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The environmental impact of Li-ion batteries and the role of key parameters

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The environmental impact caused by the production of Li-ion battery systems is often disregarded when assessing e-mobility. Nevertheless, significant impacts are associated with battery manufacturing, which gain significance when electricity from renewable sources is used for battery charging. The presentation provides a general picture of the environmental impacts associated with Li-ion battery production and the differences between existing battery chemistries in this regard. Based on a recent review of all environmental studies on lithium-ion batteries, critical aspects in the battery manufacturing process are pointed out and improvement potentials for future developments are highlighted. The consideration of different impact categories provides a broad picture of the environmental performance of common and advanced Li-ion batteries, where greenhouse-gas emissions are often less relevant than other factors like toxicity, which are often disregarded. But also the battery performance parameters have significant influence on the overall environmental picture. Over the whole lifetime of the battery, the cycle life and internal battery efficiency can influence the overall environmental performance of battery systems in the same order of magnitude as the production. With a break-down of the potential impacts to component level, the presentation also provides insights into the most critical parts of the battery and thus allows giving eco-design recommendations for future battery developments.

Biography

Jens Peters holds a Diploma degree (Dipl. Ing.) in Electrical Engineering (communication technologies) from the Technical University of Munich. He worked several years as R&D Engineer and Project Leader in the automotive industry (Ingolstadt, Barcelona) in the development of electronic components. After finishing his MSc in Renewable Energies and Fuel Cells at UIMP/CSIC in Madrid, he started working in the field of System Analysis of Energy Processes at Instituto IMDEA Energia, Madrid. In 2015, he finished his dissertation at Universidad Rey Juan Carlos (Madrid) on "Environmental, economic and thermodynamic assessment of pyrolysis processes for the production of biofuels and biochar". Since 2015, he is part of the research group 'Resources, Recycling, Environment & Sustainability' at HIU, where he is working on the modeling and assessment of novel electrochemical energy storage technologies, with a special focus on material issues and sustainability of new battery systems (eco-design).

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