

Safe energy storage for renewable energy

Development of a new generation of sodium batteries in the KeNaB-ART project

Germany has to become climate-neutral by 2045 - this is the specification of the German government's Climate Protection Act. This ambitious goal requires the transformation of energy generation to 100 % renewable energy from wind, sun, hydropower and biomass. This energy generation, which will be more and more volatile in the future, requires stabilizing measures to ensure a secure energy supply. Electricity storage in batteries can enable this transformation and will gain in importance. In the "KeNaB-ART" project (ceramic-based sodium battery with beta-aluminate for applications above room temperature), the German Federal Ministry of Education and Research (BMBF) is supporting the development of new ceramic sodium batteries for storage of renewable energy as part of the "Battery 2020 Transfer" funding initiative.

The sodium battery is considered one of the most promising approaches in the search for alternatives to lithium-ion technology which are both ecologically and economically attractive. Four project partners are now working on an innovative concept for sodium solid electrolyte batteries: the battery powder manufacturer IBU-tec, the specialist for technical ceramics and industrial technology Rauschert Heinersdorf-Pressig GmbH, the manufacturer for measuring equipment EL-Cell GmbH and the Fraunhofer Institute for Ceramic Technologies and Systems IKTS. Unlike conventional lithium and sodium-ion batteries, this type of battery is based on a solid electrolyte made of a special sodium-ion conductive ceramic as the heart of the battery cell. It is combined with a metallic sodium anode and a high-performance cathode powder based on transition metal oxides to form a so-called "all solid state" battery cell. In contrast to usual liquid electrolyte, this battery cell does not have a high fire load, and the hazard potential is significantly reduced. In addition, the metallic sodium anode has the advantage of a very high achievable energy density as - in contrast to conventional battery cells - there is no need for additional carbon.

KeNaB-ART is facing the technical challenge to develop a marketable solid-state battery cell: from raw materials to ready-to-install product. The battery concept can contribute to the "post-lithium-ion era" and enable the scalability of necessary cell compartments. The expertise gained in the project will help to manufacture more sustainable, stable and safer cells with high energy density in Germany and thus make an important contribution to the energy transformation.



Fig. 1. PAT-Cell system, solid electrolyte and active material for sodium batteries in the KeNaB-ART project.