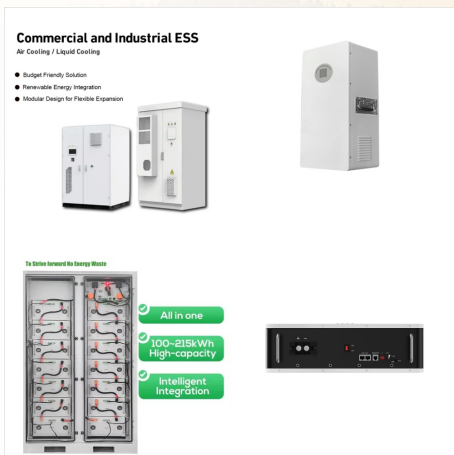




This study illustrates the methodology to compare the performance of thermal batteries with existing Li-ion batteries. The charging duration of the designed thermal battery is found to be 23 min smaller than Li-ion cell with the smallest heat flux ( $625 \text{ W/m}^2$ ).



Sodium-ion batteries (SIBs) are inherently safer than LIBs. In addition to offering better safety, SIBs are gaining momentum due to the abundance and low cost of their raw materials compared to the limited lithium resources and high cost of elements such as cobalt, copper, and nickel used in LIBs.



The prevention of thermal runaway (TR) in lithium-ion batteries is vital as the technology is pushed to its limit of power and energy delivery in applications such as electric vehicles. TR and the resulting fire and explosion have been responsible for several high-profile accidents and product recalls over the past decade.

# THERMAL BATTERY VS LITHIUM-ION BATTERY



Even those with a passing interest in the energy industry would have heard of lithium-ion batteries, seen by many as the solution for powering the electric vehicle battery revolution. But there may be less well-known and potentially more effective alternative in ???



4 ? Lithium-ion batteries (LiBs) are the leading choice for powering electric vehicles due to their advantageous characteristics, including low self-discharge rates and high energy and power density. However, the degradation in the performance and sustainability of lithium-ion battery packs over the long term in electric vehicles is affected due to the elevated temperatures ???

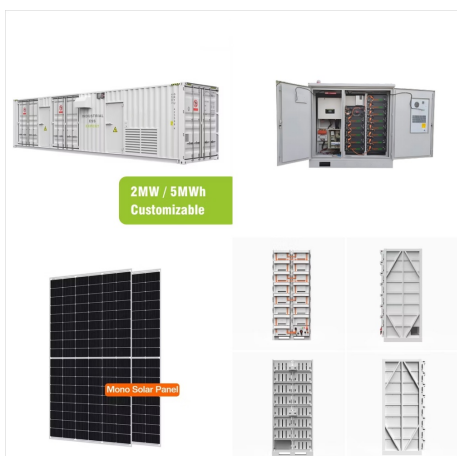


Temperature rise in Lithium-ion batteries (LiBs) due to solid electrolyte interfaces breakdown, uncontrollable exothermic reactions in electrodes and Joule heating can result in the

# THERMAL BATTERY VS LITHIUM-ION BATTERY



Temperature, as a critical factor, significantly impacts on the performance of lithium-ion batteries and also limits the application of lithium-ion batteries. Moreover, different temperature conditions result in different adverse effects.



Thermal batteries are in essence a simpler technology that require no resources in high demand like lithium cobalt oxide or lithium iron phosphate that is used in many lithium-ion batteries. Furthermore, thermal batteries do not require the use of expensive equipment or processes such as solvent extraction or cathode coating, which are needed



In this study, the TR characteristics and hazards of three types of 18650 batteries, SIB with Na x TMO 2 (NTM) as the cathode and two types of lithium-ion batteries (LIBs) with LiFePO 4 (LFP) and LiNi 0.5 Co 0.2 Mn 0.3 O 2 (NCM) as the cathode, are