**ABSTRACT**

Vehicle electrification is one of the most significant solutions that address the challenges of fossil fuel depletion, global warming, CO2 pollution, and so on. To mitigate these issues, recent research mainly focuses on finding clean energy storage devices such as batteries, supercapacitors, fuel cells, and so forth. Owing to the outstanding energy and power density, lithium‐ion batteries (LIB) have captured the market for portable electronics, hybrid electric vehicles, plug‐in hybrid electric vehicles, and so on. During 1970–1980s, electrode materials for both LIBs and sodium‐ion batteries (NIBs) were investigated but higher energy and power density of LIBs have made it a popular candidate for portable electronics. Issues arise on the availability of lithium reserves, so it is high time we take a look at finding alternative energy storage system without compromising on the energy and power density of the state‐of‐the‐art LIBs. Therefore, researchers have revisited NIBs and recent developments have contributed towards discovering new electrode materials to match the energy and power density of LIBs at low cost. While a variety of positive and negative electrode materials have been investigated for NIBs so far, the influence of voltage, capacity, cycle life, and volume expansion of negative electrodes on Na+ ion extraction and insertion are more as compared with LIBs. This affects the energy and power density of NIBs but cost‐effective partial replacement of LIBs is viable and is widely pursued.