

HIGH EFFICIENCY CURRENT COLLECTORS BY TECHNICAL EMBROIDERY – LIGHTWEIGHT FOR E-MOBILITY

A consortium of embroidery producers and scientists from Innsbruck University, Austria succeeded in the design of a new high efficiency current collector for batteries and fuel cells.

Background

A major problem in lightweight solutions for batteries and fuel cells results from the lack in efficient solutions to collect electric current at the side of its generation.

There is a clear demand to optimise cell design to maximise energy density, while keeping coulometric efficiency and energy efficiency at its maximum.

As the electrode reaction involves a heterogeneous charge transfer reaction the active electrode surface is of critical significance to achieve high current densities with high efficiencies.

An insufficient electrode area causes low maximum cell current, high internal energy losses and insufficient use of the redox-active mass. In an ideal case three dimensional current collectors allow to reach all particles of the electro-active mass with short distance.

Technology

A flexible solution to produce porous three dimensional current collectors for batteries, accumulators and fuel cells that utilises technical embroidery.

3D-electrodes can be produced in highly variable dimensions and from a wide range of different materials. Porosity and thickness of the 3D-electrodes can be adjusted to the electrochemical system. The electrodes are produced in the dimensions ready to use.

Porosity and current density can be optimised to achieve homogenous current distribution under given load, which allows efficient use of redox active battery fillings.

Using the active mass of an electrochemical cell more efficient and with higher thickness reduces the overall weight of a cell concept.

Benefits

- Flexible construction of 3D-electrodes
- Efficient use of redox active material
- Optimised current distribution for high efficiency
- Easy and flexible production - can be applied on a wide range of electrode materials
- Overall weight reduction through increased thickness and efficient usage of active mass

Status of the Technology

Prove of principle

Application

- Accumulators
- Batteries
- Fuel cells
- Electrolysers for technical applications



Figure: High performance electrode

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IP Position

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Licensing conditions

Application specific exclusive or non-exclusive license

Cooperation Options

Development cooperation

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