

Nova Micro Pouch Cell  
401225P (90 mAh)

# Test Results

PT/BI-EST4

# Nova Micro Pouch Cell 401225P (90 mAh)

## Supplier Specifications

Parameter	Value	Comment
Rated Capacity	<b>90 mAh @0.2C</b>	
Nominal Voltage	3.7 V	
Discharge Cut-Off	2.75/2.35 V	<b>CC @0.2C (2.75 V) / CC @1C (2.35 V)</b> <b>Maximum cont. discharge current → 1.5C</b>
Charge Cut-Off	4.2 V ± 0.03 V	<b>CCCV @1C</b> or 0.5C (4.2V/0.01C) → ~2.5h/4.0h
R <sub>Ac</sub> @1 kHz	<430 mΩ	
Dimensions (h x w x t)	25.5 x 12.0 x 4.0 mm <sup>3</sup>	
Chemistry	LiCoO <sub>2</sub> /Carbon fiber	
Separator	PE 20μm	
Electrolyte	LiPF <sub>6</sub> in EC/DMC/EMC	

\*0.2C = 18mA; 0.5C = 45mA; 1C = 90mA; 1.5C = 135mA

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## Electrical Tests - Overview

1	Electrical tests			
1.1	Reference cycle 50mA-DCH	EST4	done	Ø: 96,3mAh
1.2	Reference cycle 0,2C-DCH	EST4	done	Ø: 98,6mAh
1.3	Low temperature performance capacity	EST4	done	Cell 11: 0°C: 95,8mAh = 106,4% CN -10°C: 89,6mAh = 99,6% CN -20°C: 75,1mAh = 83,4% CN Cell 12: 0°C: 92,8mAh = 103,1% CN -10°C: 89,0mAh = 98,9% CN -20°C: 80,1mAh = 89,0% CN Cell 13: 0°C: 94,6mAh = 105,1% CN -10°C: 89,6mAh = 99,6% CN -20°C: 77,6mAh = 86,2% CN
1.4	Internal AC impedance	EST4	done	Ø <sub>RAC</sub> : 220,6mOhm
1.5	Cycle life with constant current	EST4	done	cycle life with 50mA charging and 50mA discharging cycle life with 80mA charging and 40mA discharging
1.6	Calendar life test	EST4	done	end 50days: done end 100days: done end 200days: done
1.7	Cell balance (OCV, RAC)	EST4	done	

