检测报告
UN38.3

Name of sample:	**Polymer Li-ion Battery**
产品名称：	聚合物锂离子电池
Model/型号规格:	**802530**
Client:	**Dongguan Ranran Electronic Technology Co., Ltd.**
委托单位：	东莞市冉冉电子科技有限公司
Classification:	**Commission Test**
检测类别：	委托测试

Shenzhen Tiansu Calibration and Testing Co.,Ltd

深圳天溯计量检测股份有限公司

Rep. No.:TSZ22090102-P01-R01

Name of samples: Polymer Li-ion Battery 样品名称：聚合物锂离子电池	Trade mark: N/A 商标: N/A
Commissioned by: Dongguan Ranran Electronic Technology Co., Ltd. 委托单位: 东莞市冉冉电子科技有限公司	Commissioner address: Room 401, No. 94, West Lane, Tianxin South Gate, Huangjiang Town, Dongguan City, Guangdong Province 委托单位地址: 广东省东莞市黄江镇田心南门西巷 94 号 401 室
Manufacturer by: Dongguan Ranran Electronic Technology Co., Ltd. 制造单位: 东莞市冉冉电子科技有限公司	Manufacturer address: Room 401, No. 94, West Lane, Tianxin South Gate, Huangjiang Town, Dongguan City, Guangdong Province 制造单位地址: 广东省东莞市黄江镇田心南门西巷 94 号 401 室
Manufacturer's Contact Information 制造商联系信息： Phone: 13798727170 Email: 2680989906@QQ.COM	Manufacturer's Web Site 制造商网址：N/A
Type/Model 型号规格: 802530	Shape: Approximate Cuboid 样品形状：近长方体
Appearance color: Silver 样品颜色：银色	Sample size 样品尺寸: L(30.00mm)*W(24.81mm)*H(7.65mm)
Rated info. 额定信息: 3.7V /600mAh/2.22Wh	Cell quantity 组成电芯数量: 1pcs
Quantity of sample: 30cells+18batteries 样品数量: 30 个电芯+18 个电池	Cell model 电芯型号: 802530
Limited charge voltage 充电限制电压: 4.2V	Cut-off voltage 放电截止电压: 2.75V
Standard charge current 标准充电电流: 300mA	Max continuous charge current 最大持续充电电流: 300mA
Standard discharge current 标准放电电流: 300mA	Max continuous discharge current 最大持续放电电流: 300mA
Receiving date 接样日期: 2022.09.08	Sample identification 样品标识序号: C01#~C30#, B01#~B18#
Completing date 完成日期: 2022.09.18	Test item: 8 items 测试项目: 8 项

Test conclusion:
检测结论:

The Polymer Li-ion Battery submitted by Dongguan Ranran Electronic Technology Co., Ltd. are tested according to Section 38.3 of The Seventh Revised Edition of the United Nations Recommendations on the Transport of Dangerous Goods, Manual of Test and Criteria (ST/SG/AC.10/11/Rev.7/Section38.3). The test results comply with the relevant requirements of the standard.

由东莞市冉冉电子科技有限公司送检的聚合物锂离子电池，依据联合国《关于危险货物运输的建议书，试验和标准手册》第七修订版第 38.3 节进行检测，测试结果符合标准相关要求。

Date of issue: Sep.21, 2022
签发日期: 2022.09.21

批 准 Approved by 殷亿清　　审 核 Reviewed by 邱伟超　　主 检 Tested by 徐志龙

Description and illustration of the sample:
样品说明及描述:

Test item 测试项目	Sample No. 样品编号	State 状态	Remark 备注
T.1~T.5	B01#~B05#	at first cycle in fully charged states; 在第一个循环完全充电;	Battery 电池
	B06#~B10#	after 25 cycles ending in fully charged states; 在第二十五个循环完全充电;	
T.6	C01#~C05#	at first cycle at 50% of the design rated capacity; 在第一个循环充电 50%的额定容量;	Cell 电芯
	C06#~C10#	after 25 cycles ending in fully charged at 50% of the design rated capacity; 在第二十五个循环充电 50%的额定容量;	
T.7	B11#~B14#	at first cycle in fully charged states; 在第一个循环完全充电;	Battery 电池
	B15#~B18#	after 25 cycles ending in fully charged states; 在第二十五个循环完全充电;	
T.8	C11#~C20#	at first cycle in fully discharged states; 在第一个循环完全放电;	Cell 电芯
	C21#~C30#	after 25 cycles ending in fully discharged states; 在第二十五个循环完全放电;	

