**ABSTRACT**

A two dimensional (2D) Mn3O4@rGO architecture has been investigated as an anode material for potassium-ion secondary batteries. Herein, we report the synthesis of a Mn3O4@rGO nanocomposite and its potassium storage properties. The strong synergistic interaction between high surface area reduced graphene oxide (rGO) sheets and Mn3O4 nanospheres not only enhances the potassium storage capacity but also improves the reaction kinetics by offering an increased electrode/electrolyte contact area and consequently reduces the ion/electron transport resistance. Spherical Mn3O4 nanospheres with a size of 30–60 nm anchored on the surface of rGO sheets deliver a high potassium storage capacity of 802 mA h g−1 at a current density of 0.1 A g−1 along with superior rate capability even at 10 A g−1 (delivers 95 mA h g−1) and cycling stability. A reversible potassium storage capacity of 635 mA h g−1 is retained (90%) after 500 cycles even at a high current density of 0.5 A g−1. Moreover, the spherical Mn3O4@rGO architecture not only offers facile potassium ion diffusion into the bulk but also contributes surface K+ ion storage. The obtained results demonstrate that the 2D spherical Mn3O4@rGO nanocomposite is a promising anode architecture for high performance KIBs.