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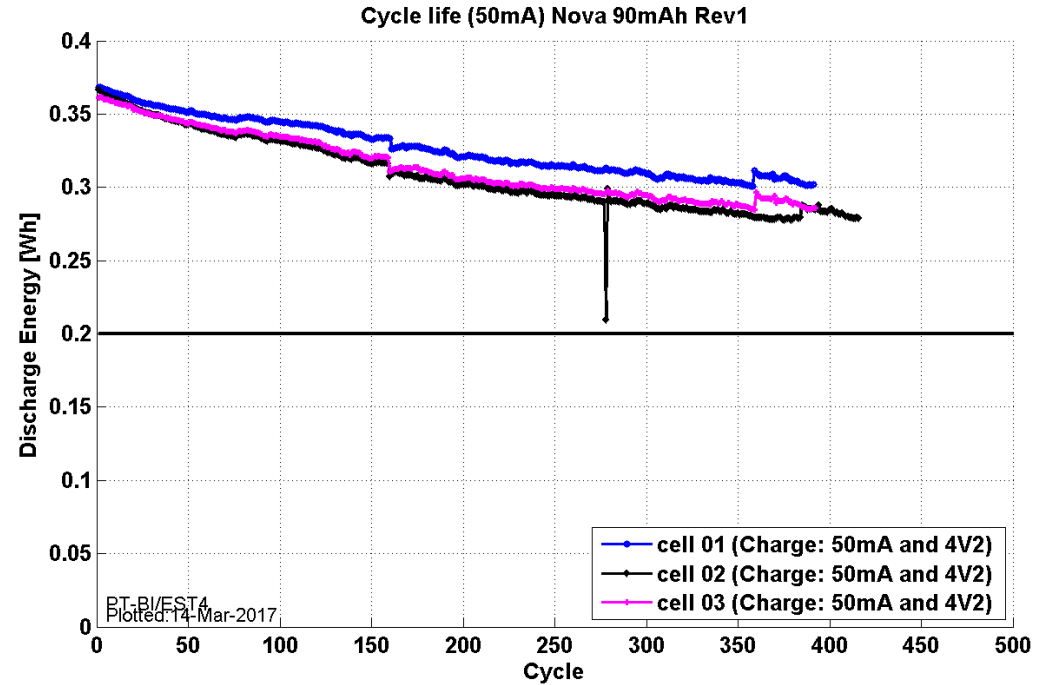
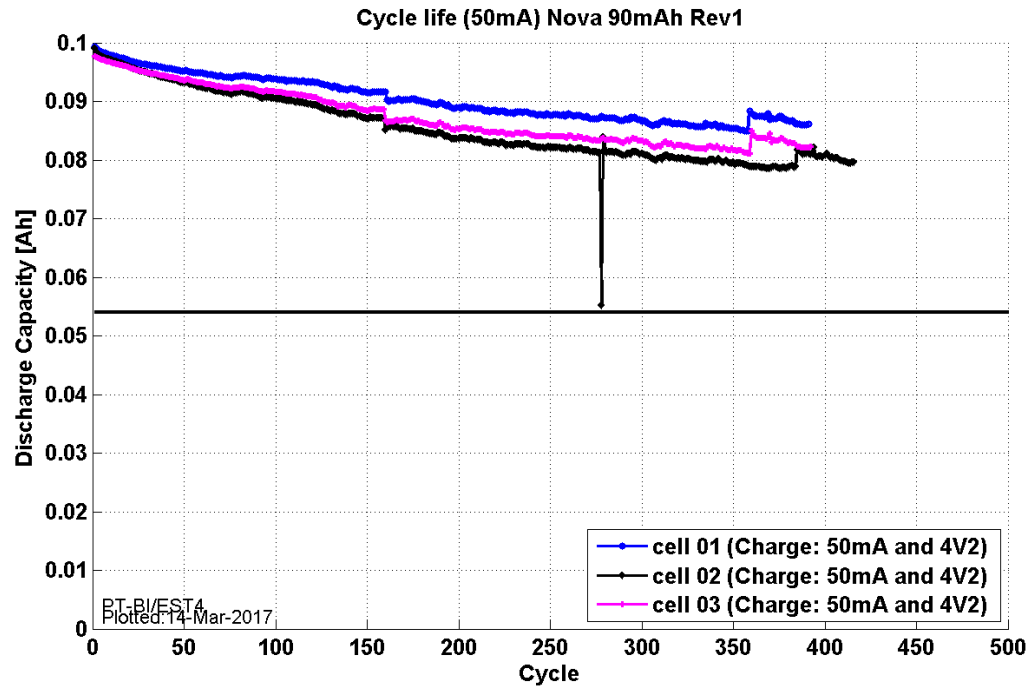
## Safety Tests - Overview

2	Safety testing <u>without</u> PCM (bare cell)			
2.1	Safety test during short circuit 10mOhm (SOC100) + subsequent charging (90 mA, CC-CV)	EST4	done	1 cell with SOC100 (4,23V) short-circuited + subsequent charging up to 4.2V (90mA, CC-CV) <b>Result:</b> no fire, no explosion, no cell rupture, only swelling, Tmaxcell 81 = 107,0 °C; 1 cell with SOC100 (4,23V) short-circuited + subsequent charging up to 6.0V (90mA, CC-CV) <b>Result:</b> no fire, no explosion, no cell rupture, only swelling, Tmaxcell 82 = 109,9 °C;
2.2	Safety test during short circuit 10mOhm (SOC50) + subsequent charging (90 mA, CC-CV)	EST4	done	2 cell with SOC50 short-circuited + subsequent charging up to 6.0V (90mA, CC-CV) <b>Result:</b> no fire, no explosion, no cell rupture, only swelling, Tmaxcell 83 = 117,7 °C; leakage of electrolyte Tmaxcell 84 = 109,2 °C; leakage of electrolyte
2.3	Safety test during overcharging 10V, 250mA	EST4	done	2 cells overcharged, cell voltage increase up to ca. 5V, then decrease down to ca. 4,1V (no fire, no explosion, slight swelling), Tmaxcell 71 = 95 °C, Tmaxcell 72 = 88 °C
2.4	Hot oven test (thermal runaway test) 130°C, 10min., 5K/min	EST4	done	Slight swelling;
2.5	Safety test during over discharging	EST4	done	Maximal Temp. < 50 °C

