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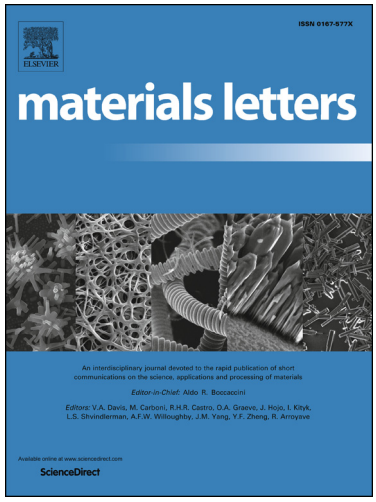

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Ruddlesden-Popper type $La_2NiO_{4+\delta}$ oxide as a pseudocapacitor electrode

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Abstract

Ruddlesden-Popper type $La_2NiO_{4+\delta}$ (LNO) oxide was investigated as a novel pseudocapacitive electrode and performed high performance with the capacitance of 657.4 $F \cdot g^{-1}$ under the scan rate of 2 $mV \cdot s^{-1}$ in 3 M KOH electrolyte. Two cathodic peaks and one anodic peak in CV curves of LNO in KOH electrolyte indicate the special oxygen insertion/extrusion processes because its structure alternates with perovskite $LaNiO_3$ layers and LaO rock-salt layers in succession. Cycle performance of LNO at a relatively high current density of 10 $A \cdot g^{-1}$ is approximately 96.2% after 500 cycles in 3 M KOH electrolyte, showing good cycling stability. This confirms LNO as a potential candidate for high performance pseudocapacitor electrodes.

Keywords: Ruddlesden-Popper; $La_2NiO_{4+\delta}$; Pseudocapacitor; Oxygen insertion/extrusion; X-ray techniques.

1. Introduction

According to the charge mechanism, supercapacitors include two different kinds as double-layer supercapacitors and pseudocapacitors[1]. Fast reversible intercalation of ions into the bulk of the material, redox reactions on the surface of electrode and adsorption of ions from electrolyte are widely accepted three types of charge storage mechanisms for

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