

# NEWSLETTER



**Serving Electrochemical Science, Technology and Engineering within  
the catchment of**

**The Royal Society of Chemistry  
and  
The Society of Chemical Industry**



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## Editorial

Welcome to the first issue of the Electrochemistry Newsletter in 2022. This year has started to be a busy year with COVID-19 restrictions becoming relaxed allowing in-person events and meetings, reestablishing old collaborations and connections. In this issue we included some technical insights, conference reports and product information.

With in-person conferences starting again (including Electrochem2022!) student travel bursaries have been awarded. Documented here are a number of reports from both national and international conferences. Please encourage students to apply for a contribution to the cost of presenting their work at a national or international conference or organizing a postgraduate conference. The Electrochemistry Group of the RSC and the Energy Technology Group of the SCI provide the funds if the application is accepted. Candidates should apply to Dr. Mark Symes.

We welcome any feedback and suggestions or contributions from readers for future issues.

*Carlos Ponce-de-León*  
*C. T. Cummings*

**If you wish to notify the editors with your view on the material or the content of any item in this issue, or if you wish to contribute to the newsletter, please write to either Editors (Carlos Ponce-de-León, Faculty of Engineering and the Environment University of Southampton or Charles Cummings, Chemistry (Atmospheres) & Power Sources, QinetiQ) at:**

[capla@soton.ac.uk](mailto:capla@soton.ac.uk)

[cycummings@qinetiq.om](mailto:cycummings@qinetiq.om)

**Missed a copy? You can catch up on all the news *via* our web-space hosted by the Royal Society of Chemistry at the following URL.**

<http://www.rsc.org/Membership/Networking/InterestGroups/Electrochemistry/news.asp>

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## *Industry Insight*

# Leading the Development of Advanced Electrochemical Materials, an Interview with David Hodgson MD

**Charles Cummings<sup>a</sup>**

<sup>a</sup> QinetiQ, Haslar Marine Technology Park, Gosport,

(email: [cycummings@qinetiq.com](mailto:cycummings@qinetiq.com))

### **Introduction**

As part of this year's RSC Electrochemistry Newsletter, an interview was held with David Hodgson Managing Director from THP-Hydrogen Products [1]. David founded PV3 Technologies in 2011, optimising the company's know-how in platinum group metal coatings and growing it significantly over the past 10+ years.

In 2021 PV3 was acquired by the Technical Fibre Products group and is now known as TFP Hydrogen Products [2]. With over 35 years' experience in the electrochemistry industry, David has been instrumental in his field, from working in R&D in multi-national corporates to CTO and CEO roles for Plurion, Amalyst and others. Since 2009, David has managed a wide and varied portfolio career, undertaking a number of advisory roles, including working together with the Department for International Trade in helping companies understand the UK energy sector, and in the area of innovation to commercialisation in a programme named 'idea2invoice'.



## **David Hodgson MD of TFP Hydrogen Products interview [1]**

*CC: Hi David thank you again for accepting the interview. I was wondering if you could give a brief overview of your professional experience?*

DH: Many thanks Charles, I'll do a quick run through but it's probably not quite what you may expect! These days you would describe what I did as a modern apprenticeship. I was fortunate to be sponsored by ICI at the time and I had 3 separate positions working in different research groups which was a great experience. I found an area of the company that interested me which was electro-catalysis and chlorine evolution. Through day release I completed a degree, masters and PhD whilst working. The challenge around the technology landscape with new demands such as higher performance was really great to be a part of. I was fortunate that the company gave me resources to develop new materials and then scale up through pilot plant and commercial trials at production scale. During this time we also had some niche and spill over benefits to develop new applications for new products including: fuel cells and photo-electrochemistry. During this phase I came across the world of start-ups and it was something I would like to be a part of.

I eventually joined a Cambridge start-up as CTO focused on molten salt electrochemistry. After this I moved to Intellectual Capitol Plurion (California based) as CTO. I was responsible for a number of individuals in different research areas. Unfortunately, the 2008 financial crisis put an end to Plurion and I moved into consultation. However, three ex-colleagues and myself wanted to transfer to product based technologies and formed PV3 technologies. We initially looked at a number of different aspects of electro-catalysts including: flow battery electrolytes, water treatment electrodes and corrosion resistance. We increase the company in terms of capability and capacity and in January 2021 we were acquired by TFP-Hydrogen group.

*CC: It sounds a very interesting experience working across different fields. Can you give an insight into some defining experiences?*

DH: The first would be the exposure to the electro-catalytic industry when I first started. The interaction/work with start-ups in the 2000s and exposure to that world was very interesting. After this consulting was a good experience but I always thought to myself to have a plan B and move into product development and manufacture. Thankfully alot of different aspects of my career have fallen into place overtime which I am grateful for.

*CC: That's great, what is your company currently working on?*

DH: What most industry electro-catalysis groups are doing, working in green hydrogen space. Basically this concerns research and development into low over potential, high durability, scalable materials for hydrogen production to reduce the cost of green hydrogen. This is critical for the technology to perform at significant scale. There are very ambitious targets from both companies and governments with considerable investment, something of which we wish to be a part of.

*CC: Are there any innovation projects you can speak about?*

DH: We have a varied innovation portfolio at THP-Hydrogen. In fact we have just finished a large innovation project for a Cornwall funded programme. We were developing a new coating for a porous transport layer that could significantly influence the cost dynamics of the application process. Part of TPH-Hydrogen's mission is to create low cost green hydrogen which includes material and component cost reduction. We are having some real successes at the small scale and commercialising technologies and innovations is currently underway. Scale up is not trivial and there is innovation to go to industrial scale. The company has just won an innovation award and its due to a medical device we have been working on. We won the award due to having technical innovation through the coating and the product but we also had some manufacturing and commercial innovation through new business models we have not used before.

*CC: Congratulations with the award. In terms of funding what experience can you share with attaining funding for a company such as TFP-Hydrogen?*

DH: It's been a mix. I have experience raising funds from a number of sources including venture capitalism, equality, and innovation funding through international (EU), national (InnovateUK) and regional funds. Non diluted funding is very attractive but it has to align with the vision and goals of the company. Funding has given us the opportunity to collaborate with partners internationally which has been great.

*CC: As MD of TFP-Hydrogen can you give an insight into your daily work routine?*

DH: It can be varied and it encompasses a few different aspects. For example, today I started by speaking to the technical team about laboratory practice. After this I have just had a meeting with our chairman elect and we discussed how we are moving forward in advanced materials and clean energy. I have meetings with direct customers to understand their ambitions for projects. I have internal project reviews with the technical teams to understand how things are coming along. Outside of technical and technical management I have some mundane financing reviews but also some exciting HR activities such as drafting job descriptions for new roles.

*CC: Personnel question advice for an undergraduate or postgraduate or PhD thinking about a move to industry.*

DH: Ha, not sure if I am the best person to give advice as things have kind of evolved over the course of my career. I have been fortunate to work with great people. Maybe my advice to a scientist wanting to join industry would be find "a home" which would fit your style and ambitions. Make sure you undertake something which has value and worth because you spend a significant portion of your life at work and its important you enjoy it. Finally I would say, Don't be afraid to ask questions, people can always say no.

*CC: Great, finally I was wondering if I could ask if THF-Hydrogen was influenced by COVID-19 pandemic at all?*

DH: We worked right throughout the pandemic as we put controls into workplace safety. We have implemented working from home and on-site. However, if you want to be innovative and drive things forward you have to be around people and come to work. We have some of our customers close down during COVID-19 but this worked to our advantage as it allowed us to progress projects.

We actually made hand sanitiser to a number of local groups including food banks, care homes, charities, schools and post offices. In the end we sold half and gave the other half away.

*The interview was conducted between Charles Cummings [3] and David Hodgson on the 10<sup>th</sup> December 2021. The RSC Newsletter editors would like to thank David and his team for taking the time to review and approve the article.*



**WE ARE  
TFP HYDROGEN PRODUCTS**

## **References**

[1] Virtual interview between C. Cummings and D. Hodgson on the 10<sup>th</sup> Dec 2021

[2] TFP-Hydrogen Products, website: <https://www.tfphydrogen.com/>

[3] QinetiQ Power Sources, website: [www.qinetiq.com/power](http://www.qinetiq.com/power)

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*Electrochem2021*

# Electrochem2021

**6<sup>th</sup> September 2021 13:30 – 7<sup>th</sup> September  
2021 17:00, Online**

Editor's note...

