Current Opinion in Electrochemistry

Recent developments on layered 3d-transtition metal oxide cathode materials for sodium-ion batteries

Palaniyandy, Nithyadharseni

Abstract
Sodium-ion batteries (SIBs) are now intensively developed as a cost-effective technology alternative to lithium-ion batteries (LIBs) for large-scale energy storage because of their various advantages such as huge abundance of sodium resources, highly safe and significantly low cost. Among many other cathode materials, layered 3d-transition metal oxides (LTMO-Na(sub)xMO(sub)2, x = 1 and M = Co, Ni, Mn, Cr, Cu, Fe and V) have gained an enormous interest and attractive attention among researchers because of their low-cost, high energy density and ease of synthesis. In addition, LTMOs offer higher reversible capacities because of relatively lower molecular weights; however, complex phase transformations limit their cycling life. Based on the previous research, it was examined that the crystalline phase of LTMO highly influences the electrochemical performance of SIBs; therefore, this review mainly focuses on the latest advances of various crystalline phases such as P2-type, P3-type, O3-type and biphase/multiphase materials and its strength as well as future prospects and challenges.