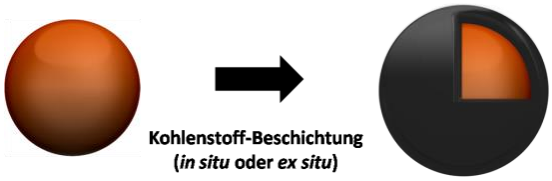
Anode Material for Lithium-Ion Batteries

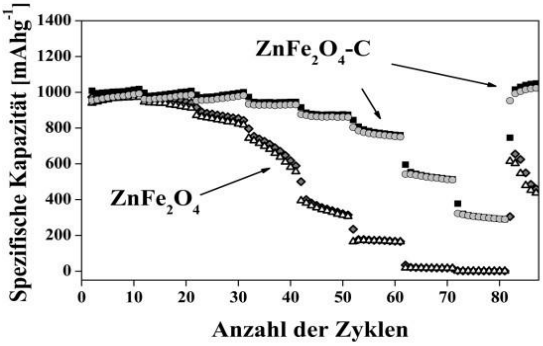
Carbon coated iron oxide and zinc ferrite nanoparticles

Invention

The presented technology offers methods for the synthesis and preparation of carbon coated metal oxide nanoparticles for application as anodic materials in lithium-ion batteries. Carbon coated Fe2O3 and ZnFe2O4 can be used in combination with carboxymethylcellulose (CMC) as binder obtaining highly mechanically stable electrodes.



Schematic illustration of the carbon coating process



Galvanostatic cycling of a ZnFe2O4/C based electrode compared to a non carbon coated one. The new material shows a significantly improved performance. Charge rates have been increased successively. Full capacity retention is obtained when going back to the initially applied current density

Commercial Opportunities

The use of these carbon coated metal oxide nanoparticles enables the realization of environmentally friendly, cost-effective, and lightweight electrochemical energy storage devices for future large scale applications. Transition metal oxides provide higher specific capacities compared to graphite, which is the actual state-of–the-art in Lithium-Ion batteries. Nevertheless, the main drawback of these conversion materials so far has been a reduced cycling stability and limited obtainable specific capacities at elevated applied current densities. However, these drawbacks could be overcome by utilizing the new carbon coated metal oxide nanoparticles. As a matter of fact, by using these materials it is possible to realize batteries offering a superior electro-chemical performance at high current densities and advanced cycle life. Moreover, such enhanced electrodes are easily recyclable and 100 % environmentally friendly.

Current Status

Two international patent applications for this technology have been filed so far. Proper functioning of the invention has been shown in several experiments and further improvement is currently under development**.** PROvendis is offering licenses for this invention to interested companies on behalf of the University of Münster.

An invention of the MEET (University of Münster).

Competitive Advantages

- New materials provide enhanced specific capacities for elevated applied current densities, e.g.: 500 mAh/g at 4.0 A/g and 1000 mAh/g at 0.1 A/g
- Significantly improved cycling stability
- Highly cost-effective technology
- Easily applicable for large scale industrial production
- Prototypes as well as further data and information available on demand

Technology Readiness Level

1234**5**678

Technology validated in lab

Industries

- Automotive Industry
- Battery Industry
- Chemical Industry

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