

33rd Southern African Universities Power Engineering Conference (SAUPEC 2025), Tshwane University of Technology. Pretoria, South Africa, 29-30 January 2025

Evaluating Sodium-Ion Batteries (SiB) and its Applications

Grobler, Inus
Council for Scientific and Industrial Research (CSIR)
Meiring Naude Drive, Pretoria, 0184
Email: IGrobler@csir.co.za

The Sodium Ion Battery (SiB) technology started to appear in production quantities in 2023. Sample SiB cells were purchased from different suppliers with various form factors and capacities. These cells were tested to verify their capabilities. Like Lithium Titanate Oxide (LTO) cells, the SiB cells can also be drained to zero volts without any damage or degradation of capacity, due to the aluminium cathode. Furthermore, our controlled environmental tests have shown that SiB cells can handle high temperatures and could function at higher C-rates than the popular Lithium Iron Phosphate (LFP) cells, but not as high as LTO. Unfortunately, the sample SiBs exhibited poor low temperature characteristics, resulting in a permanent 20% capacity loss after 1C discharges at low temperatures. A second batch of sample SiB cells were supplied with more complex temperature specifications, which when followed, resulted in no noticeable degradation. SiBs exhibit a large variation in operating voltage, which can simplify State of Charge (SOC) estimation. On the contrary, the large voltage variation can also be a negative depending on the electronics being powered by the SiB and must be accounted for in the design. SiBs have shown benefits in cost, environmental impact and sustainability, which lends itself to further development and improvements in energy density and performance as we have witnessed occur with other cell technologies.