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(24)

2004 02 25
10-0420050
2004 02 12

(21) 10-2001-0064766
(22) 2001 10 19

(65)
(43)

10-2003-0032718
2003 04 26

(73)

575

(72)

101 1102

201 402

(74)

:

(54)

[1]
Li_x Mn_{2-y} Ni_y O₄
(, x 1 1.1 , y 0.4 0.6)
5V

1

, 4

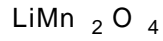
5

1
2

XRD

XRD

3
4
5
6
7



[]

[]

가

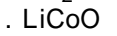
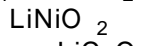
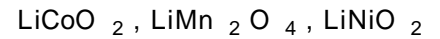
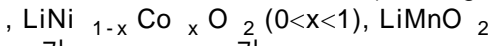
가가

(dendrite)

가

(BOC)

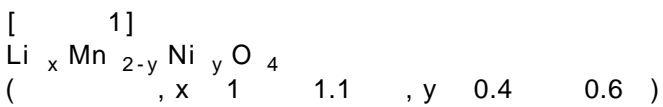
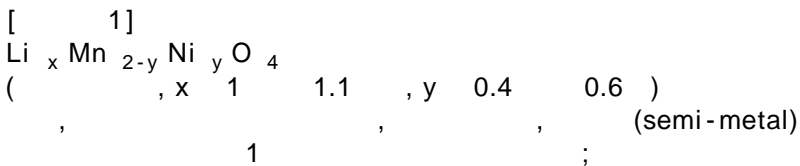
(chalcogenide)



가

가

1



5V

, 4V

4V (encapsulation). 1

[$Li_x Mn_{2-y} Ni_y O_4$], $x=1$, $y=0.6$, $y=0.5$

(source)

(source)

Mg, Al, Co, K, Na, Ca, Ti, Sn, V, Ge, Ga, Si, B

가, HB(OH)₂, B₂O₃, H₃BO₃

(tetraethylorthosilicate)

(NH₄(VO₃)) 0.1 10 % (V₂O₅) 0.1 %

가 10 % 가

, CVD(Chemical Vapor Deposition) , (dip coating) 가

가 200 200 1 800 24 5 20 (flowing)

가 200 가 800

가 Li⁺ 가 Li⁺ 가

가 1 100nm 가 100nm 가 1nm

(quenching) 200 500 100 0.5

1

가 가 (solvent-free) (mortar grinder mixing)

400 600 (semi crystalline) 가 400

(blowing) (remixing)

가 700 700 900 10 30 2 .2

(blowing) 1 5 /

(spinel type) 1 (remixing) 1

5V , 4V

[1]
 $Li_x Mn_{2-y} Ni_y O_4$
 $x = 1, y = 1.1$
 $y = 0.4, 0.6$, $y = 0.5$. y가 4V

(1)
 $LiMn_2O_4$ / / 94/3/3 N-
 AI- 1M LiPF₆ 가

(2)
 $Mn(NO_3)_2$, $Ni(NO_3)_2$ Mn-Ni
 pH $Mn_{0.75} Ni_{0.25} (OH)_2$ (coprecipitation) $Mn_{0.75} Ni_{0.25} (OH)_2$ NH₄(OH)2 가
 (grinding media) LiOH Li/(Mn+Ni)=1/1
 450 10 30
 325 $LiMn_{1.5} Ni_{0.5} O_4$ / / 875 15 2
 1.6cm 25μm AI- 94/3/3 N-
 (fresh) 2016 100μm
 1M LiPF₆ 가 (1/1)

(3)
 $LiMn_{1.5} Ni_{0.5} O_4$ 300 10 3

(4)
 $LiMn_{1.5} Ni_{0.5} O_4$ 700 10 3

(1)
 $Mn(NO_3)_2$, $Ni(NO_3)_2$ Mn-Ni
 pH $Mn_{0.75} Ni_{0.25} (OH)_2$ (coprecipitation) $Mn_{0.75} Ni_{0.25} (OH)_2$ NH₄(OH)2 가
 (grinding media) LiOH Li/(Mn+Ni)=1/1
 450 10 30
 325 $LiMn_{1.5} Ni_{0.5} O_4$ 800 20 2
 $LiMn_{1.5} Ni_{0.5} O_4$ 1 % AI- , 100 , 300
 O_3 가 -325 AI₂
 $LiMn_{1.5} Ni_{0.5} O_4$ / /
 94/3/3 N- 25μm AI- 100μm , 1.6cm
 1M LiPF₆ 가 2016 (1/1)