Due to the COVID-19 pandemic 2021 *Electrochem2021* was held on an online platform and covered talks over 2020 and 2021. The focus of the conference was to present awardees (virtually) with Barker, Sheelagh Campbell, Faraday, Fleischmann and Parsons awards and invite winners to showcase their research. In addition, regional student awardees were invited to speak.

Despite the conference being held online the electrochemistry community showed support with 130 - 150 live attendees throughout most of the event and everything seemed to go very smoothly. During questions and answers sessions there was good interaction between participants and awardees with exchange of technical information and ideas. Despite a small number of talks for an *Electrochem* (12 in total) the content crossed all boundaries within electrochemistry and it was thoroughly enjoyed and well received. Posters presented (via Twitter) were to a high standard of which a number of poster winners were selected. The editors would like to thank the *Electrochem2021* organization committee of Mark Symes, Michelle Browne, Petra Cameron & Mark Platt.

Many congratulations for the awardees:

1. **Barker Medal 2020:** Julie Macpherson, University of Warwick
2. **Sheelagh Campbell Award 2020:** Virgil Andrei, University of Cambridge
3. **Faraday Medal 2020:** Shirley Meng, University of California San Diego
4. **Fleischmann Lecture:** Hubert Girault, Ecole Polytechnique Fédérale de Lausanne
5. **Parsons Medal 2021:** Max García-Melchor, Trinity College Dublin
6. **Sheelagh Campbell Award 2021:** Alfie Wills, University of Strathclyde
7. **Faraday Medal 2021:** Petter Strasser, Technical University Berlin

Many congratulations for the student regional awardees:

1. Rajesh Jethwa – University of Cambridge
2. Franziska Boessl - University of Edinburgh
3. Laurence Savignac – Lancaster University
4. Eric Mates Torres - Trinity College Dublin
5. Matt Leech – University of Greenwich

Many congratulations for Twitter post prize awardees:

1. Max Bauming - Helmholtz Zentrum Berlin
2. Holly Fruehwald - Ontario Tech University
3. Colm Mckeever - Maynooth University
4. Sasho Stojkovic - Helmholtz Zentrum Berlin
5. Gita Sing - University College Dublin
6. Amy Smart - University of the West of England

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## *Ionic Liquids Discussion Group*

# **Inaugural joint seminar between RSC Interest Groups: electrochemistry meets molten salts and ionic liquids!**

### **Edmund Dickinson<sup>a</sup>**

<sup>a</sup>National Physical Laboratory, Teddington, Surrey

(email: [edmund.dickinson@npl.co.uk](mailto:edmund.dickinson@npl.co.uk), 27 January 2022)

On 22 November 2021, some 60 attendees from around the world tuned in online for the inaugural joint seminar coordinated between the RSC Electrochemistry Group and the RSC Molten Salts and Ionic Liquids Discussion Group. Edmund Dickinson (National Physical Laboratory) and George Chen (University of Nottingham) convened the meeting on behalf of the respective Interest Groups. As molten salts and ionic liquids are used as electrolytes in diverse applications of industrial and scientific relevance, the intersection of the topics offers significant interest to both communities.

Four academic speakers gave half-hour talks and took questions at the event. First, Debbie Silvester-Dean (Curtin University, Perth, Australia) spoke about her research on “Ionic liquids as electrochemical sensor materials”, considering especially the selection of the optimal room-temperature ionic liquid (RTIL) for particular target gas analytes. Andy Abbott (University of Leicester) introduced a set of novel investigations into the properties of “Ambient temperature calcium chloride-based eutectics for metal electrodeposition”, demonstrating electroplating capability for a set of first-row transition metals and some advantageous properties over more traditional deep eutectic solvents, such as those based on quaternary ammonium salts.

In the second half of the seminar, Clint Sharrad (University of Manchester) provided insight into the impact of molten salt electrochemistry in a specific industrial sector by introducing “Electrochemical treatment of nuclear graphite

using molten salts” – the purpose being to use electrochemistry to concentrate specific radioactive elements so that a larger proportion of radioactive waste can be downgraded. Lastly, Darren Walsh (University of Nottingham) spoke on the prospects for “Electrochemical synthesis in flowing ionic liquids”; his research has explored the particular impact of the ionic liquid electrolyte on the role of TEMPO as a mediator in alcohol oxidation.

The organisers hope that this seminar was the first of many, and that the fruitful collaboration between the two Interest Groups can continue. While it is hoped that running future seminars in-person could offer a more social experience, the opportunity to invite speakers from across the globe was a definite benefit of the online format.

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## *Great Western Electrochemistry*

# **Regional Postgraduate Symposium Great Western Electrochemistry 2022, University of Bath**

### **Frank Marken<sup>a</sup>**

<sup>a</sup> Department of Chemistry, University of Bath, Claverton Down, Bath

(email: [f.marken@bath.ac.uk](mailto:f.marken@bath.ac.uk))

On Monday 13th June 2022, the “in-person” one-day postgraduate “GWEM 2022” symposium was held at the University of Bath. At this meeting some invited guests presented talks together with postgraduate presenters from Bristol, Oxford, Bath, Reading, Exeter, Swansea, and from Cardiff. Industry exhibitors (Alvatek, Integrated Graphene, Metrohm) contributed with displays and prizes. There were four sessions with in total 20 talks, all chaired and discussed by postgraduate students. Major themes of the day were carbon dioxide reduction, ocean plastics, photo-electrochemistry, electrocatalysis, spectroelectrochemistry, and artificial intelligence.

The day started with a talk by Philippa Kearney (Bath) on ocean plastics and bisphenol A removal strategies. Emily Owen (Bath) then discussed new impedance spectroscopy approaches for monitoring skin damage and skin diagnostics. Kaya Davies-Brenchley (Bath) continued with a talk on the topic of photoelectrochemical water splitting with perovskites.



The first session then concluded with Sabrina Waters (Bristol-Bath) discussing Pt mono-layer deposition into lipid-templated gold nanostructures.

The second session started with Dr Minjun Yang (Oxford) explaining how electrochemical tools combined with microscopy allow biogenic calcite formation in the ocean to be monitored quantitatively. Autonomous measurement tools will provide much better diagnostics and speciation data for CO<sub>2</sub> uptake in the sediment to be estimated and the new approach is now gathering data mid-Atlantic (see: Mayflower Autonomous Ship). Diyar Othman (Cardiff) then described his

work on new types of colloidal quantum dots. Manal Alruwaili (Exeter) reported TiVO<sub>4</sub> materials for solar driven fuels processes. Dr Craig Armstrong (Swansea) introduced new ideas for gas diffusion reactors combined with chlorine production for industrial scale de-carbonisation. The urgency of solving carbon dioxide recycling challenges with new types of processes and the need for new technologies were highlighted.

After some lunch and poster discussions, the third session started with Haotian Chen (Oxford) presenting his work on neural networks in predicting concentration profiles in 2D and 3D electrode systems. Physics informed neural networks (PINN) were shown to provide very powerful approximation tools that overcome the need for detailed finite element models. The neural network successfully predicts concentration profiles and processes at electrodes. Next, Aswathi Koorikat (Bristol) presented her work on pulse-deposited copper films. Ecem Bozdogan (Bristol) presented work on Cu<sub>2</sub>O deposited into silicon nanowire structures for photoactive films. Sami Alharbi (Bristol) focused on water splitting and the oxygen evolution reaction at nickel-doped MnO<sub>2</sub> nanostructures. Srijita Nandy (Exeter) discussed new types of “high entropy” oxide materials based on rare earths for photocatalytic water splitting.

In the final session, Mohammed Alkhalifah (Bristol) reported work on perovskites for heterogeneous water splitting catalysis and Daniel Skelson (Reading) introduced IR-spectroelectrochemistry in room temperature ionic liquids for homogeneous CO<sub>2</sub> reduction catalysis. Mansour Alhabradi (Exeter) discussed thin sputter coated hematite materials and Dr Maisa Beluomini (Bath) explained how she developed new screen-printed electrodes for valuable components in agricultural waste streams. The day concluded with Wanli Liu (Bath) discussing lipidic bio-sensor structures and Simon Wikeley (Bath) explaining a new approach to glucose sensing.

Prizes were presented to Daniel Skelson (Reading), Haotian Chen (Oxford), and Sabrina Waters (Bristol-Bath) for excellent talks. Two poster prizes were awarded to Ayesha Mubshrah (Bristol) and to Diyar Othman (Cardiff). Daniel Skelson has been selected for free access to the 2022 RSC Electrochem conference in Edinburgh. The day was inspiring and discussions continued.

