Impact Report
March 2022 - March 2023
Contents

Page 4  Introduction
Page 5  Conference
Page 12  Electronics for Healthcare
Page 14  Middle-Career Workshop
Page 17  eFutures Film
Page 18  Brain-Inspired Computing
Page 19  eFutures 3.0 Funding
Over the twelve months of February 2022-2023, the eFutures Network has grown in size and impact. As well as now having over 1700 members from over 70 institutions, the events we have staged across the grant have attracted more than 1800 attendees. One of our biggest successes recently was the 2022 Conference, which attracted speakers and 130 participants from across the world. With its clear focus on sustainability, the conference has set a model for the sector to engage and frame our important activities as vital in the necessary race to Net Zero.

On Net Zero, we partnered with the British Computer Society and were honoured to feature as part of their film series, which described technological innovation for sustainability. The films featured our Steering Group member Professor Layi Alatise (University of Warwick) as well as myself and other colleagues active in the eFutures Network.

Our online or hybrid events are recorded, to try to make them as accessible to all as possible, and our YouTube channel (34 videoed talks featuring speakers from 19 countries) which hosts these has seen the videos being viewed over 1000 times in total.

As well as events, we remain committed to influencing national arms-length bodies by providing them with reports and information; such as scoping the strengths, opportunities, and challenges facing the Electronics for Healthcare Sector across the UK.

We appreciate all of our members contributions to participating in the network to ensure it is agile, thriving and remains as relevant to the needs of an ever-evolving sector. Our network’s current focus is on amplifying how electronic systems is at the forefront of the future’s most pressing challenges, and I am delighted to confirm that we will be taking this work through into 2024 and 2025, thanks to an EPSRC award. Please do contact us to take part in this exciting new chapter.

"FOCUS ON AMPLIFYING HOW ELECTRONIC SYSTEMS IS AT THE FOREFRONT OF THE FUTURE'S MOST PRESSING CHALLENGES"
2022 Conference
Electronics for Sustainable Societies
SEPTEMBER 14-16 - THE MUSEUM OF LIVERPOOL

130 participants
53 institutions
15 countries

ACADEMIC LEAD:
PROFESSOR IVONA Z. MITROVIC,
UNIVERSITY OF LIVERPOOL
### ESS2022: Agenda

**Tuesday 13th September**
- 7.30pm-11.30pm: Welcome event, The Cavern Club, Liverpool (10 Mathew St, L2 6RE)

**Wednesday 14th September**
- 9.00am: Registration (The Museum of Liverpool, Pier Head, Mann Island, L3 1DG)
- 9.45am: **Welcome Address**: Professor Laura Harkness-Brennan, Associate Pro-Vice Chancellor for Research & Impact, University of Liverpool
- 10.00am: **The eFutures Network**: Professor Roger Woods, Queen’s University Belfast, and Dr Ivona Z. Mitrovic, University of Liverpool
- 10.15am: **Climate Science and Deliver of a Climate Resilient Net Zero Society**: Professor Piers Foster, University of Leeds
- 10.40am: **Challenge and Solutions for Sustainable Electronics & Societies**: Professor Francis Balestra, CNRS/Univ. Grenoble-Alpes/Sinano Institute
- 11.05am: **Transparent, Modular, Convivial – What Characterises Products for a Sustainable Circular Society?**: Professor Melanie Jaeger-Erben, BTU Cottbus
- 11.30am: **“Circular Design” Case Studies**: Karsten Schischke, Fraunhofer
- 11.55am: **Toolbox for Sustainable Flexible Electronics**: Dr Maria Smolander, VTT
- 12.20-1.20: LUNCH

**1.30pm-2.45pm Tutorial – Education Area 2**
- Memristive Devices for Low Power Memory and Computing Applications: Professor Wei Zhang, Liverpool John Moores University Limited Places

- 1.20pm: **Atomristors: Single-Atom Memristors and Low-Energy Electronic Systems**: Professor Deji Akinwande, University of Texas, Austin
- 1.45pm: **Flexible Electronics Designed at Nanoscale for a Future Sustainable Society**: Professor S. Ravi P. Silva, University of Surrey
- 2.10pm: **Semiconducting Piezoelectric Transducers based on ZnO Nanowires**: Professor Gustavo Ardila, University Grenoble Alpes
- 2.35pm: **Oxide Thin Films and Nanostructures as the Basis of Sustainable Smart Surfaces**: Dr Pedro Barquinho, CENIMAT, Nova University Lisboa
- 3.00pm: BREAK
- 3.25pm: **Sustainable Materials for Batteries and Electronic devices**: Professor Magda Titirici, Imperial College London
- 3.50pm: **Operando Optical Diagnostics of Battery Chemistries**: Professor Laurence Hardwick, University of Liverpool
- 4.15-5pm: **The Circular Economy**: UKRI
- 4.30pm-6.30pm: Magical Mystery Beatles Bus Tour Limited Places
- 6pm-9pm: Networking reception at The Spine, Liverpool (2 Paddington Village, L7 3FA)
Thursday 15th September