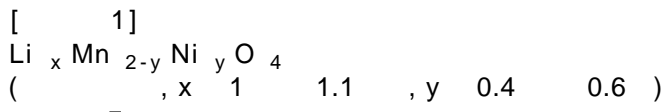
(2)
 2 850 17 , 3 500 10 , 3 %
 AI- 1

(3)

2 875 15 , 3 300 10 , 5 %
 Al- 4)
 1 500 10 , 2 900 10
 , Al- 1 1 , 3 , 3 2 2 XRD
 , Al- 가 , 가 XRD 3 2 4
 XRD 1 2 2 XRD , Al- 3 2 4
 , Al- 1 3 4 가 2 XRD
 , Al- 1 3 (60) , 3
 0.1C=11mAh/g 1 3 4.3 3.0V 3
 가 1 0.1C (C-rate) , 3
 , - 4.3V-2.75V, 4.3V-3V, 4.9V-3.0V , Al- 3 2 3
 3 가 4V , 4 2 , Al- 5V
 가 가 3 4V
 (60) , 3 1
 0.1C 0.1C(1), 0.2C 0.2C(3) 0.5C 0.5C(10) 1C
 4.3V 2.75V
 (29) 5 5 , 3 1
 , 3 가 가
 - 3V-3V, 4.5V-3V, 4.6V-3V - 1C=110mAh/g 1 4.4V-3V, 4.
 가 가 7(3) 6(1) , 3 1 가
 가 , LiMn₂O₄ 가
 , 4V , 5V ,

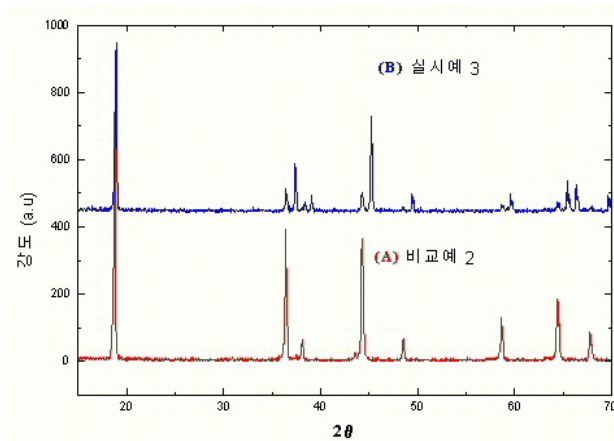
- (57)
1. ; , Mg, Al, Co, K, Na, Ca, Ti, Sn, V, Ge Ga
 Si B
 - [1]
 Li_xMn_{2-y}Ni_yO₄ (, x 1 1.1 , y 0.4 0.6)
 2. , y 0.5
 - 3.
 4.
 Mg, Al, Co, K, Na, Ca, Ti, Sn, V, Ge Ga

, Si B
1 ;

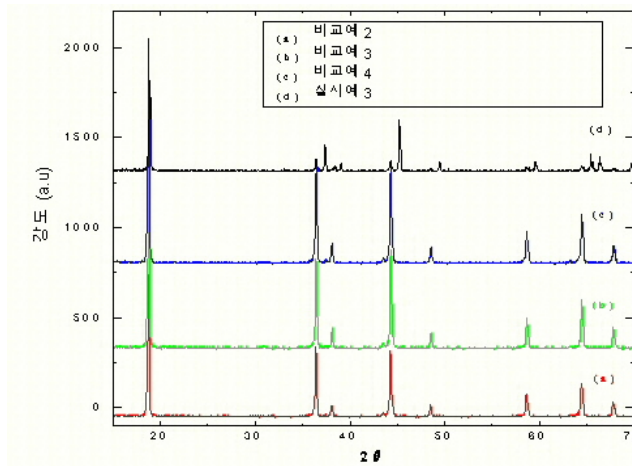


5.
4 , y 0.5
6.

