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Honeycomb layered oxide $Na_3Ni_2SbO_6$ for high performance pseudocapacitor

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Abstract

In this study, $Na_3Ni_2SbO_6$ was synthesised by simple solid state method and its electrochemical behaviour was examined as a supercapacitor electrode for the first time. $Na_3Cu_2SbO_6$ was also synthesized by the same preparation method in order to compare with the $Na_3Ni_2SbO_6$. The structure and morphology of the samples were characterized by XRD, XPS and SEM analysis. The results shows O3-type honeycomb layered $Na_3Ni_2SbO_6$ with microcrystal morphology. Electrochemical properties were characterized by cyclic voltammetry, galvanostatic charge/discharge measurements, and electrochemical impedance spectroscopy. The results showed that the specific capacitance of the $Na_3Ni_2SbO_6$ and $Na_3Cu_2SbO_6$ electrodes were 397 F/g and 50 F/g at the current density of 0.5 A/g respectively. The high pseudocapacitive nature of $Na_3Ni_2SbO_6$ can be attributed to reversible redox reaction of Ni(II)/Ni(III).

Keywords:

$Na_3Ni_2SbO_6$

Solid state synthesis

Supercapacitor

Electrode material