The effect of transition metals addition on electrochemical properties of Si-Ti-Ni alloy anode for lithium ion batteries

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Recently, most commercial rechargeable Li-ion batteries use carbons as the negative electrode reactant. There is considerable interest in finding alternative materials that might be more attractive with respect to the ability to improve discharging capacity, to operate safely at higher current densities, less first cycle irreversible capacity loss, better cycling behavior, and lower cost.

Si-Ti-Ni ternary alloy have been studied for commercial application as an anode material for lithium ion batteries[1], [3]

In this study, the addition of cost effective transition metals fulfills two important purposes. First, they reduces raw material cost for Si alloy anode to commercialize, And second, they improve electrochemical properties such as capacity retention ratio, coulombic efficiency, etc.

With increasing Fe content, initial capacity becomes lower, but capacity retention ratio and coulombic efficiency are improved.

This study leads to the best understanding to date of the electrochemistry of a Si alloy anode with an inactive matrix

Keywords : lithium ion battery, Si alloy anode, inactive matrix, transition metal, cost effective.

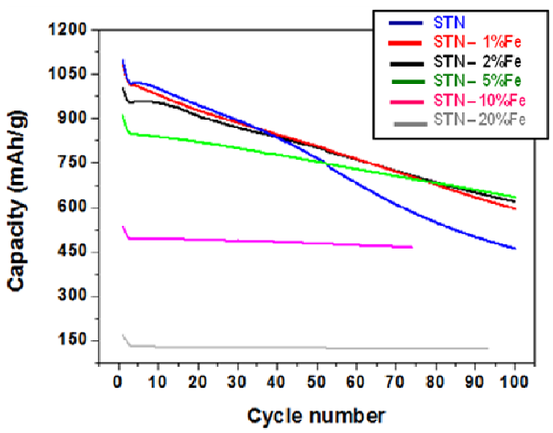

Fig. 1 Specific capacity of Si-Ti-Ni alloy anode with transition metal addition versus cycle numbers.

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Reference

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