

AKE 1: Electrochemical Storage: Batteries and Fuel Cells

Zeit: Montag 9:00–10:00

Raum: S Aula

Hauptvortrag

AKE 1.1 Mo 9:00 S Aula

Energy Density, Lifetime and Safety - Not Only an Issue of Lithium Ion Batteries — ●MARTIN WINTER^{1,2}, FALKO SCHAPPACHER¹, MARKUS BÖRNER¹, and ALEX FRIESEN¹ — ¹MEET Battery Research Center, Westfälische Wilhelms-Universität Münster, Corrensstraße 46, 48149 Münster, Germany — ²Helmholtz Institute Münster (HI MS), IEK-12, Forschungszentrum Jülich GmbH, Corrensstraße 46, 48149 Münster, Germany

Lithium ion batteries (LIBs) became the most important rechargeable electrochemical energy-storage system for portable consumer electronics devices and are presently advancing to a key technology for enabling the broad commercial launch of electric vehicles (EV). For a broad acceptance of this technology and a market breakthrough of EVs several issues have to be addressed to overcome customers' objections against this technology. The cruising range and hence the energy density (Wh/L) and specific energy (Wh/kg), respectively, is a most crucial parameter. Different cell chemistries are discussed as alternative for LIB to increase the energy density, but the advantages and disadvantages (e.g. energy density, lifetime and safety) of these so-called Post-LIB systems and other alternatives with respect to LIBs and advanced LIBs have to be compared carefully.

In this presentation, we will highlight the most recent findings in view of practically realizable specific energies and energy densities of various battery chemistries as well as the safety and aging characteristics of LIBs and will compare it with state of the art technologies.

Hauptvortrag

AKE 1.2 Mo 9:30 S Aula

Fuel Cells - A complement and an Alternative to Batteries on the Path to Application — ●K. ANDREAS FRIEDRICH — German Aerospace Center (DLR), Institute of Engineering Thermodynamics, Pfaffenwaldring 38-40, Stuttgart 70569, Germany

Fuel cells are acknowledged as essential parts of the necessary transition of the energy system as required by the commitments to climate protection in the frame of COP21 and COP22. Fuel cell development has reached an advanced maturity stage as demonstrated by the first series cars from Asian manufacturers, the approaching commercialization of stationary systems in Europe as well as the successful market penetration of residential fuel cell systems in Japan. With the advancement of fuel cell application in cars a concurrent built-up of a hydrogen refueling infrastructure is needed. The first hydrogen infrastructure areas are located in California, Germany and Japan. In order to achieve a global reach, however, much more efforts worldwide are needed. In this presentation an overview over the state-of-art of fuel cells, with a focus on polymer electrolyte membrane (PEMFC) and solid oxide fuel cells (SOFC) is given accompanied by a critical assessment of achievements and challenges. The advantages and disadvantages in comparison to other technologies, in particular batteries, is discussed. The system design of a hybrid fuel cell with a battery exhibits many beneficial properties that will be described. Finally, some applications are highlighted, e.g. propulsion of aircraft, in which fuel cells are a necessity to achieve the requirements.