Special Issue

The Precise Battery—towards Digital Twins for Advanced Batteries

Message from the Guest Editors

E-mobility has led to high demands regarding energy and power density, durability and safety. To meet these requirements, research efforts in various areas are in progress. New candidates for negative electrodes are being investigated, such as lithium metal or silicon. At the positive electrode, the Ni content is steadily increased to reduce the amount of cobalt and nickel. In parallel to new material developments at the cellular level, the optimization of cell design and operating strategy are in focus. Important factors include the tab design, the geometric cell and battery formats. The challenges of material selection and cell design are doubtless important trade-offs among different KPIs. Without a precise battery model and advanced calculation methods, all the aforementioned mentioned attempts fail. A precise battery model is a digital twin including electrical, thermal, mechanical and aging models as well as new approaches employing artificial intelligence. Additionally, the digital twin should show real-time ability. Consequently, we want to promote and address a new Special Issue 'The precise battery - towards digital twins for advanced batteries'.

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