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ModVal 2024

20th Symposium on Modeling and Experimental Validation of Electrochemical Energy Technologies



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The authors bear the entire responsibility for the content of this report and for the conclusions drawn therefrom.



Summary

The 20th edition of the Symposium on Modeling and Validation of Electrochemical Energy Technologies (ModVal 2024) took place on April 13 and 14, 2024 in Baden AG. The Trafo venue proved to be very suitable, as it is only a few minutes' walk from the train station and Baden is easily accessible by public transport and private vehicles. The program comprised 54 talks, including 2 plenary and 4 invited presentations, and 77 posters. The presentations were divided into two parallel sessions, 'Batteries' and 'Conversion Devices'. ModVal 2024 was attended by 214 participants from 16 countries, with participants from Germany and Switzerland representing the largest share (~75%). The conference contributions are bundled in the 'Book of Abstracts' and electronically accessible via a DOI number. The next ModVal conference in Switzerland is expected to take place at EPFL in 2026.

Zusammenfassung

Die 20. Ausgabe des Symposiums über Modellierung und Validierung elektrochemischer Energietechnologien (ModVal 2024) fand am 13. und 14. April 2024 in Baden AG in statt. Der Veranstaltungsort Trafo hat sich als sehr geeignet herausgestellt, da er nur einige Gehminuten vom Bahnhof Baden entfernt ist und Baden verkehrstechnisch sehr gut erschlossen ist, sowohl mit öffentlichen Verkehrsmitteln als auch mit dem Privatfahrzeug. Das Programm umfasste 54 Vorträge, davon 2 Plenar- und 4 eingeladene Vorträge, und 77 Posterbeiträge. Die Vorträge wurden in zwei parallele Themenblöcke aufgeteilt, 'Batterien' und 'Elektrochemische Wandler'. ModVal 2024 wurde von 214 Teilnehmenden aus 16 Ländern besucht, wobei die Teilnehmer:innen aus Deutschland und der Schweiz den grössten Anteil darstellten (~75%). Die Konferenzbeiträge sind im 'Book of Abstracts' gebündelt und elektronisch über eine DOI Nummer zugänglich. Die nächste ModVal Konferenz in der Schweiz wird 2026 voraussichtlich an der EPFL stattfinden.



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1 Introduction

1.1 Description of ModVal 2024

The ModVal symposia were initiated in 2004 by the Swiss Federal Office of Energy and have since then taken place annually in locations alternating between Switzerland and Germany, initially focusing on pertinent topics in the development of fuel cells, in particular the polymer electrolyte fuel cell (PEFC) and the solid oxide fuel cell (SOFC). Over the years, the scope of the symposium has expanded to rechargeable batteries and now also includes water and CO₂ electrolyzers as well as flow batteries. All of these are clustered under the general term 'electrochemical energy technologies', highlighting their intended use as energy storage and conversion devices for a range of applications, ranging from electromobility, decentralized power generation, to stationary energy storage and use in industrial processes.

ModVal aims at disseminating new results in research, fostering the exchange of ideas, notably between experimentally oriented and simulation centered research, promoting personal contacts, and stimulating new collaborations. It is targeted at colleagues from academic and governmental institutions as well as industry.

1.2 Sponsors

We were successful in reaching out to various sponsors for ModVal 2024 (Figure 1). The basic sponsoring package included listing of the company logo at the conference, printed and online documents. With the advanced package, sponsors could additionally set up a booth in the foyer area of the conference venue to promote their products and services. This opportunity was used by 4 out of the 9 sponsors.



Figure 1: Sponsors of ModVal 2024

1.3 Program

The 2-day conference program was structured along the two parallel sessions on 'Batteries' and 'Conversion Devices', where the first contribution on both days were the plenary talks of 45 min duration (Figure 2). On Day 1, after an introduction by the organizers, Prof. Ulrike Krewer from the Karlsruhe Institute of Technology (KIT) gave the first plenary lecture on the topic of 'Electrosynthesis: Modeling Processes at Electrodes'. The second plenary talk on Day 2 was given by Prof. Arnulf Latz from the German Aerospace Center (DLR) and Helmholtz Institute Ulm entitled 'Battery Design by Modeling and Simulation: From Particle over Electrode Structure to Cell Performance'. Four invited talks (30 min) were



scheduled in the two sessions as first contributions after lunch on both days. The 48 contributed talks (20 min) were structured into 7 sessions each for 'Batteries' and 'Conversion Devices'. In fact, 27 abstracts submitted for 'oral presentation' had to be reallocated to 'poster presentation' due to the limited number of slots.