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## *BES symposium XXVII*

# **Student conference report: XXVII International symposium on Bioelectrochemistry and Bioenergetics (BES)**

**Tanushree Mandal<sup>a</sup>**

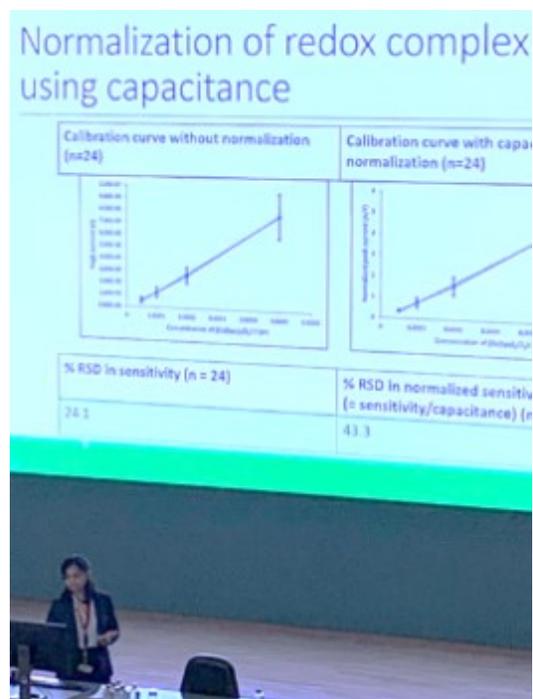
<sup>a</sup>National University of Ireland, Galway

The BES conference is an international conference organized by the Bioelectrochemical Society (BES) which happens every two years. The six main topics of this year's conference were: i) Bio(inspired) sensors & diagnostics; ii) Microbial electrochemical technologies and electron transport system; iii) Bio-electrosynthesis; iv) Electroporation & biomembrane electrochemistry; v) Nano technologies & architectures for bio-electrochemistry; and vi) Bio(photo)electrochemistry & bio-energetics.

I work on diagnostic assays, which is why the 'Bio(inspired) sensors & diagnostics' session was very interesting to me. There were many talks on how different kinds of assays can be designed to make the detection methods more precise, reliable, and easy to use. The talks in this session focused on detection of many bio-analytes like glucose, cholesterol, testosterone, cancer biomarkers, bacteria etc. One particularly interesting talk was by Johan Bobacka on a magneto-hydrodynamic (MHD) extraction technique where a small electric current is combined with a magnetic field to accelerate fluid transport through skin. This technique was being used to suction glucose off the skin and quantify the glucose concentration to use the technique for a glucose sensor. This was different for many reasons as most assays usually use enzymes or DNA aptamers to do this kind of diagnosis. Elena Ferapontova gave a very detailed talk on using DNA aptamers for diagnosis of various cancer biomarkers in the human body. Using DNA aptamers, it was shown that a biomarker for breast cancer can be detected in femtomolar region which is

very impressive. Fabiana Arduini had a different approach to the assay as she used paper-based sensors for diagnosis. This kind of technique makes point-of-care (POC) devices much feasible to use. Paper-based electrochemical devices were shown to detect analytes in aerosol phase and on surface without any additional instrument. The most common sensor system that was discussed during the conference was the glucose sensor. There were a few talks on how to make the glucose sensor better by using microneedle devices for transdermal sensing and by using polymeric films for stable signals. Another interesting part of this session was the assays for detection of bacteria in sample. Enterobactin (Ent), a siderophore produced by *E. coli*, and pyocyanin (PyoC), a metabolite of *P. aeruginosa*, were shown to be used as target markers for detection of these common bacteria in water.

BES2022 was my first in-person talk after the pandemic lockdown. It was very nice to attend the oral presentations and the poster sessions in-person. I presented a talk on 'Peroxidase-based sensors using mediated electrochemistry and in-situ area normalization'. I discussed various electrochemical techniques which can be used to normalize irregular electrode surface area in-situ. After that, I discussed peroxidase catalysis using osmium polypyridyl redox complexes. In the end, I talked about how these two methods can be used together to design peroxidase-based prostate cancer immunoassays with improved peroxide detection. Right is a picture of me discussing my results in the conference.



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## *ECS Meeting XXVII*

# **Student conference report: Summary of 241st Electrochemistry Society (ECS) Meeting XXVII**

**Mateen Mirza<sup>a</sup>**

**<sup>a</sup>Department of Chemical Engineering, University College London**

The 241<sup>st</sup> Electrochemical Society Meeting was held between 29<sup>th</sup> May – 2<sup>nd</sup> June 2022 at the Vancouver Convention Centre, Canada. This conference brought together the most active researchers in academia, industry and government with a wide range of electrochemical research areas for all who are interested in this field. There was a particular focus on batteries, solid state technology as well as using electrochemistry for industrial applications. It served as an excellent opportunity to collaborate and network with people in-person following the Covid-19 pandemic.

The most interesting and relevant section was on battery recycling and reuse. The symposium addressed and reported the most pressing concerns surrounding the future use and recovery of critical materials, for e.g. cobalt, manganese and aluminium. Given the depletion of fossil fuels, research groups in the last two to three decades have begun to turn their attention to recycling methods and even optimising current Li-ion batteries and opting for perhaps the revolutionary Na-ion battery as stated by Prof. Jeff Dahn (plenary speaker for the ECS Meeting). It is clear that despite our best efforts to optimise battery cathode materials, the rapid electrification of vehicles recycling lithium-ion batteries (LiBs) will leverage the cost and supply of battery materials and efforts should focus on these areas.

Most of the talks focused on the use of hydrometallurgical (aqueous-based process) and pyrometallurgical processes for the recovery of such materials. I presented my research which comprised of a novel approach to recover battery materials by electrochemical means (fluidised cathode process). The fluidised cathode process is where particulate solids come into close and due to the agitation of a liquid/gas

lead to the formation of a pseudo-like mixture which enhances and improves the kinetics of a process. In our system, the metal oxide particles are suspended within a molten salt, LiCl-KCl, and are agitated by inert argon gas. The fluidised cathode system is widely used in copper deposition, alkaline peroxide synthesis as well as wastewater treatment processes. In this work, two different types of battery materials were tested both spent and commercial phase pure LiCoO<sub>2</sub> in which we achieved Faradaic current efficiencies exceeding 70%. Further details on this work can be found in our recent publication in *Electrochimica Acta*, <https://doi.org/10.1016/j.electacta.2021.138846>. It was interesting to compare this work to methods which do not use electrochemical means and have achieved industrial maturity by means of producing large yields of critical materials. This talk was followed up with many interesting questions and conversations with scientists from both academia and industry which helped bring new ideas and perspective to my future research.



Ultimately, attending an international conference has provided me with an understanding of where my research lies with respect to current efforts, and facilitated the formation of new collaborations and networking opportunities.

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## *ECS Meeting XXVII*

# **Student conference report: Summary of 241st Electrochemistry Society (ECS) Meeting XXVII**

**Rajesh Bharat Jethwa<sup>a</sup>**

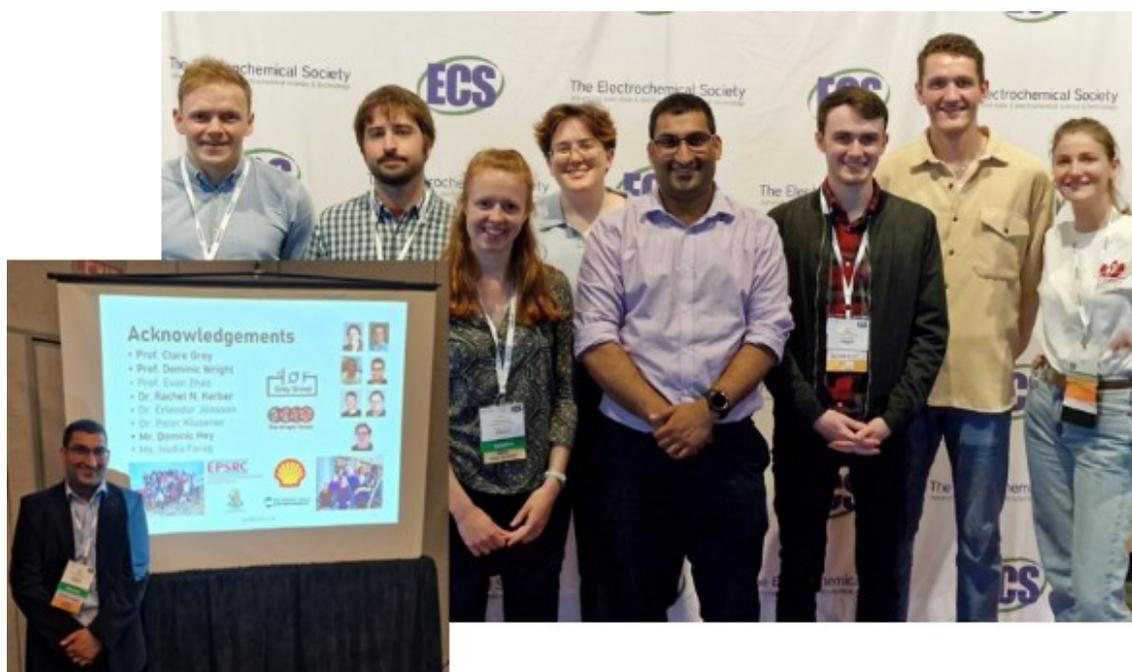
<sup>a</sup>Department of Chemistry, University of Cambridge