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.15am</td>
<td>Registration</td>
</tr>
<tr>
<td>9.30am</td>
<td>Brain-Inspired Computing for Energy-Efficient AI: Professor Steve Furber, University of Manchester</td>
</tr>
<tr>
<td>9.55am</td>
<td>Revolutionizing Power Electronics: Professor Layi Alatise, University of Warwick</td>
</tr>
<tr>
<td>10.20am</td>
<td>Internet-of-Things (IoT) for the Best and the Worst: Professor Jean-Pierre Raskin, Université Catholique de Louvain</td>
</tr>
<tr>
<td>10.45am</td>
<td>Research Efforts and Future Prospects for Solar Power Satellite in Japan: Dr Koji Tanaka, Japan Aerospace Exploration Agency</td>
</tr>
<tr>
<td>11.10am</td>
<td>The Potential Long and Productive Life of Electronic Products: Dr Colin Fitzpatrick, University of Limerick</td>
</tr>
<tr>
<td>11.35am</td>
<td>Material Selection for Biodegradable Transistors and ICs: Dr Jeff Kettle, University of Glasgow</td>
</tr>
<tr>
<td>12.00-1.00</td>
<td>LUNCH</td>
</tr>
<tr>
<td>1.30pm-2.45pm</td>
<td>Tutorial Education Area 1 SoC Arm – Professor David Flynn (Arm and University of Southampton) Limited Places</td>
</tr>
<tr>
<td>1.05pm</td>
<td>Nanoscale and Low-dimensional Components for Future Devices: Professor Hannah Joyce, University of Cambridge</td>
</tr>
<tr>
<td>1.30pm</td>
<td>Reshaping Electronics for a Sustainable Future: Soft, Flexible and Biodegradable: Dr Shweta Argawala, University of Aarhus</td>
</tr>
<tr>
<td>1.55pm</td>
<td>Enabling Technologies for a Sustainable Digitalisation: from Internet-of-Things to Digital Twins at the Edge: Professor Adrian Ionescu, EPFL</td>
</tr>
<tr>
<td>2.20pm</td>
<td>Environmental Sustainability and Research: UKRI</td>
</tr>
<tr>
<td>3.00pm</td>
<td>Tea and Coffee</td>
</tr>
<tr>
<td>3.30pm-5.00pm</td>
<td>Round Table (Chaired by Professor David Cumming, University of Glasgow, and Dr Ivona Z. Mitrovic, University of Liverpool)</td>
</tr>
<tr>
<td>6pm</td>
<td>Drinks reception: The Colonnades, The Albert Docks</td>
</tr>
<tr>
<td>7pm</td>
<td>Gala Dinner: The Maritime Museum (Royal Albert Dock, L3 4AQ)</td>
</tr>
<tr>
<td>11pm</td>
<td></td>
</tr>
</tbody>
</table>
# ESS2022: Agenda

**Tuesday 13th September**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.30pm</td>
<td>Welcome event, The Cavern Club, Liverpool (10 Mathew St, L2 6RE)</td>
</tr>
<tr>
<td>11.30pm</td>
<td></td>
</tr>
</tbody>
</table>

**Wednesday 14th September**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.00am</td>
<td>Registration (The Museum of Liverpool, Pier Head, Mann Island, L3 1DG)</td>
</tr>
<tr>
<td>9.45am</td>
<td><strong>Welcome Address:</strong> Professor Laura Harkness-Brennan, Associate Pro-Vice Chancellor for Research &amp; Impact, University of Liverpool</td>
</tr>
<tr>
<td>10.00am</td>
<td><strong>The eFutures Network:</strong> Professor Roger Woods, Queen’s University Belfast, and Dr Ivona Z. Mitrovic, University of Liverpool</td>
</tr>
<tr>
<td>10.15am</td>
<td><strong>Climate Science and Delivery of a Climate Resilient Net Zero Society:</strong> Professor Piers Foster, University of Leeds</td>
</tr>
<tr>
<td>10.40am</td>
<td><strong>Challenge and Solutions for Sustainable Electronics &amp; Societies:</strong> Professor Francis Balestra, CNRS/Univ. Grenoble-Alpes/Sinano Institute</td>
</tr>
<tr>
<td>11.05am</td>
<td><strong>Transparent, Modular, Convivial – What Characterises Products for a Sustainable Circular Society?</strong>: Professor Melanie Jaeger-Erben, BTU Cottbus</td>
</tr>
<tr>
<td>11.30am</td>
<td><strong>“Circular Design” Case Studies:</strong> Karsten Schischke, Fraunhofer</td>
</tr>
<tr>
<td>11.55am</td>
<td><strong>Toolbox for Sustainable Flexible Electronics:</strong> Dr Maria Smolander, VTT</td>
</tr>
<tr>
<td>12.20-1.20</td>
<td>LUNCH</td>
</tr>
</tbody>
</table>

