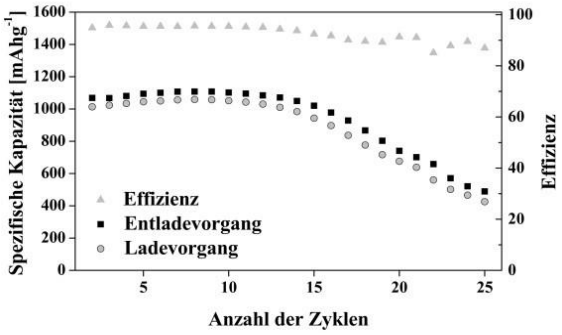
Anode Material for Lithium-Ion Batteries

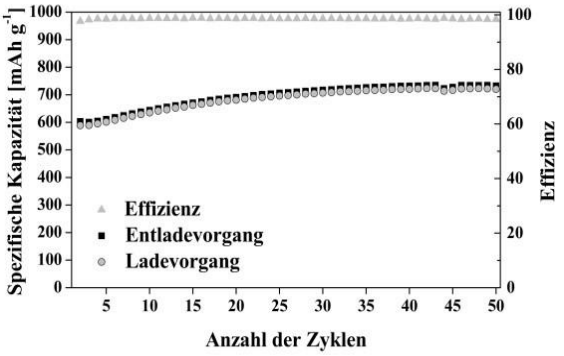
Carbon coated CoO nanoparticles

Invention

The herein presented invention provides a method for the preparation of a cobalt oxide-carbon composite and its application as active material in electrodes for lithium-ion batteries. Advantageously, the within this invention utilized sugar serves not only as a reduction agent to obtain CoO-particles starting from Co3O4, but serves furthermore as a carbon source to form a carbonaceous layer on the particles surface, thus inhibiting particle agglomeration upon thermal treatment and subsequent electrode preparation. Moreover, the carbon coating enhances the electrical conductivity of the resulting electrodes and buffers the volume expansion upon lithiation.



Galvanostatic cycling of common Co3O4electrodes. Although offering high initial capacity, a rapid decay is observed



Galvanostatic cycling of the new CoO/C-electrodes, showing a significantly improved cycling performance

Commercial Opportunities

As sugar is an abundant and very cheap reduction agent, this technology can easily be integrated into an industrial production process. Compared to other processes this is a rather mild way of reduction. Therefore, the initial shape and size of the preliminary Co3O4 particles can be preserved. The enhanced electric conductivity of the so obtained CoO-composite leads to an improved cycling stability of cells with electrodes prepared of such material. Beside this, the process enables further reduction of cobalt oxide to elementary cobalt and can also be applied to other transition metals.

Current Status

A national patent application for this invention has been filed at the German Patent Office (DPMA). 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 University of Münster.

Competitive Advantages

- Enhanced coulombic efficiency
- Improved cycling stability
- Increased specific capacity compared to current standard electrode materials
- Cost-effective and easily applicable for industrial production
- Prototypes as well as further data and information available on demand

Technology Readiness Level

1 2 3 **4** 5 6 7 8

Technology validated in lab

Industries

- Automotive Industry
- Battery Industry
- Chemical Industry

Ref. No.

2944

Contact

Dr. Thomas Vogel
E-Mail: tv@provendis.info
Phone: +49(0)208-94105-52

PROvendis GmbH
Schlossstraße 11-15
45468 Muelheim an der Ruhr
Germany
www.provendis.info