With the resurgence of in-person conferences and meetings in the wake of the pandemic, I am grateful that I was able to give an oral presentation in Vancouver at the 241<sup>st</sup> Electrochemical Society Meeting. Over the course of the five-day conference, several talks and posters were presented spanning several symposia and topics, involving a range of diagnostic and functional applications of electrochemistry. In the Redox Flow Battery Symposium, several topics came to the fore: the effect of electrode functionalisation and how that impacts the interaction with the electrolyte, the need to understand the processes that occur inside the battery, and the need for new electrolyte motifs and membranes. The latter two are especially important to facilitate flow batteries that have decadal service lives. This means that they need to be capable of undergoing several thousands of cycles without suffering from any capacity fade.

Having presented a talk combining synthetic exploration with in-situ characterisation, the concept of using machine learning and computational techniques to inform synthetic design is one that is particularly intriguing to me. Two speakers presented updates on this topic during the conference. The first, by Professor Noack (FICT), summarised the progress that has been made within the Horizon 2020 SONAR Project. The project uses mathematical models and numerical simulation for high volume pre-selection of systems. By modelling several properties at a variety of length-scales, the project ultimately aims to optimise flow battery performance. For example, providing estimates for redox potential, solubility, electron transfer kinetics, as well as full cell voltage and power density, all from a simple SMILES chemical input. If predictions that correlate well

with experimental values can be made cheaply and easily, such a system would allow synthetic chemists to focus on making the more promising electrolytes, rather than having to generate a library of compounds to identify the key structure-property relationships themselves. Professor Wang (PNNL) also indicated that his group is working towards this goal, highlighting the need in the field for accelerated screening of candidate molecules.

In addition to the wealth of topics provided throughout the conference, the opportunity to network face-to-face with well-known professors in the field is something that has been largely absent from the digital meetings that took place over the last few years. Through this conference, I am grateful that I was able to exchange a few words with fellow early-career researchers during the Student Mixer evening, as well as having the opportunity to mingle with academics during the Members and Opening Receptions. Through these interactions, I hope to either facilitate future collaborations with relevant parties or investigate future career options as I approach the end of the current chapter in my academic career.



Ultimately, through the talks and interactions held throughout the conference, I am aware of the increased need for systematic and informed synthetic design in

energy storage applications. Whether it be degradation resistant salts for lithium- or sodium-ion batteries, or energy dense redox-active species for flow batteries, or indeed redox-species that are migration resistant for battery-capacitor hybrids or membrane-free batteries, there is a need to survey, synthesise and screen new molecules. This together with the use of in-situ characterisation – which is rapidly growing in capability - and battery diagnosis will hopefully pave the way towards energy dense, cheap energy storage systems and a decreased reliance on fossil fuels for our future energy needs.

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## ECS Meeting XXVII

# Student conference report: Summary of 241st Electrochemistry Society (ECS) Meeting XXVII

**Emma Latchem<sup>a</sup>**

<sup>a</sup>Department of Chemistry, University of Cambridge

Due to the covid-19 pandemic, this is the first year that I have been able to attend a conference in-person. At the ECS conference, I particularly enjoyed presenting some of my research into crossover of quinone species in aqueous organic redox flow batteries (AORFBs). Although I have appreciated the accessibility of online conferences, the discussions I have had following in-person research talks have been much more in-depth and engaged. I found the discussions in more relaxed settings, such as over lunch and student mixers were the most useful. For example, after my talk multiple people approached to me to ask questions about my work. As my talk session ended at lunchtime, I then went to lunch with some of these people, where I was able to learn more about their work too.

There was a redox flow battery (RFB) symposium at this conference, meaning that there were many researchers who had research interests closely aligned to my own. For example, the Aziz Group at Harvard is a leading group in the field of AORFBs and I have been using one of their systems as a model system to develop my methodology for measuring crossover. The presentations from the Aziz group were all really interesting. In particular, I enjoyed T. Y. George's presentation on 'Size and Charge Effects on Organic Flow Battery Crossover Evaluated By Quinone Permeabilities through Nafion'. T. Y. George *et al.* prepared a series of quinone molecules with varied size (e.g. hydroquinone, anthraquinone) and charge (by addition of -1 charged sulfonate groups). The permeabilities of these molecules through Nafion (a cation-exchange membrane), was then measured, along with the Stokes radii of each molecule. Through this systematic study, they deduced that, for this series of molecules, the charge-effects were more impactful at reducing

crossover than size effects. They found over an order of magnitude permeability reduction per sulfonate. Conversely, when comparing two analogous molecules with the same number of sulfonate groups, the one with half the Stokes radius had a permeability less than an order of magnitude higher. These studies should help inform the design of low-crossover quinone molecules moving forward.

In another talk, R. R. Jacquemond, from the Eindhoven University of Technology, presented his work on 'Neutron Radiography As a Powerful Method to Visualize Reactive Flows in Redox Flow Batteries'. In this work, by leveraging the high attenuation of organic isotopic labelled materials, they were able use subtractive neutron imaging to quantify the concentrations of active species and supporting electrolytes. As they had an *operando* setup, they were able to investigate how these concentration profiles depended on the operating conditions of the battery. Furthermore, *in-plane* imaging configuration used meant that the changes in concentrations on either side of the membrane could be measured simultaneously. Therefore, this allowed them to investigate the influence of electrode microstructure, membrane type and flow field design on spatial and temporal gradients in reactant concentrations. This is particularly exciting to me, as it is another method through which the influence of charging protocol on crossover could be investigated.



This is just a couple of examples of the many exciting research projects that I was introduced to at the ECS conference. I am very grateful being able to talk to many of the presenting authors, and to have been given the opportunity to present work myself. These experiences have improved my confidence in scientific communication and have left me feeling very motivated to push my project forward on my return to Cambridge.

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## Future conferences:



## International Society of Electrochemistry

Several events have been cancelled or postponed due to COVID-19 pandemic. Please check carefully in the events website. Below is the list of ISE conferences listed online:

### 2022

**27 - 30 November, Santiago, Chile** (33rd ISE Topical Meeting)  
Challenges in Molecular Electrochemistry and Surface Reactivity  
([more information](#))

### 2023

**20 - 22 March, Mar del Plata, Argentina** (34th ISE Topical Meeting)  
Electrochemistry: reaching out society

**7 - 10 May, Gold Coast, Australia** (35th ISE Topical Meeting)  
Electrochemistry for energy, environment and health: key challenges and enabling solutions

**3 - 8 September, Lyon, France** (*74th Annual Meeting*)  
Bridging Scientific Disciplines to Address the World's Challenges

### 2024

**26 - 29 May, Sibenik, Croatia** (36th ISE Topical Meeting)

**9 - 12 June, Baveno, Italy** (37th ISE Topical Meeting)

**18 - 23 August, Montréal, Canada** (*75th Annual Meeting*)

**8 - 11 September Manchester, UK** (38th ISE Topical Meeting)

2025

**Mainz, Germany** (*76th Annual Meeting* )

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# Sponsors

Many thanks to our generous sponsors for supporting this conference:



Where science meets business  
an environment to advance knowledge exchange

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**Where science meets business**

### Electrochemical Technology

The Electrochemical Technology Technical Interest Group is involved in all aspects of the application of electrochemical science and engineering. The Group's aim is to promote research and development of electrochemistry which leads to the production of appropriate technologies and industrial and consumer products. The Group provides an interface between academia and industry and is a forum for promoting research and collaboration between a range of scientific and engineering disciplines.