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## Cycle Life

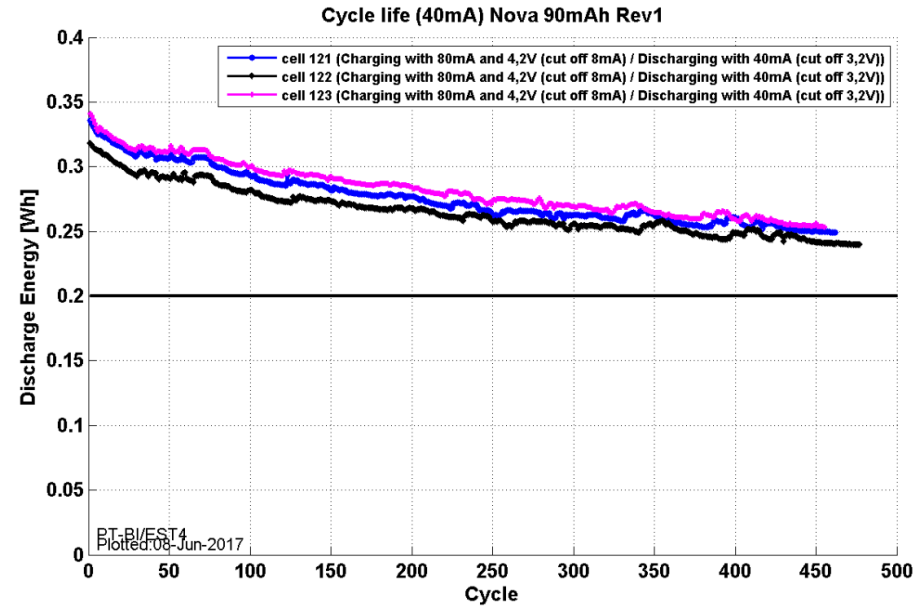
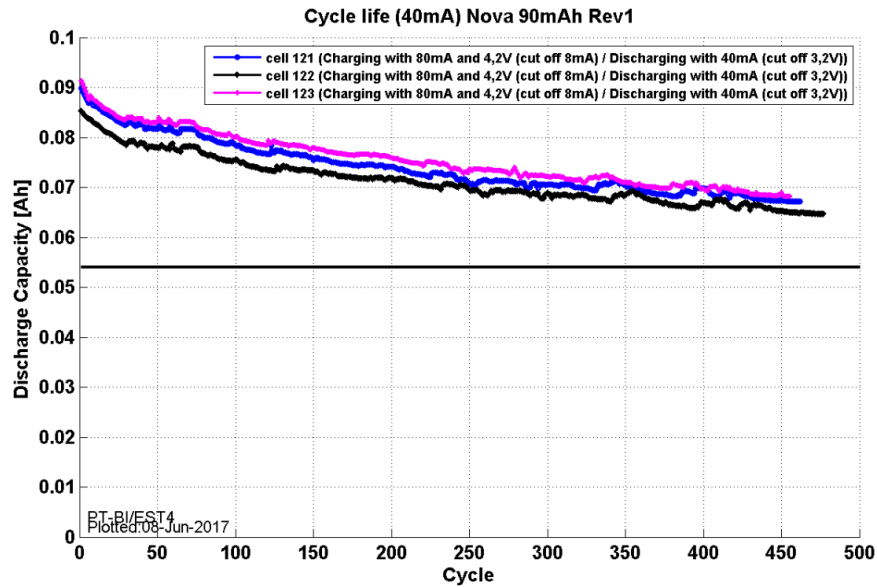
- Charge: 50mA
- Discharge: 50mA (until 2.35V)



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## Cycle Life

- Charge: 80mA
- Discharge: 40mA (until 3.2V)

