Synthesis and Electrochemical Properties of Nickel oxide as Anode for Lithium Ion Batteries

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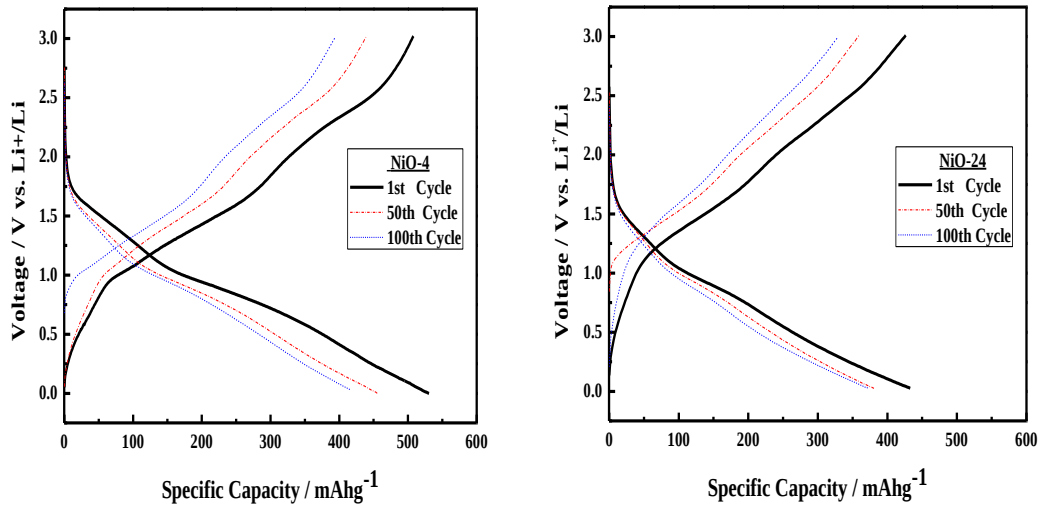
Transition-metal oxides (MO, where M is Fe, Ni, Co and Cu) have been studied since these materials were proposed by Tarascon and co-workers [1-6]. These oxides can offer higher capacities (600-1000 mAh g^{-1}) that graphite material (372 mAh g^{-1}); in particular, NiO has high theoretical capacity values (718 mA h g^{-1} for $2Li^{+}$per NiO) also present many advantages such as natural abundance, low cost and environmental friendless

In this contribution we would like to present the preparation and characterization of nickel oxide as anodes materials in lithium-ion batteries. Two processes are involved in the synthetic procedure; in the first step the nickel hydroxide was obtained by hydrothermal synthesis (4h, 180°C) and then the precipitated was washed with distilled water to remove the residual species. The second step consists of the material calcinations in air at 300ºC, for 4 (NiO-4h) and 24(NiO-24h) hours.

The structural characteristics and electrochemical properties of the obtained nickel oxides are subsequently investigated by optical and electrochemical techniques such as: FTIR, SEM, charge-discharge cycles, galvanostatic discharge at different currents, cyclic voltammetry and electrochemical impedance spectroscopy.

The anode materials (NiO-4h and NiO-24h) were synthesized via a facile two-step route and exhibit a satisfactory specific capacity, cyclability and rate capability. These results indicate that the studied electrodes could be suitable as anodes in lithium ion batteries applications.



References

[1] P. Poizot, S. Laruelle, S. Grugeon, L. Dupont, J-M. Tarascon, Nature 407 (2000) 496.
[2] J.-M. Tarascon, M. Armand, Nature 414 (2001) 359.
[3] S. Grugeon, S. Laruelle, R. Herrera-Urbina, L. Dupont, P. Poizot, J-M. Tarascon, J. Electrochem. Soc. 148 (2001) A285.
[4] A. Débart, L. Dupont, P. Poizot, J-B. Leriche, J-M. Tarascon, J. Electrochem. Soc. 148 (2001) A1266.
[5] D. Larcher, G. Sudant, J-B. Leriche, Y. Chabre, J-M. Tarascon, J. Electrochem. Soc. 149 (2002) A234.
[6] P. Poizot, S. Laruelle, S. Grugeon, J-M. Tarascon, J. Electrochem. Soc. 149 (2002) A1212.