centre is a modern-day take on a traditional, baronial style hall; guests will pass through the shadow of the magnificent bronze casting of the River God Tyne, and into the most prestigious building in the city for a truly unforgettable red carpet experience, and dine surrounded by medieval-style walls inscribed with the names of past Lord Mayors.</p> <p>We will also be announcing the winners of our Faraday Institution Community Awards 2024 during the dinner this year. We look forward to the awards being a powerful platform for celebrating community successes, and a way of rewarding individuals and teams that demonstrate excellence and behaviours encouraged by the Faraday Institution's mission and values.</p>

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Thursday 12 September | The Frederick Douglass Centre, Newcastle University

09:30-11:30 *Parallel Session* G.41, Ground Floor

Session | Industrialisation Challenges

Chaired by: Professor Colin Herron CBE, Professor of Practice at Newcastle University and Head of Faraday Institution North East (FINE)

If the nascent battery industry and its supply chain are to help meet net zero targets and the requirements of OEMs manufacturing capacity needs to be delivered over very tight time scales. Unanswered questions remain regarding technical readiness level, economics and capacity for scale up. Moreover, the UK could take a leading role in delivering a sustainable battery supply chain, however meeting this potential will require considerable research and engineering input. In this panel discussion, a range of industry perspectives will be explored on scale up and manufacturing challenges and the required interventions across the entire battery life cycle - using lithium as the example - from mining to recycling and remanufacture.

09:30-10:00 | **Invited talk**

10:00-10:30 | **Invited talk: Graeme Cruickshank, Chief Technology and Innovation Officer, CPI**

10:30-11:30 | **Panel discussion with:**

- Stewart Dickson, Co-founder and Managing Director, Weardale Lithium
- Dr Keri Goodwin, Chief Technologist, CPI
- Dr Christian Marston, President and COO, Altilium
- Professor Sudipta Roy, Chief Technology Officer, Evolve Metals
- Cameron Tomkin, Chief Operating Officer, Green Lithium
- Helen Waters, Head of Electric Battery Recycling, EMR

09:30-11:30 *Parallel Session* G.56, Ground Floor

Session | Materials, Electrode and Battery Characterisation

Chaired by: Dr James Le Houx, Faraday ISIS Emerging Leader Battery Fellow, ISIS Neutron and Muon Source

Understanding the performance and degradation of battery materials requires complementary characterisation approaches that can separate out the complex changes that occur within different battery components and at the interfaces between them. This session will explore the development of new characterisation tools, as well as the adoption of techniques from other fields to better understand the origins of battery performance. This will include efforts to develop in situ/operando methods, software and simulation tools to interpret the data collected, and advanced electrochemical methods for extracting key material properties. Approaches for monitoring battery health will also be covered, including integrated sensor platforms and low-cost methods for the online detection of degradation processes.

09:30-09:50 | **Selected Talk**

09:50-10:10 | **Selected Talk**

10:10-10:50 | **Invited talk: Professor Louis Piper, Professor of Battery Innovation, University of Warwick**
"Seeing is believing" – Operando X-ray studies of Pilot line batteries

10:50-11:10 | **Selected Talk**

11:10-11:30 | **Selected Talk**

14:00-16:00 *Parallel Session* G.06, Ground Floor

Session | Battery Safety

Chaired by: Dr Wojciech Mrozik, Faraday Institution Senior Research Fellow, Newcastle University

The future of battery technology is, of course, about durability, capacity and performance: but safety is also critical to the successful and sustained adoption of the technology. This session will provide a balanced overview of the

risks and hazards of lithium-ion batteries, and methods and procedures that are being used or developed to ameliorate these risks. The session will also provide an insight into future battery technologies and the potential risks and hazards associated with these.

09:30-09:50	Selected Talk
09:50-10:10	Selected Talk
10:10-10:30	Selected Talk
10:30-10:50	Selected Talk
10:50-11:30	Invited talk: Emma Sutcliffe, Director, EV Firesafe

11:30-12:00	Morning Refreshments Ground Floor Atrium
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12:00-12:50	G.41, Ground Floor Academic Plenary Talk Professor Shinichi Komaba, Professor of Applied Chemistry at Tokyo University of Science and Project Professor at Kyoto University
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12:50-13:50	Lunch Ground Floor Atrium
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13:50-14:30	Main Lecture Theatre, Lower Ground Closing Keynote Talk Professor Sir Peter Bruce FRS, Wolfson Chair, Professor of Materials at the University of Oxford and Chief Scientist at the Faraday Institution
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14:30-14:45	Main Lecture Theatre, Lower Ground Poster Awards Presentation Awards presented by Professor Sir Peter Bruce FRS
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14:45-15:00	Main Lecture Theatre, Lower Ground Closing Remarks
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