Next-generation batteries: European leading-edge technology to leverage electromobility (in English)

The development of next generation batteries is a key factor for a successful market introduction of electric vehicles urgently needed to achieve mandatory emission targets for greenhouse gases and pollutants. To secure the competitiveness of the automotive industry the European Commission has started a comprehensive initiative for the setup of a battery cell production in Europe. The session presents SWOT-analyses of existing and future battery cells and other components, their integration to stacks and into the vehicle as well the international cooperation needed for a breakthrough in electromobility.

Chair: Ingolf Schädler  
Deputy Director General of Section III and Head of Division for Innovation, Austrian Federal Ministry for Transport, Innovation and Technology (BMVIT), Vienna

Moderator: Andreas Dorda  
Deputy Head of Unit Mobility and Transport Technologies, Austrian Federal Ministry for Transport, Innovation and Technology (BMVIT), Vienna

Coordination: Walter Mauritsch  
Scientific Collaborator, Business Unit Mobility Innovations, AustriaTech GmbH, Vienna

13:00 - 13:05  Welcome, goals and outline of the panel discussion  
Ingolf Schädler  
Deputy Director General of Section III and Head of Division for Innovation, Austrian Federal Ministry for Transport, Innovation and Technology (BMVIT), Vienna

13:05 - 13:20  The Austrian Battery Initiative  
Christian Chimani  
Head of Center for Low-Emission Transport, AIT Austrian Institute of Technology GmbH, Vienna

13:20 - 15:00  Panel discussion 1: Research and battery producers  
Christian Chimani  
Head of Center for Low-Emission Transport, AIT Austrian Institute of Technology GmbH, Vienna  
Stefan Koller  
Managing Director, VARTA Micro Innovation, Graz  
Jean-Baptiste Pernot  
Vice President Transformation & Operational Excellence, Saft, Levallois-Perret  
Margret Wohlfahrt-Mehrens  
Head of Department Accumulators Materials Research, ZSW - Center for Solar Energy and Hydrogen Research, Ulm

15:00 - 15:30  Questions from the audience

15:30 –16:00  Coffee Break
16:00 - 17:30  Panel discussion 2: Vehicle industry and technology policy

Gero Kempf  
Chief Engineer, Jaguar Land Rover, Coventry

Helmut List  
Chief Executive Officer, AVL List GmbH, Graz

Carl Rosén  
Director-General of the Swedish Ministry of Enterprise and Innovation, Stockholm

Manuel Szapiro  
Member of Cabinet of Vice-President Maroš Šefčovič, European Commission, Brussels

17:30 - 17:50  Questions from the audience

17:50 - 18:00  Résumé and outlook

Andreas Dorda  
Deputy Head of Unit Mobility and Transport Technologies, Austrian Federal Ministry for Transport, Innovation and Technology (BMVIT), Vienna
Christian Chimani: Head of Center for Low-Emission Transport, AIT Austrian Institute of Technology GmbH, Vienna

Abstract

The AIT Austrian Institute of Technology is Austria's largest research and technology organisation and a specialist in the key infrastructure issues of the future. The experts at the AIT Center for Low-Emission Transport develop innovations for efficient, intelligent and safe vehicle components. The focus is on key technologies for sustainable transport and mobility: powertrain electrification and material-based lightweight design and materials processing.

One main research area is Battery Technologies: The scientists at AIT are pursuing a holistic research approach to make batteries safer, more efficient, powerful and cost-effective. The battery development process covers the whole value chain – from synthesis of advanced battery materials, through electrode and cell manufacturing, battery testing, diagnostic and simulation, up to post-mortem analysis. The focus is primarily on the development of high-performance cathodes and high-energy anode materials as well as on the optimisation of known cell chemistries. A dry room with a state-of-the-art research pilot line for pouch cell manufacturing enables prototyping of lithium ion cells and brings fundamental research closer to industrial production to bridge the gap between academia and industry.
Stefan Koller: Managing Director, VARTA Micro Innovation, Graz

Abstract

VARTA Micro Innovation GmbH (VMI), with registered office in Graz (AUT), was founded in 2009 as a joint venture between VARTA Microbattery and Graz University of Technology (AUT).