#### Industrial sectors

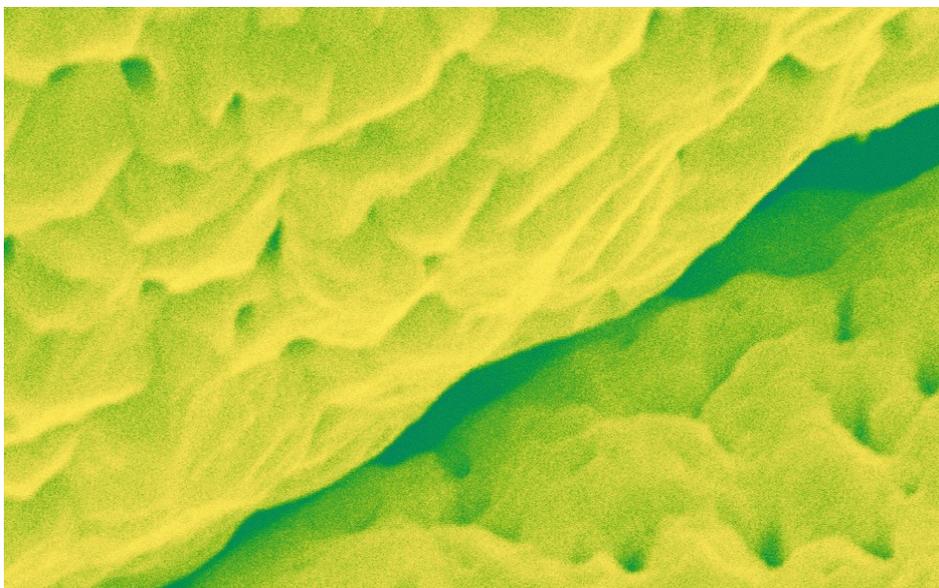
Electrochemical activities cut across all industrial sectors, including chemical, pharmaceutical, electrical, electronic and micro-electronic, information technology, mining and metallurgical, biotechnology, transportation, medical, water and wastewater. As such, the Group's interests include applications of electrochemistry in:

- ▶ sensors and monitors
- ▶ energy conversion and storage
- ▶ synthesis of chemicals, pharmaceuticals, biochemicals, polymers and electronic materials
- ▶ materials protection, processing and fabrication
- ▶ environmental protection and control

Join [here](#)

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*RSC Electrochemistry Group*



## RSC Electrochemistry Group

This RSC Group is part of the Faraday Division, involved in all aspects of electrochemical processes (fuel cells, energy sources, analytical devices and sensors, electrochemical planting and synthesis, fundamental research etc).

### Activities:

- The Group organises the annual 'Electrochem' meetings (Faraday Medal) to reward outstanding international scientists. For up-to-date information, go to the RSC's web pages for the Electrochemistry Group.
- The Electrochemistry newsletter: available quarterly, in pdf, from our RSC web pages, it highlights events' reports and general sector's news and insights.
- Student bursaries: to support/encourage graduate students giving lectures on their PhD work at national and/or international conferences.
- Outreach: activities involving the public and schools to raise awareness of the fundamental importance of electrochemical processes today.

RSC | Advancing the  
Chemical Sciences

[www.rsc.org/electrochemistry](http://www.rsc.org/electrochemistry)

Registered Charity Number 207890

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## The Electroanalytical Sensing Systems Group

The Electroanalytical Sensing Systems Group is one of the RSC's many Interest Groups. The Interest Groups are member driven groups which exist to benefit RSC members, and the wider chemical science community, in line with the RSC's strategy and charter.

Join [here](#)

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## Product Information



ALVATEK

Electrochemistry Product News

# EmStat<sup>3</sup> blue



- 8 hours of battery life
- USB or Bluetooth communication
- potential range of  $\pm 4V$
- current ranges from 1 nA to 100 mA
- ideal for sensor applications

**Optional:**

- 8 or 16 channel multiplexer
- stirrer control
- Pt1000 temperature sensor
- differential electrometer amplifier

software for Windows  and Android 

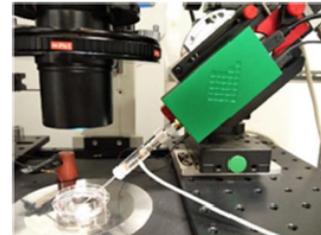
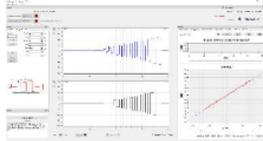


**PalmSens**  
Compact Electrochemical Interfaces

## Electrochemistry Solutions - What's New?

### Elements Ultra low noise current amplifiers for nanopore and electrophysiology research.

Alvatek is now the official UK distributor for Elements Srl products. Elements specialises in pico- and nano-scale electrochemistry measurements ranging from live cells to bio- and solid state nanopore sensing.



### PalmSens Sensit BT– Handheld, wireless dual channel potentiostat with EIS to 200kHz

- Dual channel / Bipotentiostat
- EIS to 200kHz
- Current Ranges 100nA – 5mA (3mA max)
- USB / Battery Power
- £1.5K ex VAT



### Ivium pocketStat2– handheld potentiostat with EIS to 1MHz

- Low noise design with 100pA current range (optionally 10pA)
- EIS to 100kHz and current to 30mA
- Optional battery and BlueTooth.
- < £3.5K ex VAT



### OctoStat30– 8 independent potentiostats each with EIS.

For applications requiring simultaneous EIS measurements on multiple cells. (also for multichannel battery cycling with Ivium's new **CycliScan** software)

- 30mA per channel
- EIS to 100kHz (NEW option to 1MHz)
- Are £1.5K per channel ex VAT



### ALSO...

**We are pleased to offer MICRUX microfluidic cells, sensors and platforms to complement our BASi range.**

**We are now the official UK distributor for EL-Cell battery fixtures and cells (more in our Energy News page in this newsletter.**

For more information: [www.alvatek.co.uk](http://www.alvatek.co.uk)

Email: [info@Alvatek.co.uk](mailto:info@Alvatek.co.uk)

Call us on: 0800 566 8228

# New Product Information



Alvatek Ltd, Unit 48 Basepoint Business Centre, Premier Way,  
Abbey Park Industrial Estate, Romsey, Hampshire, SO51 9AQ  
Telephone: 0800 566 8228 Fax: 0870 751 5064  
Email: info@alvatek.co.uk www.alvatek.co.uk

## Energy Research Solutions - What's New?

### EL-Cell – battery test cells & fixtures

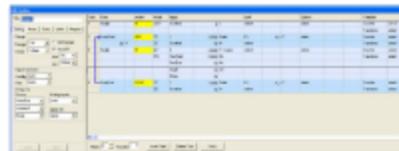
Alvatek is now the official UK exclusive distributor for EI-Cell GmbH. EI-Cell's unique combination of Electrochemistry and mechanical engineering expertise is evident in its innovative and high quality range of cells, systems and dilatometers for battery research.

- Test Cells
- Temperature chambers
- Precision Tools: cutters and punches
- Dilatometers



### Ivium CycliScan – cyler software

Included IviumSoft, Ivium's electrochemical software, CycliScan provides a look and feel familiar to battery researchers. Also adds functionality (such as **drive cycle simulation**) and safety features essential for battery research.



### IVICycle – 32 channel cycler with EIS

This **32 channel multi-potentiostat / battery cycler** includes independent EIS per channel and both Cycler and Electrochemistry capabilities.

- 30mA to 5A per channel (16A with booster).
- Per-channel costs start around £1K.



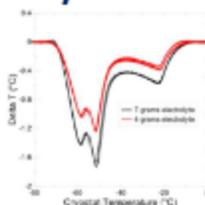
### NanoCycler – 8-channel cycler

- 10mA per channel OR
- 100mA max per channel
- Including software < £4,000 total



### Non-destructive Electrolyte Measurements

Novonix's Differential Thermal Analysis (DTA) system enables the reliable measurement of the evolution of liquid electrolyte in lithium-ion cells and other electrochemical cells.



### Electrolyser Test Systems

Scribner's new 600ETS and E857 systems flexibly address electrolyser researcher requirements across a wide range of materials, liquids and gases.



