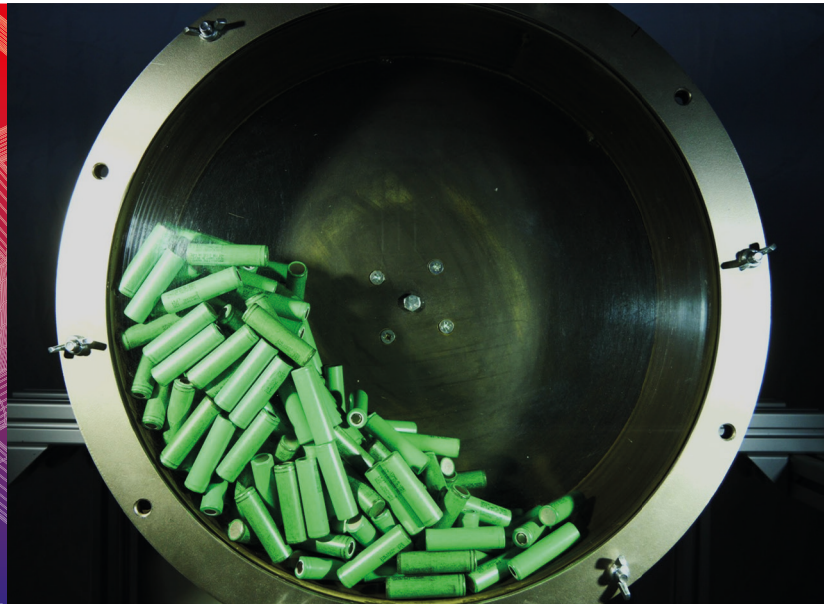


Thermisches Recycling



Thermal recycling of lithium batteries

Background and Scope

The recycling of transaction batteries, e.g. in automobiles, is currently carried out through disassembly and total discharge, as well as mechanical separation followed by hydrometallurgical separation. Without total discharge, the energy stored in the battery is converted into thermal energy when the battery is opened – also known as thermal runaway. This process leads to irreversible exothermal chain reactions, accompanied by the release of flammable gases, smoke, fire and explosion. For portable batteries in the consumer sector, e.g. in e-cigarettes, smartphones and notebooks, disassembly and total discharge are technically and economically not feasible, so no comprehensive recycling process currently exists.

Results

A new thermal process for the direct treatment of lithium batteries is being developed for an efficient raw material recovery of e.g. lithium, cobalt, nickel and aluminium. In particular, the control of the thermal runaway under specifically induced and defined process conditions is the subject of investigation. In addition, a database will be available for the first time to characterize and classify bat-

tery systems with regard to battery type, heterogeneity of battery components, battery chemistry, and shape of battery case. Finally, a mathematical process model for a furnace reactor will be developed that can be used to describe the phenomenology of thermal runaway coupled with the process-relevant heat and mass transport models.

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Contact

Prof. Dr. Fabian Herz

Department Applied Biosciences
and Process Engineering

✉ fabian.herz@hs-anhalt.de

☎ +49 3496 67 2583

🌐 www.hs-anhalt.de