**1.30pm - 2.45pm Tutorial – Education Area 2**

**Memristive Devices for Low Power Memory and Computing Applications:** Professor Wei Zhang, Liverpool John Moores University *Limited Places*

<table>
<thead>
<tr>
<th>Time</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.20pm</td>
<td><strong>Atomristors: Single-Atom Memristors and Low-Energy Electronic Systems:</strong> Professor Deji Akinwande, University of Texas, Austin</td>
</tr>
<tr>
<td>1.45pm</td>
<td><strong>Flexible Electronics Designed at Nanoscale for a Future Sustainable Society:</strong> Professor S. Ravi P. Silva, University of Surrey</td>
</tr>
<tr>
<td>2.10pm</td>
<td><strong>Semiconducting Piezoelectric Transducers based on ZnO Nanowires:</strong> Professor Gustavo Ardila, University Grenoble Alpes</td>
</tr>
<tr>
<td>2.35pm</td>
<td><strong>Oxide Thin Films and Nanostructures as the Basis of Sustainable Smart Surfaces:</strong> Dr Pedro Barquinha, CENIMAT, Nova University Lisboa</td>
</tr>
<tr>
<td>3.00pm</td>
<td>BREAK</td>
</tr>
<tr>
<td>3.25pm</td>
<td><strong>Sustainable Materials for Batteries and Electronic devices:</strong> Professor Magda Titirici, Imperial College London</td>
</tr>
<tr>
<td>3.50pm</td>
<td><strong>Operando Optical Diagnostics of Battery Chemistries:</strong> Professor Laurence Hardwick, University of Liverpool</td>
</tr>
<tr>
<td>4.15-5pm</td>
<td><strong>The Circular Economy:</strong> UKRI</td>
</tr>
<tr>
<td>4.30pm</td>
<td><strong>Magical Mystery Beatles Bus Tour</strong> <em>Limited Places</em></td>
</tr>
<tr>
<td>6.30pm</td>
<td><strong>Networking reception at The Spine, Liverpool</strong> (2 Paddington Village, L7 3FA)</td>
</tr>
</tbody>
</table>
Conference Photos

"I have met wonderful people and made some really good connections for future work."

"A very important and timely conference - provocative and high quality talks in a welcoming environment. "

EFUTURES
"A wonderful, unusual event which I enjoyed very much - already discussing several collaborations. It was such a memorable and important conference at the same time. Location and activities were also outstanding. Much credit to you all."
"I had a two-day great time at EPSRC eFutures Network EFH22 in London, hearing about current, cutting-edge research across the UK and workshopping next steps for R&D in this area. Thanks for organising such an amazing event!"

43 participants
32 institutions

"All in all, excellent - I learned a lot, had fun and some really interesting conversations. Perhaps most importantly made new connections that are highly relevant to my work and career."

ACADEMIC LEAD:
PROFESSOR PANTELIS GEORGIOU,
IMPERIAL COLLEGE LONDON
"Last week was a special opportunity for young researchers to take a peek into the reality of research and its subsequent translation into real world applications. Academics with diverse expertise came together to discuss the electronics for healthcare initiative. I got to witness actual collaborations materialize in front of my eyes in a matter of hours. Thank you for the wonderful opportunity to be inspired"
Middle-Career Workshop

EFUTURES
MIDDLE-CAREER RESEARCHER WORKSHOP

Join us to receive expert input on exploring your career path and plans, planning future growth of your research portfolio, and network with colleagues based across the UK.

1ST-2ND DECEMBER
QUEEN'S UNIVERSITY, BELFAST

28 participants
24 institutions

"A very well organised event with some excellent talks and career insights."

"The opportunity to have quality and extensive interaction with the speakers was great."