For more information: [www.alvatek.co.uk](http://www.alvatek.co.uk)

Email: [info@Alvatek.co.uk](mailto:info@Alvatek.co.uk)

Call us on: 0800 566 8228



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**ALVATEK**

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E. info@alvatek.co.uk

## Electrochemistry? There's an app for that



 **PStouch**

Use your PalmSens and EmStat  
with a tablet or smartphone



 Bluetooth

 **PalmSens**     
Compact Electrochemical Interfaces

# New Product Information



**PalmSens<sup>3</sup>**



Potentiostat / Galvanostat / Impedance Analyser

**EmStat<sup>3</sup> and 3+**



Potentiostat

**EmStat<sup>3</sup> MUX8**



EmStat3 with integrated 8 channel multiplexer (MUX8)

**EmStat<sup>3</sup> MUX16**



EmStat3 with integrated 16 channel multiplexer (MUX16)

**MultiEmStat<sup>3</sup>**



4 channel multipotentiostat with EmStat3 modules

**MultiEmStat<sup>3</sup> and 3+**



4, 8 or 12 channel multipotentiostat with EmStat3 or EmStat3+ modules

**EmStat<sup>3</sup> 4WE**



Polypotentiostat for use with up to 4 working electrodes.

Distributed in the UK by



**ALVATEK**

Tel: 01666 500991  
Email: [info@alvatek.co.uk](mailto:info@alvatek.co.uk)  
[www.alvatek.co.uk](http://www.alvatek.co.uk)

## New Product Information



Tel: 01666 500991

Electrochemistry, Fuel Cell & Battery Research & Test Solutions

**April 2013:**

### **ALVATEK and BASi sign UK distribution contract**

**A Selection from the BASi range of electrochemistry accessories.  
These can be found at [www.basinc.com/products/ec.html](http://www.basinc.com/products/ec.html)**

#### **Electrochemical Cell Packages**

- C-3 Cell Stand for Voltammetry
- Controlled Growth Mercury Electrode (CGME) for Polarography
- RDE-2 Rotating Disk Electrode
- Bulk Electrolysis Cell
- Thin-Layer Cross-Flow Cell
- Spectroelectrochemical Cell
- Glucose Sensor Interface

#### **Electrodes**

- Working Electrodes for Voltammetry
- Working Electrodes for Bulk Electrolysis
- Microelectrodes
- Reference Electrodes
- Auxiliary Electrodes
- Wired Enzyme Electrode
- Polishing Kit and Supplies

#### **Cells**

- Cell Vials
- Cell Tops
- Gas Sparging & Magnetic Stirring
- VC-2 Voltammetry Cell
- Low Volume Cell



For more information on any of the above products please contact Steve Fryatt at Alvatek



Tel: 01666 500991

Email: [info@alvatek.co.uk](mailto:info@alvatek.co.uk)

[www.alvatek.co.uk](http://www.alvatek.co.uk)

## New Product Information

### WHISTONBROOK TECHNOLOGIES LIMITED

*'experts in electrochemical equipment'*

Tel: 01582 434252

[www.whistonbrook.com](http://www.whistonbrook.com)



Whistonbrook Technologies design, manufacture and supply a full range of standard and custom potentiostats and other electrochemical instrumentation to meet all your needs.



#### Analogue Potentiostats

- Low noise analogue potentiostats
- Single channel and dual channel units
- Current ranges from 1nA to 10mA

Prices from £1990

#### Point of Care (POC) and Medical Diagnostic Instrumentation

- Instruments and software developed for medical diagnostic sensors



#### Electrochemical Instruments for Student Experiments

- Potentiostats
- Amplifiers for Neuroscience
- Galvanostats
- High impedance buffer amplifiers
- Loads for fuel cells
- Analogue and Digital

Prices from £325\*

\*cost of 200off

#### Digital Instrumentation with PC software packages

- EzeScan 4 – entry level potentiostat
- EzePG – potentiostat/galvanostat
- Quad potentiostat – four channel potentiostat
- EzeTouch – portable touch screen potentiostat

Prices from £2470



Website	<a href="http://www.whistonbrook.com">www.whistonbrook.com</a>
Telephone	01582 434252
Email	<a href="mailto:info@whistonbrook.com">info@whistonbrook.com</a>

Whistonbrook Technologies Limited, Unit C24, 110 Butterfield, Great Marlings, Luton, Beds, LU2 8DL



# MTZ-35

## The new benchmark of impedance analyzers



Exploring new frontiers of impedance testing  
with a wide frequency range impedance analyzer  
and a full range of ancillary equipment.

### MEASUREMENT RANGES

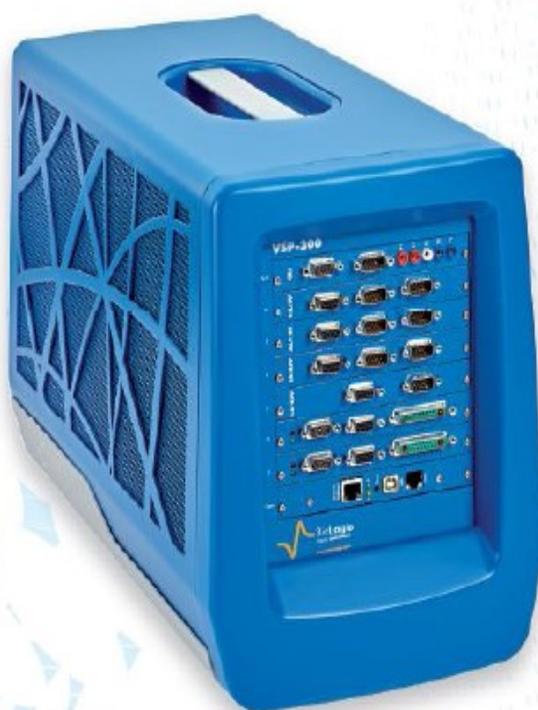
- Frequency range 10  $\mu$ Hz to 35 MHz
- Inductance 10 nH to 10 kH
- Capacitance 1 pF to 1000  $\mu$ F
- Resistance 1 m $\Omega$  to 100 M $\Omega$

3e7

HIGH END MULTICHANNEL POTENTIOSTAT/GALVANOSTAT

# VSP-300

The ultimate versatile multipotentiostat



 **BioLogic**  
Science **Instruments**

## APPLICATIONS

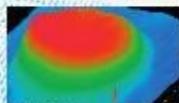
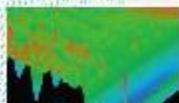
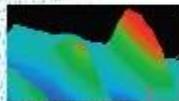
- Batteries/supercapacitors
- Fuel cells/photovoltaic cells
- Fundamental electrochemistry
- Corrosion

## New Product Information



### Application areas:

bio-sensors,  
biochemistry,  
corrosion,  
coatings,  
catalysts...



# M470

## Introducing the 4<sup>th</sup> generation of scanning probe electrochemical workstations

- **9 available techniques:**  
SECM, LEIS, SVP, SDS, SKP, OSP, ic-SECM, ac-SECM, ac-SDS
- High performance scanning stage:  
0.09 nm ultimate z-resolution,  
20 nm resolution on all axes,  
100 mm scan range on all axes,  
10 mm/s max scan speed
- New innovative techniques:  
ic-SECM offering true simultaneous imaging  
of topography and reactivity,  
ac-SECM offering measurement of surface  
conductivity without a mediator.
- Fully integrated potentiostat/galvanostat/FRA:  
±10 V potential range, current ranges from 1 A to 1 nA,  
1 MHz to 1µHz EIS capability



Product developed and manufactured by Electrochemical Society Ltd,  
a Bio-Lab Group company

[www.bio-logic.info](http://www.bio-logic.info)



ec-lab

EC-Lab Ltd.  
[www.ec-lab.co.uk](http://www.ec-lab.co.uk)

Tel: 01753 822522  
E-mail: [sales@ec-lab.co.uk](mailto:sales@ec-lab.co.uk)

# New Product Information

## VMP-300



POTENTIOSTAT/GALVANOSTAT



The ultimate multichannel electrochemical workstation



### Modularity

- Multi-users
- Up to 16 independent channels
- EIS capability (10  $\mu$ Hz to 7 MHz)
- Ultra Low Current (100 nA to 1 pA)
- Current boosters: 1A/48V, 2A/30V, 4A/14V, 10A/5V
- Current boosters in parallel
- Linear Scan Generator (1 MV/s)

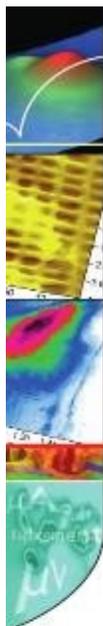


### Unique features

- Up to 48 V control
- Up to 150 A (amplifiers in parallel)
- 1 pA min. current range
- 1  $\mu$ s min. acquisition time



## New Product Information



# SensorSTAT

uniscan instruments



The Uniscan SensorSTAT™ is a high quality digital scanning multi-channel potentiostat system. The modular design provides a user configurable system for demanding research applications.