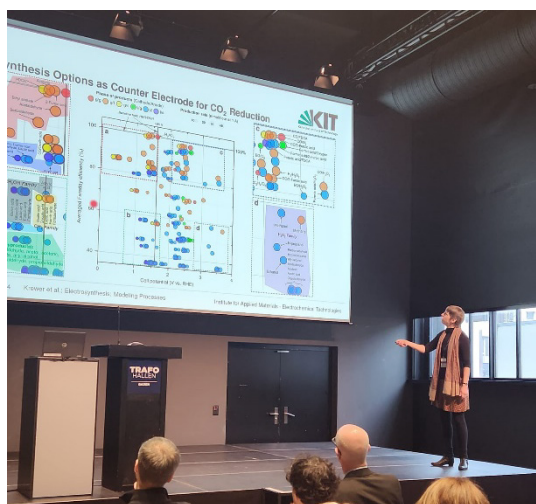


Figure 2: Prof. Ulrike Krewer and Prof. Arnulf Latz giving their plenary talks.

Posters were on display in the foyer area of the venue (Figure 3), and a dedicated poster session was scheduled on Day 1 from 17:30 to 19:00. The large number of posters (77) reflected the large interest in participants in sharing their research results and engaging in scientific exchange. The poster awards were determined by anonymous voting by the participants (Figure 4).

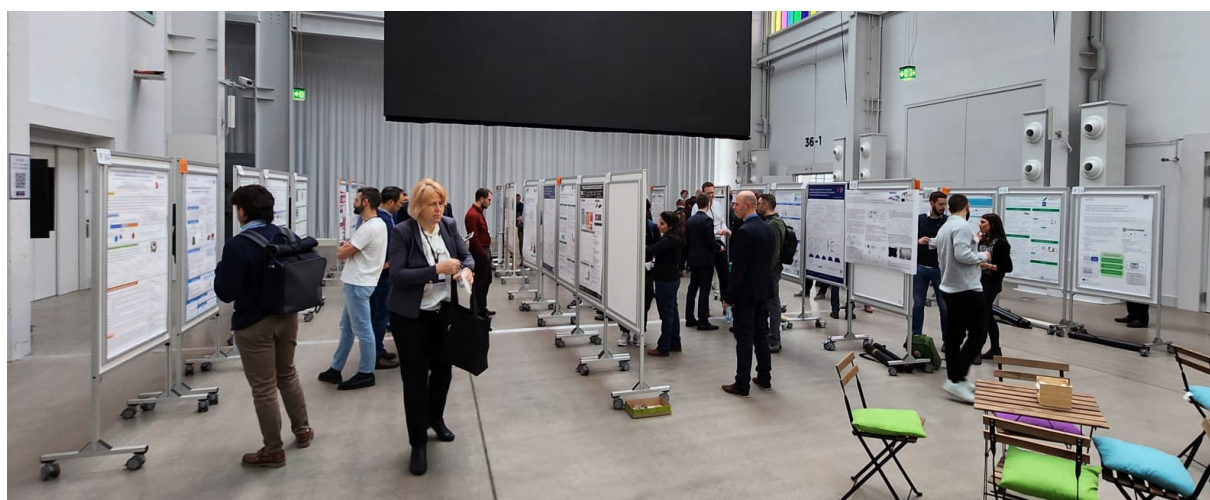


Figure 3: Poster area.

The conference dinner was held at the evening of Day 1 at the Trafohalle (Figure 5).

