THEOS
THEORY AND SIMULATION OF MATERIALS

MARVEL
NATIONAL CENTRE OF COMPETENCE IN RESEARCH

ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE

Some challenges for electro-chemical simulations of Li-ion batteries with automotive applications.

Edwin Knobbe,

BMW Group, Munich, Germany.

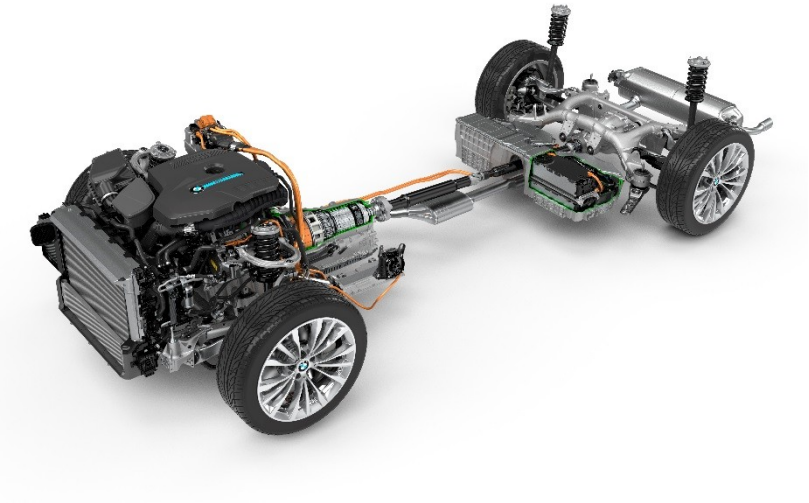
Monday May 29, 15:00, Room MED 0 1418

Abstract: The future of mobility will be governed by several iconic changes. Individual demands for flexible mobility, sustainable usage of natural resources and environmental protection must be balanced. This requires technological innovations for the implementation of sustainable solutions for future mobility concepts. Electrification of propulsion systems, from hybrid power-trains to vehicles with full electrical power-trains, is an accepted next step to achieve this balance. The BMW Group clearly shows this approach by its holistic philosophy behind the vehicles of the BMW i brand. Moreover, the technology of the BMW i brand is now transferred to conventional BMW vehicles.

One of the key technologies of an electrified power-train is the storage of energy in a High-Voltage battery. The application of electro-chemical simulations on material, cell and/or battery level provides a huge potential for an optimal development and operation of HV-batteries. This presentation will provide some insight into typical tasks for electro-chemical simulations at BMW, starting with the required measurements for simulations (input) up to the assessment process (output). One challenging step in these tasks is to determine the optimal set of parameters for the mathematical models which are used in electro-chemical simulations. This is particularly true for the case of the huge amount of materials that can be used in HV-batteries. Finally a number of electro-chemical simulations applied to real-life automotive applications will be shown in this presentation.

There is an increasing effort to improve the predictability of electro-chemical simulations, but there are still a number of open issues that require further research. This presentation will show why these issues have to be resolved, so electro-chemical simulations can be more established in the automotive world. This is further clarified

by our vision of electro-chemical simulations: prediction of the safety and life-time of future cells based on pure material properties before these cells exist in reality.



Map: http://plan.epfl.ch/?room=med01418