Within VARTA Micro Innovation both, the industrial fabrication know how from VARTA Microbattery and the basic research know how from Graz University of Technology for various electrochemical energy storage systems are merged together. Today VARTA Micro Innovation is fully integrated as R&D centre within the VARTA Group with the main business purpose of development and validation of new material as well as process technologies and their transfer to the stage of industrial application. This work includes on the one hand the qualification of new material and process technologies, conceptualizing of implementation strategies and finally the demonstration within proof of concept prototypes.

In addition, VARTA Micro Innovation is also highly experienced in advanced analysis and electrochemical characterization of Li-Ion Batteries for different application fields (e.g. automotive, storage of renewable energies, consumer electronics, etc.).
Jean-Baptiste Pernot: Vice President Transformation & Operational Excellence, Saft, Levallois-Perret

Abstract

Saft, a wholly-owned subsidiary of Total, specializes in advanced technology battery solutions for industry, from the design and development to the production, customization and service provision. For nearly 100 years, Saft’s longer-lasting batteries and systems have provided critical safety applications, back-up power and propulsion for our customers. Our innovative, safe and reliable technology delivers high performance in space, at sea, in the air and on land. Saft is powering industry and smarter cities, while providing critical back-up functionality in remote and harsh environments from the Arctic Circle to the Sahara Desert.

Saft has been designing and delivering different electro-chemical battery solutions for hybrid and electric vehicles for more than 20 years, helping to cut CO₂ emissions, meet regulatory targets, limit fuel consumption and improve transport’s environmental footprint. Today, Saft solutions address:
Margret Wohlfahrt-Mehrens: Head of Department Accumulators Materials Research, ZSW - Center for Solar Energy and Hydrogen Research, Ulm

Abstract

Energy with a future – that has been ZSW's motto for nearly three decades. The Zentrum für Sonnenenergie-und Wasserstoff-Forschung Baden-Württemberg (Centre for Solar Energy and Hydrogen Research Baden-Württemberg - ZSW) is one of the leading institutes for applied research in the areas of photovoltaics, battery technology, fuel cells, renewable fuels, and energy system analysis.

The Ulm-based Electrochemical Energy Technologies division focuses on developing batteries and fuel cells, super capacitors for high-power storage, and new electrolysis technologies to generate hydrogen. Our research activities and services cover the value chain from end to end. This includes modelling and simulating electrochemical processes, synthesizing and characterizing innovative materials, optimizing components and their production processes, and qualifying new products in field-test sites. Working very closely with many allies from all industry sectors, research institutes and universities we take an application-minded approach to R&D.
Gero Kempf: Chief Engineer, Jaguar Land Rover, Coventry

Abstract

Jaguar Land Rover is the UK’s largest automotive manufacturer, built around two iconic British car brands: Land Rover, the world’s leading manufacturer of premium all-wheel-drive vehicles; and Jaguar, one of the world’s premier luxury sports saloon and sports car marques.

We employ more than 44,000 people globally and support around 260,000 more through our retailer network, suppliers and local businesses. Manufacturing is centred in the UK, with additional plants in China, Brazil, Austria and Slovakia.

At Jaguar Land Rover, we are driven by a desire to deliver class-leading vehicles, which will provide experiences our customers will love, for life. Our products are in demand around the globe. In 2017 Jaguar Land Rover sold 621,109 vehicles in 130 countries, with more than 80% of our vehicles being sold abroad.

Our innovation is continuous: we will spend in the region of £4.5 billion this year on new product creation and capital expenditure.

The transition to modern mobility must be seamless for customers. At Jaguar Land Rover, we are working at pace, refining and improving the efficiencies of our diesel and petrol engine technologies while simultaneously managing the technological changes required to move from ‘ICE’ (the internal combustion engine) to ‘ACES’ (autonomy, connectivity, electrification and shared) technologies. As we transition to full electrification over the years to come, we believe ICE technology will continue to be a critical option for consumers.

We believe the future is electric. From 2020 all new Jaguar Land Rover vehicles will be electrified, giving our customers even more choice. But even in a battery powered, autonomous future, customers will want cars that are exciting to drive, refined and agile on the road. The electric motor offers performance coupled with the luxury of silence. A real game changer for the industry, the all-electric Jaguar I-PACE which is now on sale gives us true competitive advantage. I-PACE’s 90kWh battery is made up of high energy density lithium-ion pouch cells. Its design and state-of-the-art thermal management system supports longevity and periods of sustained maximum power. We are also seeing success with our new Range Rover and Range Rover Sport PHEV models that blend battery electric power with our 300bhp 2.0-litre Ingenium petrol engine into a highly capable package that truly demonstrates sustainable luxury.

