**ABSTRACT**

Sodium cobalt oxide (NCO) has been synthesized by a glycine assisted sol–gel combustion method. XRD studies confirm the P2 phase formation of NCO. Na exists in two different environments in the NCO crystallite structure, which is confirmed by 23Na Nuclear Magnetic Resonance spectra (NMR). Morphological studies confirm that the particles are unique with a stacked hexagonal shape. Galvanostatic charge/discharge studies performed at different current rates (0.1, 0.2 and 0.5) deliver reversible specific capacities of 126, 108 and 77 mA h g−1 respectively. Further, cycle life performance of the fabricated cells after 50 cycles at 0.1 C rate exhibits an average discharge capacity of ~121 mA h g−1 with a capacity retention of ~86% (Coulombic efficiency ~99.9%). The investigated NCO's superior performance suggests its suitability as a cathode material for Na-ion batteries.