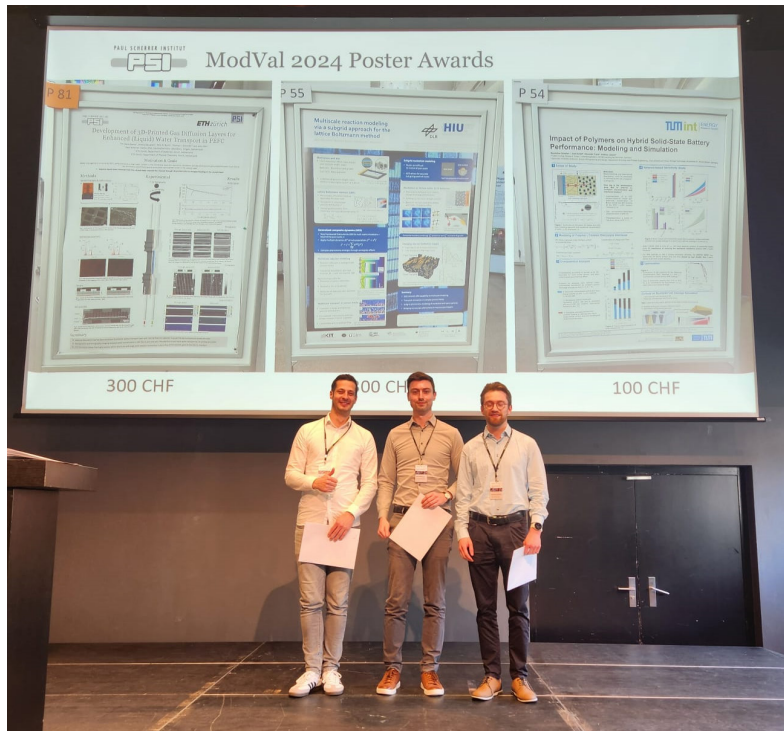


Figure 4: Poster awards: Tim Dörenkamp (PSI), Julius Weinmiller (German Aerospace Center at Helmholtz Institute Ulm), Maximilian Scheller (TU München and TUMint Energy Research)



Figure 5: Conference Dinner (Trafohalle)



1.4 Participants

A total of 214 participants attended ModVal 2024. The previous ModVal symposium organized by PSI in 2018 was attended by 151 participants. This shows the growing interest in electrochemical conversion and storage technologies. In particular, the number of battery contributions has strongly increased over the past 10 years. The statistics of the countries of origin of the attendees (affiliations) of ModVal 2024 are given in Table 1.

Table 1: Participant statistics.

Country	Number of participants
Germany	107
Switzerland	57
United Kingdom	14
France	12
Austria	4
Italy	3
Norway	3
Denmark	2
Korea	2
Lichtenstein	2
Spain	2
Sweden	2
Belgium	1
India	1
Poland	1
The Netherlands	1
total	214

1.5 Output

The domain www.modval2024.ch has been registered in preparation of the symposium and will continue to be available for some time [1]. It is a forwarding domain that redirects the user to the conference website <https://indico.psi.ch/event/13209>, which is permanent. It can also be accessed via www.psi.ch/modval2024.

The abstracts of the contributions presented at ModVal 2024 as talks or posters have been collected in the book of abstracts (Figure 6), along with the conference program and organizational information (180 pages). The final version of the document has been uploaded to the Research Collection repository of ETH Zürich and can be accessed via the DOI number 10.3929/ethz-b-000662523 [2]. This allows authors to cite the work in their scientific articles.

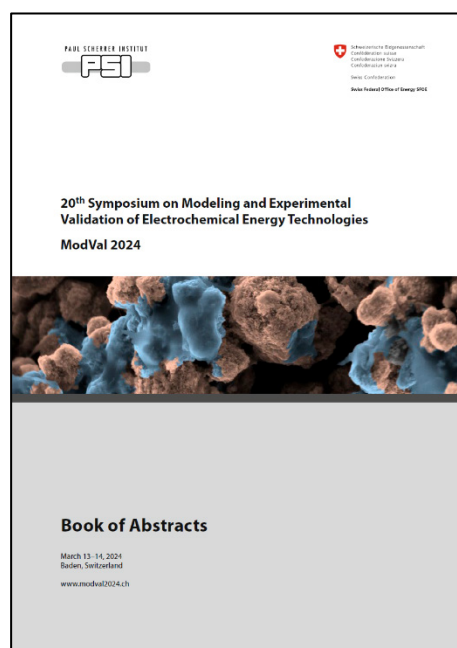


Figure 6: Book of Abstracts title page



2 Outlook

The ModVal conferences are held annually, alternating between locations in Germany and Switzerland. ModVal 2025 will be held on March 11 and 12, 2025 in Karlsruhe, Germany, with the lead organizer Prof. Wolfgang Bessler: www.hs-offenburg.de/en/research/transfer/transfer-events/modval-2025. The next ModVal conference in Switzerland in 2026 will be organized by Prof. Sophia Haussener, EPFL. In keeping with the format, the next ModVal conference expected to be organized by PSI will be in 2028.

3 References

1. ModVal 2024 conference website (permanent URL): www.psi.ch/modval2024 → <https://indico.psi.ch/event/13209>
2. ModVal 2024 Book of Abstracts, <https://dx.doi.org/10.3929/ethz-b-000662523>