Our participation in the all-electric ABB FIA Formula E Championship provides an ideal testing ground – covering everything from charging times and battery life cycles to recycling techniques. This ‘race to road’ approach will help accelerate electric development. To enable future electrified models, we are now set on a course to become a leading expert in developing and manufacturing vehicle battery technologies.
Abstract

AVL is the world’s largest independent company for the development, simulation and testing solutions of powertrains (hybrid, combustion engine, transmission, electric drive, battery, fuel cell, control systems) for passenger cars, trucks and large engines as well as vehicle integration. Founded in 1948, AVL has more than 9,500 employees (2/3 engineers and scientists) all over the world. In 2017, sales revenues reached EUR 1.55 billion.

In addition to the electrification of powertrains, the company focuses strongly on new tasks in the field of autonomous driving, especially based on human centric experience. AVL has digitalized the vehicle development process with cutting-edge and highly scalable IT, software and technology platforms. In a highly agile and integrated development environment, AVL creates new customer solutions in big data, AI, simulation and embedded systems.

AVL has been leading Austria’s patent ranking list for many years. The large number of patents shows the very broad competence spectrum of technologies, processes and specific solutions.
Abstract

The Swedish parliament has determined that Sweden should be one of the first fossil-free welfare countries. By 2040, 100% of all energy shall be renewable, by 2030 emissions from domestic transports shall be reduced by at least 70% compared with 2010, and by 2045 Sweden shall be carbon-neutral.

Electrification of transport and machines is crucial to achieving these goals. Sweden therefore makes investments and policy changes to fast-track the green transition. To avoid creating new sustainability problems in the process, we need to establish value chains that are sustainable in every step.

Regarding batteries, actions are needed in relation to:
- A secure supply of sustainably produced raw materials.
- Enabling investment in large-scale battery production
- Charging and testing infrastructures
- Research and innovation, not least to establish commercially viable processes for recycling key battery materials like cobalt or lithium.
Abstract

The European Commission (EC) can be considered as the executive of the European Union. It promotes the European Union's general interest and takes appropriate initiatives to that end. It oversees the application of the Treaties and Union law under the control of the Court of Justice of the European Union. It ensures the European Union external representation for the policies under its remit. It executes the EU budget and manages relevant programmes. It initiates the Union annual and multiannual programming. It has a coordinating function and works in partnership with the Member States – and other key stakeholders - to deliver on the EU priority objectives. Its decision-making body is a College of Commissioners, which members are proposed by the Member States, chosen by its President, approved by the European Parliament as a result of its elections, and finally appointed by the European Council (EU Heads of State and government).

On 13 September 2017, the EC adopted its Industrial Policy Strategy with a clear objective, as reiterated by President Juncker: "to stay or become the world leader in innovation, digitisation and decarbonisation". Batteries are a case-in-point. The market for electric vehicles and also for energy storage is rapidly evolving in Europe with demand for batteries expected to grow exponentially in the upcoming years. Currently, there is however no battery cells production at scale in Europe. An incomplete batteries value chain and a dependence on non-European suppliers significantly undermines the EU leadership role in the clean energy and clean mobility transition, with potential long term consequences in terms of jobs and security of supply. There are huge assets in Europe which can be the basis for a strong batteries value chain, including mass production capability for cells. This represents a challenge for the industry and for national and European authorities alike.

With this in mind, Vice President Šefčovič launched the European Battery Alliance with Member States and industry in October 2017 to set out the measures needed to encourage the development of a competitive, innovative and sustainable battery supply chain in Europe. This work culminated with the adoption of the Strategic Action plan for Batteries on 17 May 2018 as part of the Third Mobility Package.

The Commission’s action plan for batteries includes a set of measures to boost up this sector i.e. to secure access to raw materials, financial and non-financial instruments to support manufacturing projects along the value chain, research and innovation, support to skills, and preparation of regulatory work to ensure that batteries are sustainable through their life cycle (production, use, reuse, recycling). While the lead should clearly remain in industry hands, the Commission and Member States can develop and implement an enabling framework to support EU industry becoming world leader in this strategic area.

On 15 October 2018 the Commission, Member States and key industrial stakeholders will take stock of the progress made in one year, since the launch of the Alliance, and look at the road ahead.