- Configurable for 8 to 14 channels
- Single USB connection controls all channels
- Ultra low noise current performance
- UiEChem™ software supplied with system
- Analogue triggering
- 5-WE multiplexing on each channel
- Interfaces to commercial electrochemical sensors
- User programmable techniques via macro programming
- ActiveX software for LabView™ applications



 uniscan instruments  
A  BioLogic company  
Science Instruments

Represented by:



ec-lab

Web: [www.ec-lab.co.uk](http://www.ec-lab.co.uk)  
e-mail: [sales@ec-lab.co.uk](mailto:sales@ec-lab.co.uk)

Tel: +44(0)1753 822522  
Fax: +44(0)1753 822002

## *New Product Information*

# Metrohm Autolab



Metrohm Autolab has been a member of the Metrohm Group since 1999. Metrohm Autolab customers can look expect excellent sales and service support from a dedicated team of Electrochemists based at Metrohm's prestigious laboratories at Daresbury near Runcorn.

Metrohm Autolab produces four different potentiostat/galvanostat lines for a wide range of electrochemical applications, as well as modular extensions, software and accessories.



**Metrohm**  
Autolab U.K.

[www.metrohm-autolab.co.uk](http://www.metrohm-autolab.co.uk)

Tel: 01928 579 600

Email: [autolab@metrohm.co.uk](mailto:autolab@metrohm.co.uk)

# New Product Information

**DROPSSENS**

**Metrohm**  
U.K. Ltd.

$\mu$ Stat 8000P Multi Potentiostat

Ref. STAT8000P



DropSens is proud to announce the launch of the NEW portable Multi Potentiostat  $\mu$ Stat 8000P.

Our brand new instrument, of only 22x20x7 cm, includes 8 channels that can act at the same time as 8 independent potentiostats; it also includes one multichannel that can act as a potentiostat where up to 8 working electrodes share an auxiliary and a reference electrode.

With  $\mu$ Stat 8000P users can perform up to 8 different electrochemical techniques at the same time; or carry out the study of one technique's parameter in just one step by applying the same electrochemical technique in several channels but selecting different values for the parameter under study. These are just examples of the enormous capabilities that our new instrument offers.

$\mu$ Stat 8000P can be applied for Voltammetric or Amperometric measurements, including 11 electroanalytical techniques. In addition,  $\mu$ Stat 8000P owners can later upgrade their instrument to a  $\mu$ Stat 8000 by just purchasing an extension. This self-upgrade does not require any hardware modification, but it is implemented by means of a Galvanostat software update kit.

The NEW portable Multi Potentiostat is Li-ion Battery powered (DC charger adaptor also compatible), and can be easily connected to a PC via USB or Bluetooth®.

$\mu$ Stat 8000P is controlled by the powerful software "DropView 8400" which allows plotting of the measurements and performing the analysis of results. DropView software provides powerful functions such as experimental control, graphs or file handling, among others.

Available techniques:

#### POTENTIOSTAT

##### Voltammetry

LSV	Linear Sweep Voltammetry
CV	Cyclic Voltammetry
SWV	Square Wave Voltammetry
DPV	Differential Pulse Voltammetry
NPV	Normal Pulse Voltammetry
NDP	Differential Normal Pulse Voltammetry
ACV	AC Voltammetry

##### Amperometry

AD	Amperometric Detection
FA	Fast Amperometry ( $t_{90\%} < 0.1$ s)
PAD	Pulsed Amperometric Detection
ZRA	Zero Resistance Amperometry

**Contact us:**

email: [dropsens@metrohm.co.uk](mailto:dropsens@metrohm.co.uk) | website: [dropsens.co.uk](http://dropsens.co.uk) | Tel: 01928 579 600

# New Product Information

**DROPSSENS**

**Metrohm**  
U.K. Ltd.

µStat 8000P Multi Potentiostat

Ref. STAT8000P

Instrument Specifications	
● Power	Li-ion Battery (3300 mAh) USB DC charger adapter compatible (5-V, 1A W)
● PC interface	Bluetooth® USB
● Operating modes	8x 1 Channel Potentiostat 1x 8 Channel Potentiostat
● DC Potential range	±4.095V
● Current ranges (potentiostat)	±1 nA to ±100 mA (9 ranges)
● Maximum measurable current	±50 mA
● Rise time	20 µs
● Applied Potential Resolution	1 mV
● Measured Current Resolution	0.025 % of current range (1 µA on lowest current range)
● Potential Accuracy	±0.2 %
● Current Accuracy	±0.5 % (current range dependent)
● External inputs/outputs	- 5 Digital Input/Output pins (PIO 1, PIO 2, PIO 3, PIO 4, PIO 5) - 3 Analog Inputs (multiplexing PIO 1, PIO 2, PIO 3) - 2 Analog Outputs (configurable I-out or O-out)
● Indicators	LCD display in front panel
● Dimensions	22.2 cm x 20.5 cm x 7.5 cm L x W x H
● Weight	1.4 kg

Control Specifications				
General Pre-treatment	Conditioning stage duration:	0 – 1300 s		
	Deposition stage duration:	0 – 1300 s		
	Equilibration stage duration:	0 – 1300 s		
General Parameters	Begin, End, Base, Voltage potentials:	-4.095V to +4.095V		
	Step potential:	1 mV to 500 mV		
	Pulse potential:	1 mV to 250 mV		
	Scan rate:	1 ms up to 1.3 s per step		
Specific Parameters	SWV	Frequency:	1 Hz to 490 Hz	
		Amplitude:	1 mV to 250 mV	
	DPV, NPV, NDP	Modulation time:	1 ms to 1300 ms	
		Pulse time:	1 ms to 1300 ms	
	ACV	Frequency:	2 Hz to 250 Hz	
		Amplitude:	5 mV to 250 mV (80%)	
	Chrono, Methods (AD, 2SA)	Interval time:	0.1 s to 1300 s	
		Run time:	Hours 165000 points	
	Fast Chrono, Methods (FA)	Interval time:	1 ms to 1300 ms	
		Run time:	Hours 165000 points	
(RD)	Pulse time:	1 ms to 1300 ms		
	Interval time:	10 ms to 1300 ms		
Run time:	Hours 165000 points			

Specifications are subject to change without previous notice

Related products



CABSTAT1



CABSTATMULTI



CAST



CAST8X



8X110

Contact us:

email: [dropsens@metrohm.co.uk](mailto:dropsens@metrohm.co.uk) | website: [dropsens.co.uk](http://dropsens.co.uk) | Tel: 01928 579 600

# PARSTAT™ MC

multichannel potentiostat/galvanostat

Protect Your Experiment From  
the Unexpected



Designed to protect your experiment from the unexpected, the PARSTAT™ MC is the most modular and robust multi-channel electrochemical testing platform on the market. It builds on our industry-leading 50+ years of experience in potentiostat development and software user-interface design.



- The *ultimate* in modular design
- Widest dynamic current range of 2 Amps to 4 nA (120 fA resolution) as standard. No need for expensive hardware options
- Hot-swappable channels allow potentiostats to be added or removed without interruption of experiments on other channels
- Fast data acquisition at 500 kS/sec allows for a wide range of high speed applications
- Features the most popular electrochemical acquisition and analysis software solution, VersaStudio
- Floating ground allows testing of multiple samples in the same cell



[www.princetonappliedresearch.com](http://www.princetonappliedresearch.com)  
[pari.info@ametek.com](mailto:pari.info@ametek.com)  
P: 885.425.1289 F: 885.481.2410



# New Product Information



Not so much an instrument...



...more an orchestra.

The definitive modular system for electrochemical research, ModuLab delivers sublime performance for a vast repertoire of applications...

- High performance 'Plug & Play' modules
- 64 MB/s smooth scan - LSV, LSF, CV
- Up to 1 MB/s data acquisition - pulse, CV
- 100 nA current resolution
- Up to ±20 A current - scan / pulse
- ±100 V compliance and polarization
- 10 μΩ impedance measurement
- >100 TΩ impedance measurement
- Multiple high-speed EIS techniques



**solartron**  
analytical

US: Tel: 1-866-426-1350  
Fax: 1-360-331-2710  
UK: Tel: +44 (0)1252 556900  
Fax: +44 (0)1252 556909  
Email: solartron.info@ametek.com  
www.solartronanalytical.com

**AMETEK**

**ModuLab** the new gold standard for electrochemical instrumentation  
To compose an electrochemical test system that's totally in tune with your research requirements, contact Solartron today.

