Materials Panel Abstract & Speaker Biography

Enhanced specific energy for Li-S-cells through a new cathode concept based on dryfilm electrodes and perforated current collectors

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The Lithium-Sulfur technology offers an outstanding specific energy due to the high specific capacity of sulfur as conversion material (1672 mAh g^{-1}). However, the weight of actual prototype cells is still dominated by it's inactive components. In particular aluminium current collectors add about 10-15 % to the cell mass.

Here we present a new approach to reduce the weight of the current collector through laser perforation by up to 70 %. This concept is combined with freestanding electrode films produced by an environmental friendly solvent-free process. The high electrical conductivity of the freestanding electrode films takes an important role in this concept and is achieved by nanostructured carbons.

The cathode concept is evaluated on pouch cell level. Potential and limitations concerning rate capability and total savings in weight will be discussed.
First results reveal high sulfur utilization (> 60 %) for an electrode with 2,3 mg S / cm^2 and an perforated aluminium foil with 70 % weight reduction.

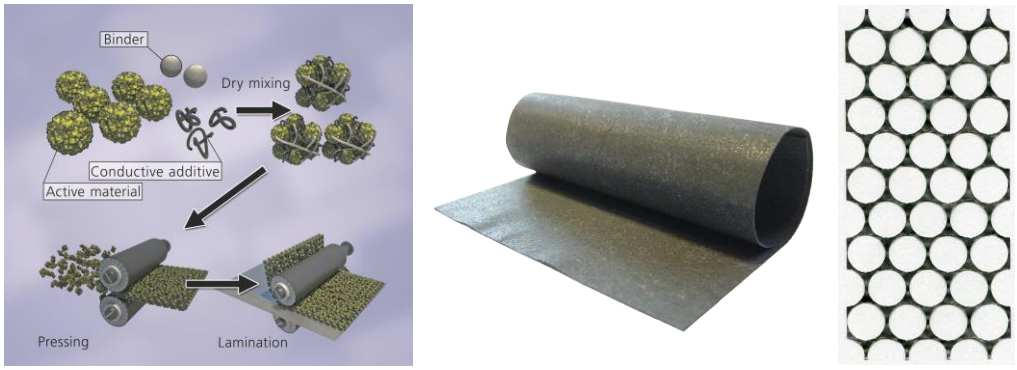

Figure: Process scheme dryfilm process (left); freestanding sulfur/carbon cathode (middle), perforated current collector (right)

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Speaker Biography:

Dr. Holger Althues studied chemical engineering and received his doctoral degree in inorganic chemistry at the University of Technology Dresden in 2007. Since then he is working at the Fraunhofer Institute for Material and Beam Technology in Dresden, Germany.

In 2008 he became a team manager for the chemical surface technology group and his team was transferred into a division with 3 sub-groups in 2015. In his position as division manager he administrates various projects in the area of film deposition techniques, electrode processing and energy storage applications. Among others he is the coordinator of the EU funded project PLIANT (Pilot line implementation for applied surface nanotechnologies) as well as the BMBF funded project SepaLiS (New separator coating and cell design for Li-S-Batteries).

His main research topics are inorganic nanomaterials and their processing into films for energy storage applications, such as supercapacitors or batteries. A recent focus is on material and electrode development for high energy lithium sulfur batteries.