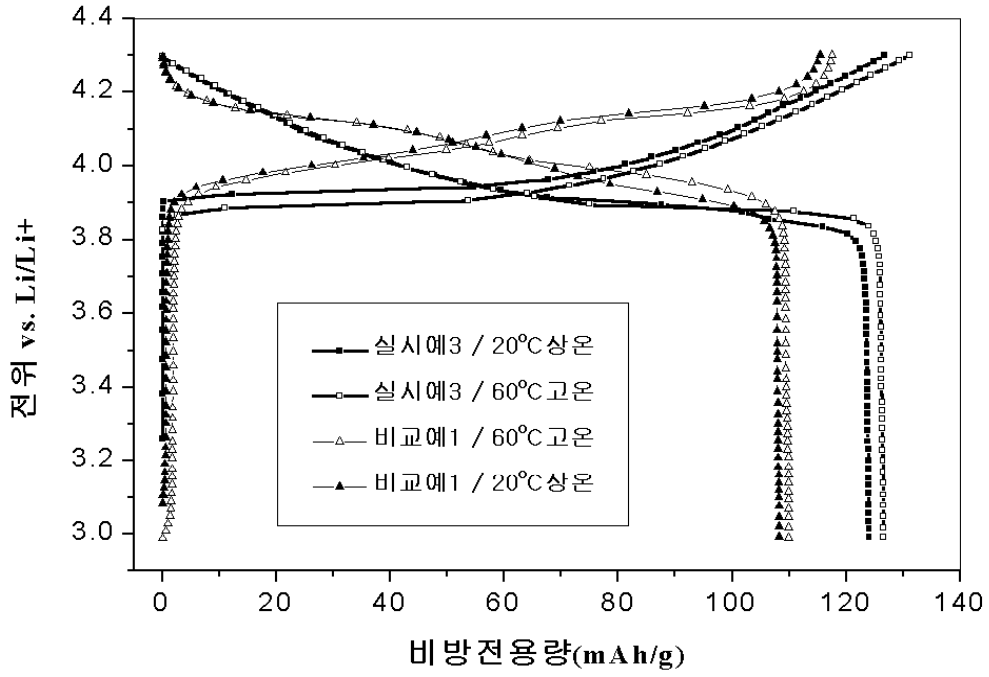
1



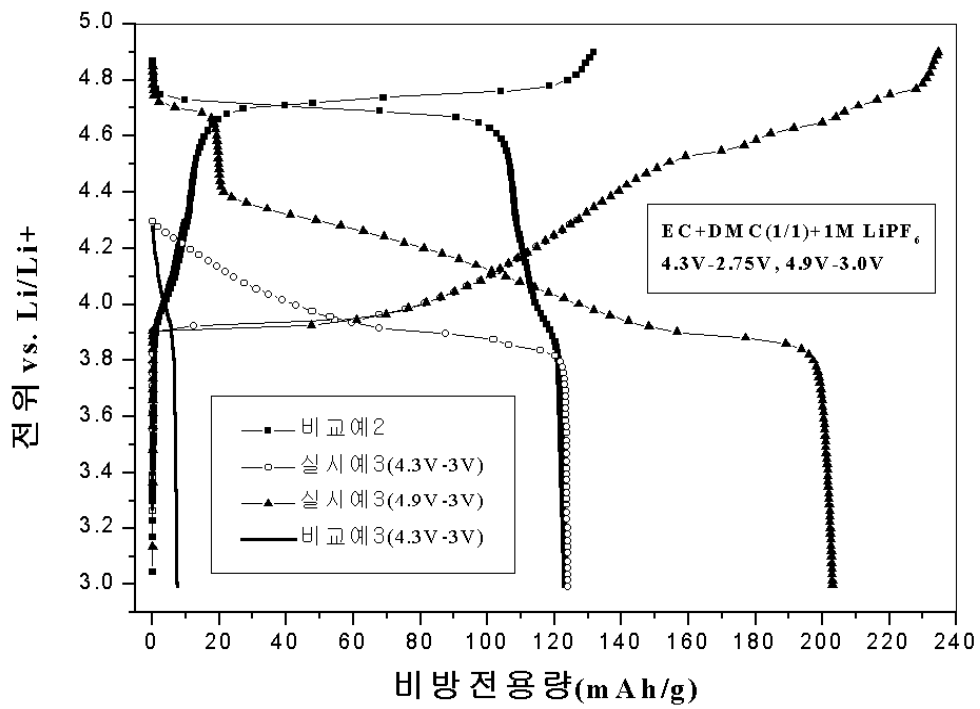
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