## *New Product Information*

### **New Solartron EnergyLab XM for Energy Research**

The Solartron EnergyLab XM is an electrochemical impedance workstation designed specifically for energy storage research:

- Batteries
- Supercapacitors
- Fuel cells

### **New Application-Focussed Product Line**

The EnergyLab XM is the first of a new application-specific range of potentiostats from Solartron Analytical (Ametek), with small footprints and affordable pricing. There will be four systems in the range, which will be launched over the coming months.

Follow Blue Scientific on Linked In to receive details of the new instruments as they are announced.

### **EnergyLab XM**

The first product in the series to launch is EnergyLab XM, for impedance testing of a variety of energy storage devices, including the testing of batteries, supercapacitors and fuel cells. The system includes all components required for this area of research, eliminating the need for costly hardware add-ons. The system includes:

- A reference grade potentiostat
- Frequency response analyser (FRA)
- 2A booster

The unit may be operated in boosted or unboosted mode (with automatic switching), providing optimum test conditions and accuracy for a wide range of devices.

EnergyLab XM's extreme sensitivity is ideal for complete characterisation of prototype low current or low impedance new generation cells. If high current is needed, external boosters can be connected and automatically controlled, allowing fully integrated high current tests at up to 100A.

For more information and quotes, please contact Blue Scientific, exclusive distributor for Solartron Analytical in the UK and Ireland, on 01223 422 269 or [info@blue-scientific.com](mailto:info@blue-scientific.com)

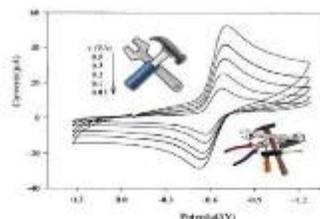
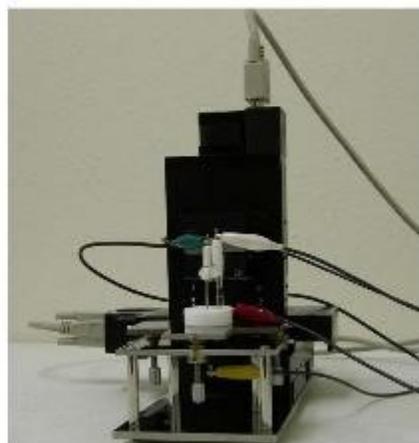


 bluescientific

[www.blue-scientific.com](http://www.blue-scientific.com)

## Tools for Electrochemists!!!

CH Instruments at IJ Cambria Scientific



### CHI920D SECM

The latest closed loop scanning electrochemical microscope

#### Products and accessories

- Wide range of electrochemical instrumentation; as well as potentiostats (and bipotentiostat) we have multiplexers, multichannel potentiostats, EQCM, and electrochemical detectors (ECDs) for LC and sensor use.
- Modules for very low current (pA range), compliance boost and rotating ring disk electrodes (RRDE)
- All instruments are very well developed and available at a very cost effective price; software included!
- In addition, we distribute the excellent ALS Ltd range of electrochemical accessories. We always keep a large stock of reference electrodes, working electrodes (including microelectrodes), and counter electrodes.
- We will almost always have the accessory parts that you require in stock for rapid delivery

IJ CAMBRIA  
SCIENTIFIC

#### Contact:

IJ Cambria Scientific Ltd ♦ 39 Clos Bryn Haul ♦ Llanelli ♦ Carmar ♦ SA14 9DZ . U.K.  
Phone: 01554 835050 ♦ Fax: 01554 835060 ♦ E-mail: info@ijcambria.com  
(Mobile: 07987 287343)  
IJ Cambria Scientific: www.ijcambria.com  
(Reg. No. 4772897)

# New Product Information



Think & Innovate



Thin-film microelectrodes

» POTENTIAL IN ELECTROCHEMISTRY

Thin-film technologies enable the manufacture of standard and customized (micro)electrodes with a low-cost, high precision and resolution. Micrux can adapt the electrochemical system to the requirements of the customers applications.

Thin-film accessories: flow cell and universal connector have been developed to use in combination with these electrodes.



Flow cell

## » PROFICIENCY IN MICROFLUIDICS

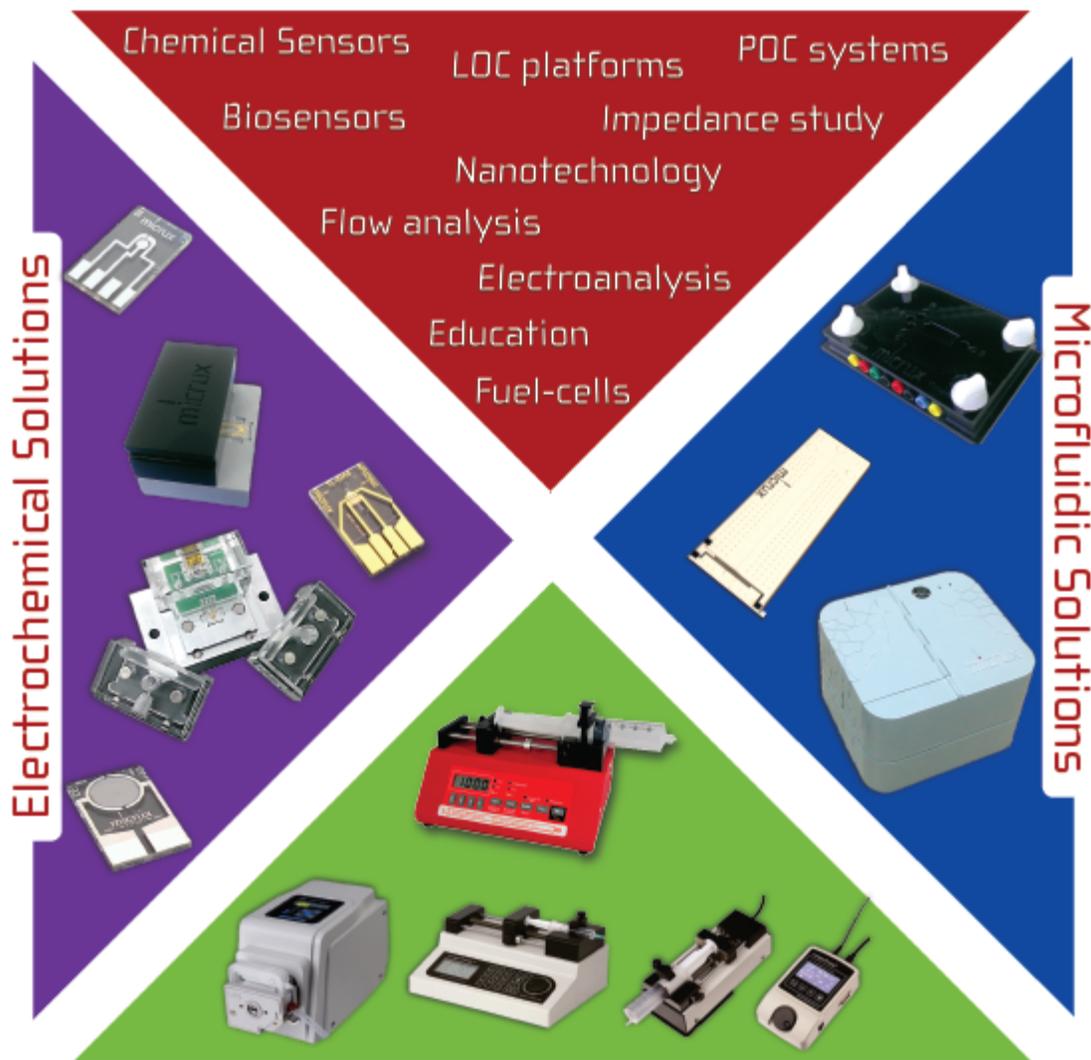
Micrux has experience in developing capillary Electrophoresis microchips with electrochemical detection and the small and totally portable instrumentation to use them: Holder, iHVStat, miniPump, etc.



[www.micruxfluidic.com](http://www.micruxfluidic.com)

[sales@micruxfluidic.com](mailto:sales@micruxfluidic.com)

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