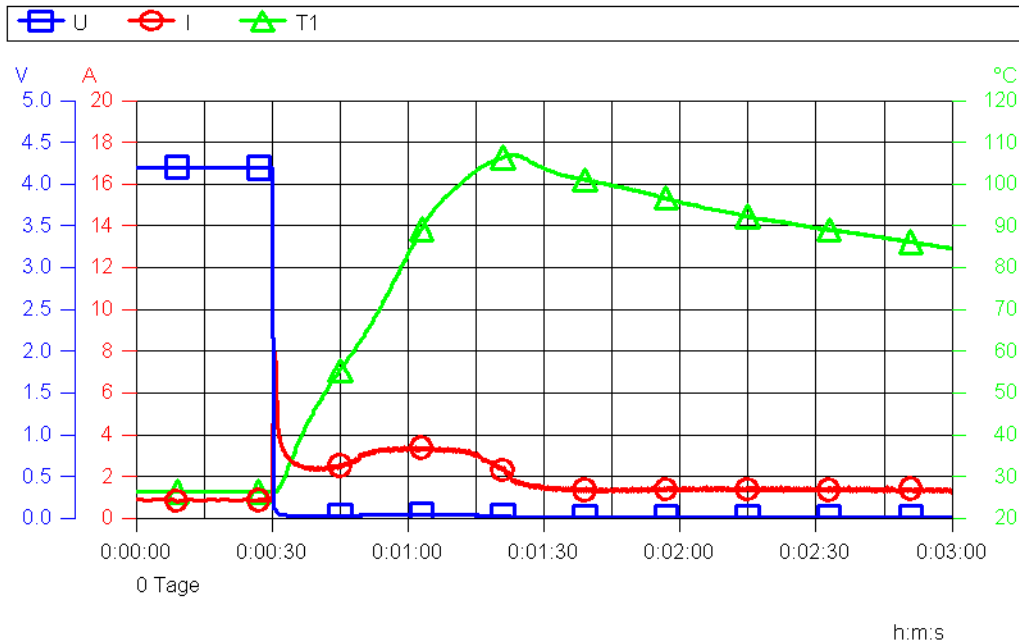


# Nova Micro Pouch Cell 401225P (90 mAh)

## Short-Circuit

Nova\_90mAh\_Rev1\_ShortCircuit\_SOC100\_cell\_81.bt

max. Temp: 107,0 °C  
max. Current: 8,1 A



- $R = 10 \text{ m}\Omega$
- $I_{\text{max}} = 16 \text{ A}$  (PicoScope)
- $T_{\text{max}} = 109.9 \text{ }^\circ\text{C}$
- Subsequent overcharging for 4h: 90 mA / 6 V  
→ no events