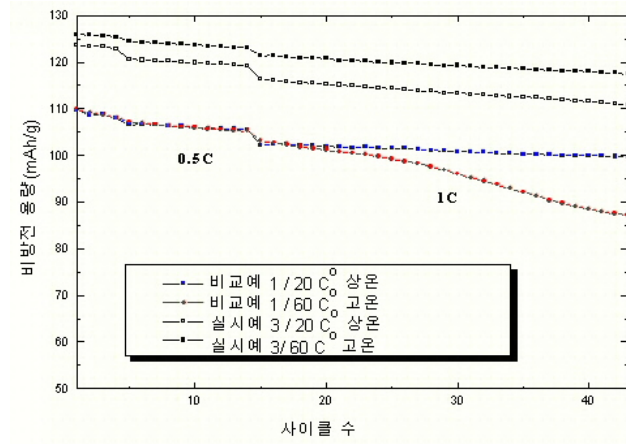
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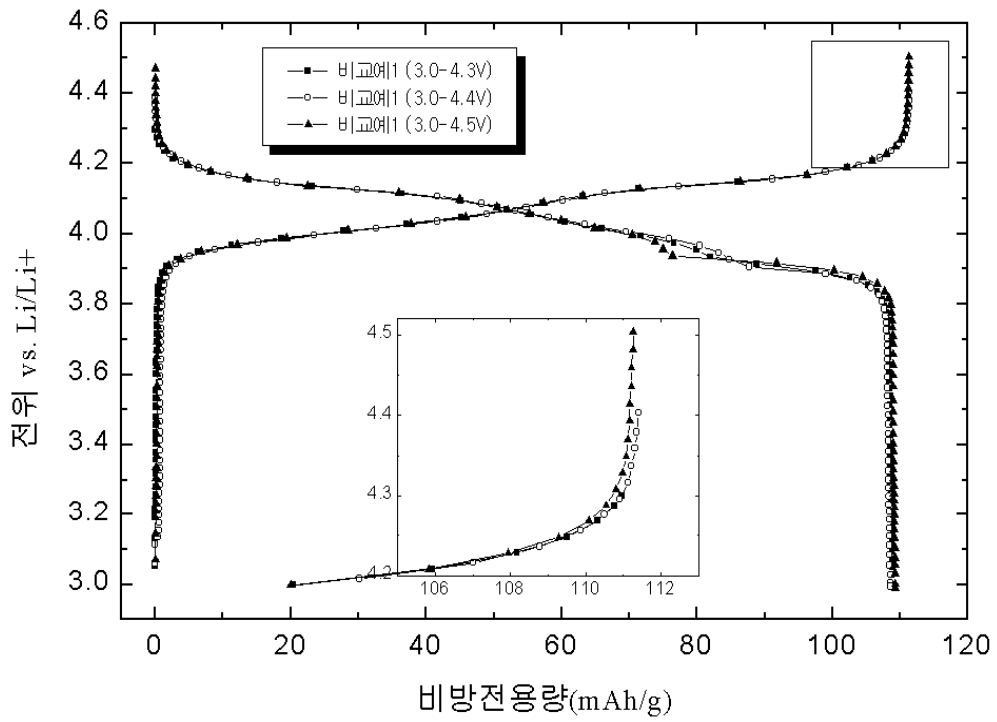
4



5



6



7