"The tips and experience shared by the speakers was insightful and inspirational"

ACADEMIC LEAD: PROFESSOR ROGER WOODS, QUEEN'S UNIVERSITY, BELFAST
THURSDAY, DECEMBER 1ST
LOCATION: GREAT HALL, LANYON BUILDING, QUEEN'S UNIVERSITY BELFAST, UNIVERSITY ROAD, BT7 1NN

09:30 Registration (tea and coffee)
10:00 Welcome and Warm Up - Beth McEvoy, Queen’s University Belfast
10:40 My Career Journey - Professor Chris Johnson, Queen’s University Belfast
11:15 How to lead a career in academia - Professor Bashir Al-Hashimi, King’s College, London
12:15 Buffet Lunch
13:00 Networking Activity (Black Taxi Tour of Belfast)
15:00 Resilience: dealing with adversity - Professor Roger Woods, Queen’s University Belfast
15:20 Breakout Session
16:20 The Royal Academy of Engineering - Gillian Gregg
16:50 Communicating your research - Professor Eiman Kanjo, Nottingham Trent University
17:30 Free Time
18:30 Group Meal at Deanes at Queens, 1 College Gardens, Belfast BT9 6BQ

FRIDAY, DECEMBER 2ND
LOCATION: GREAT HALL, LANYON BUILDING, QUEEN'S UNIVERSITY BELFAST, UNIVERSITY ROAD, BT7 1NN

09:30 Registration (tea and coffee)
10:00 Ten top tips for research proposal success – Professor Roger Woods
10:30 Breakout Task: Objective setting for a successful career
11:30 Funding your research- Marie Louise Cairns, EPSRC
12:00 Group session: Sharing career goals
12:30 Lunch
13:00 Close
Films: eFutures Network and Net Zero Digital

BCS, The Chartered Institute for IT, has produced a digital series exploring the instrumental role of the IT industry in responding to the climate crisis; delivering digital solutions to support mitigation and adaptation, whilst embedding sustainability into its own practices.

The eFutures Network is pleased to be featured in three of these short films, exploring our network’s innovative multidisciplinary work in the pursuit of enabling future clean, green transport.

Click here to view video
Brain Inspired Computing

As a follow-up to the launch of the brain-inspired hardware computing report, an online meeting was held on the 7th of November involving 40 attendees, well distributed among most of the UK universities.

The limits of classical computing are being reached, particularly when energy consumption is considered as current hardware cannot match the brain-like capabilities and energy consumption seemingly needed by AI algorithms. Neuromorphic computing holds the promise to reduce energy consumption drastically in suitable application areas, including AI, where today a lot of energy is used to train large models on conventional GPU hardware.

It was acknowledged that the UK has a unique combination of expertise in hardware, theory and AI which puts it in a strong position to develop neuromorphic systems which can revolutionize technology and address environmental issues. It offers considerable potential but there needs to be a full-stack approach to the design of such systems considering not only the software/hardware challenges but also the details of the architectural, circuit and device design decisions. A Centre of Excellence should therefore be established virtually across the number of institutions that lead on competing and complementary aspects of the challenge.

At the meeting, questions were considered including the need for massive datasets to train hardware; the ability of the UK and funding needed to design and implement such hardware; how such a centre could be established as numerous UK partners needed to work effectively together and; the potential for collaboration outside the UK in the current climate. There was clear enthusiasm from the meeting to establish the centre of excellence and therefore, to continue the conversation. Tony Kenyon from UCL, Steve Furber from the University of Manchester, and Roger Woods from Queens University Belfast agreed to meet and plan a path forward. Given the UK’s strength in computer design, it was clear that it represents an opportunity for UK academia and associated industry to create valuable IP in this area. This has the potential to make a major contribution to both research and industry in the UK.
eFutures 3.0 Electronic Systems Technology for Emerging Challenges

May 2023-May 2025

Professor Roger Woods and the eFutures Steering Group are delighted to announce that we have been successful in a bid to EPSRC for a two-year long Network + grant.

This grant, "eFutures 3.0", will build on the work of previous eFutures' Network grants, and focus on electronic systems technology needed to address emerging challenges.

Professor Woods is PI on this award, and is joined by Dr Hamza Shakeel, Queen’s University Belfast, as Co-I.

We will also be expanding the project team and the Steering Group and look forward to offering Network members access to a variety of planned initiatives, including a major conference to take place in 2024, on the theme of electronic systems for Net Zero.

To become more involved in this activity, please do reach out on social media or by email.
Connect with us

efutures2.com
@efuturesuk
linkedin.com/in/efutures/

efutures@qub.ac.uk