- Swelling of the cells
- no rupture, no fire, no explosion

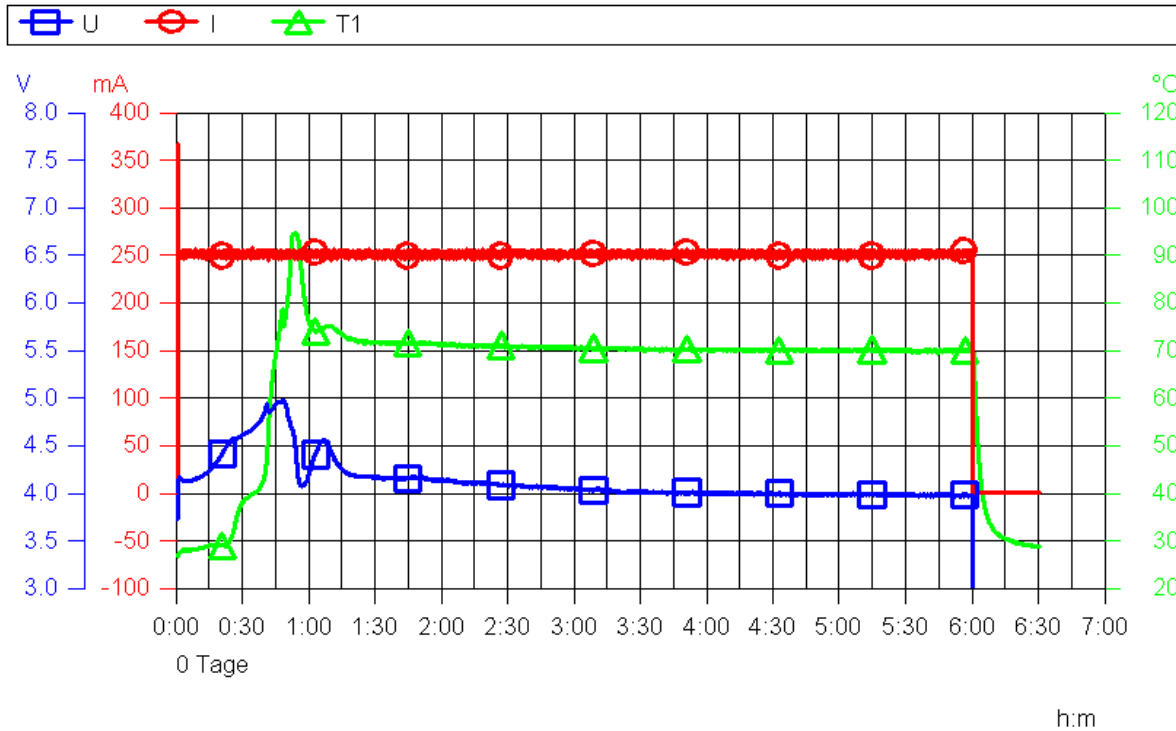
\*Fresh Cell:  $t=3.89\text{mm}$

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## Overcharge

Nova\_90mAh\_Rev1\_OCH\_10V\_250mA\_cell\_71.bt

max. Temp: 94,9 °C



- Overcharging for 6h: 250 mA / 10 V
- 1.5 Ah “charged”
- $T_{\max} = 95 \text{ °C}$
- $U_{\max} = 4.98 \text{ V}$



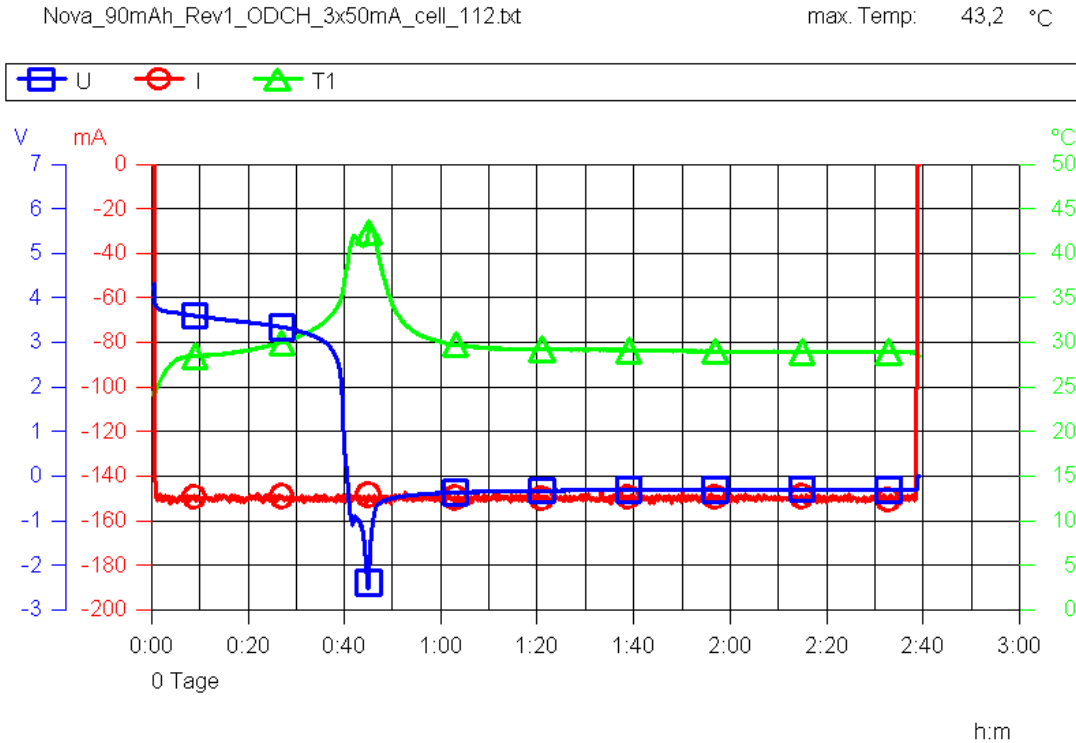
- Swelling of the cells
- no leakage, no rupture, no fire, no explosion

\*Fresh Cell: t=3.89mm

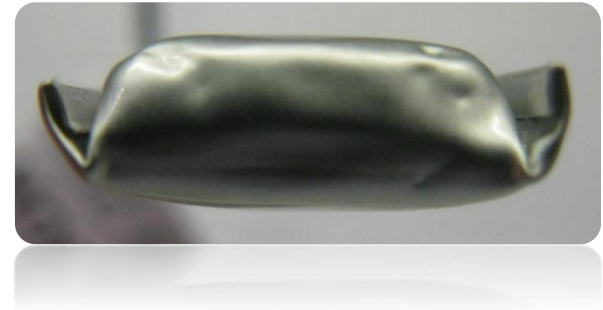


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## OverDischarge



- OverDischarging for 2h: 150 mA
- $T_{\max} < 45 \text{ °C}$
- Subsequent overcharging for 6h: 90 mA / 6 V  
→ no events



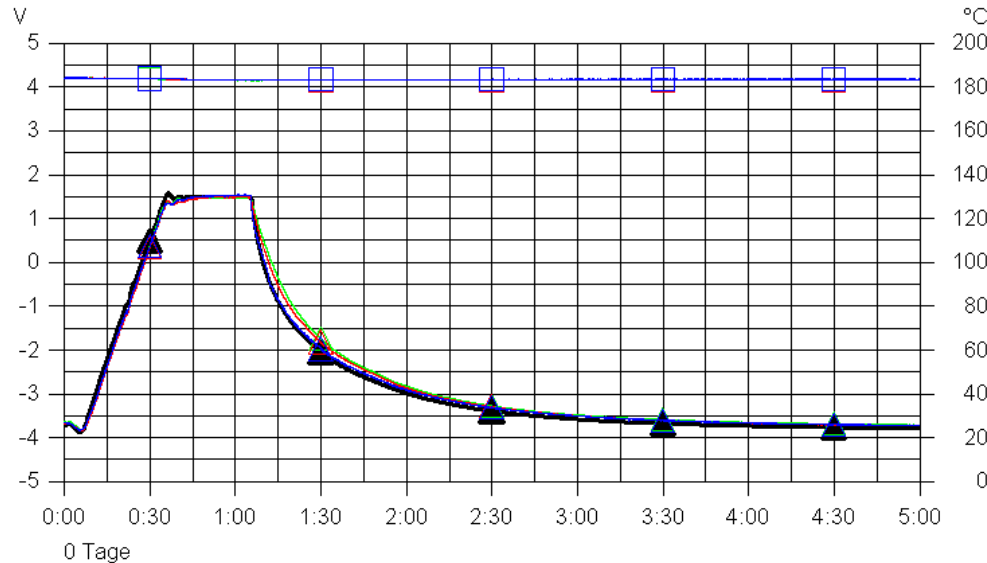
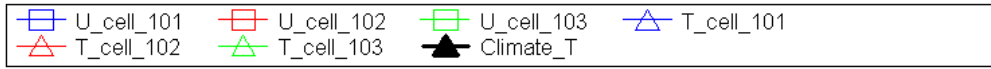
- Slight swelling of the cells
- no leakage, no rupture, no fire, no explosion

\*Fresh Cell: t=3.89mm

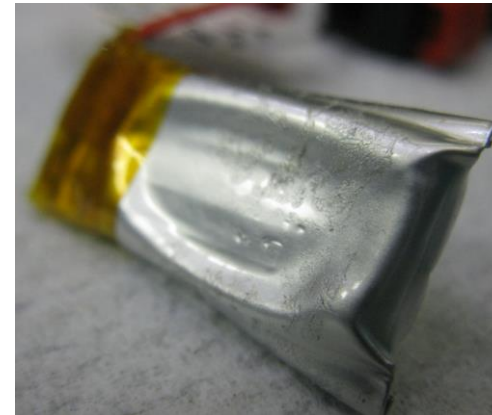
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## Hot Oven

Nova\_90mAh\_Rev1\_HotOvenTest\_130°C\_cell\_101-103.bt



- Expose cell to 130 °C for 30min in climatic chamber



- Swelling observed and traces of electrolyte
- No thermal runaway occurred

\*Fresh Cell: t=3.89mm

# Nova Micro Pouch Cell 401225P (90 mAh)

## Summary

- All electrical tests passed
- All safety tests passed (no rupture, no fire, no explosion)