Description of the sampling procedure:
取样程序的说明:
N/A

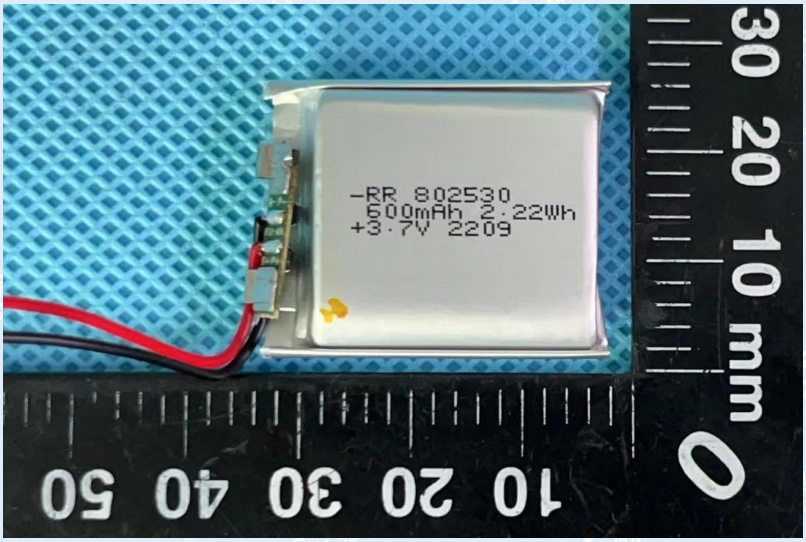
Description of report revision ：
报告修订的说明：
N/A

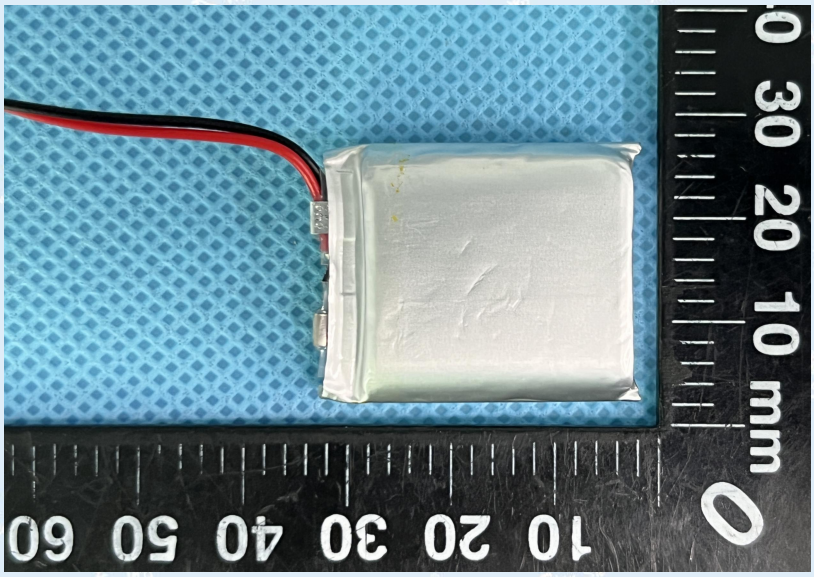
Remarks:
备注：

The Polymer Li-ion Battery submitted by Dongguan Ranran Electronic Technology Co., Ltd. are single cell batteries.

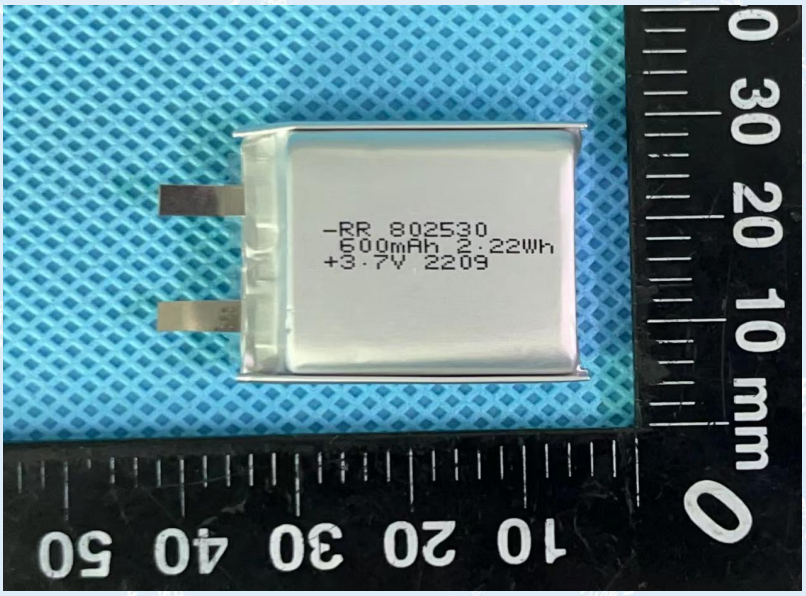
由东莞市冉冉电子科技有限公司所送的聚合物锂离子电池是单电芯电池。

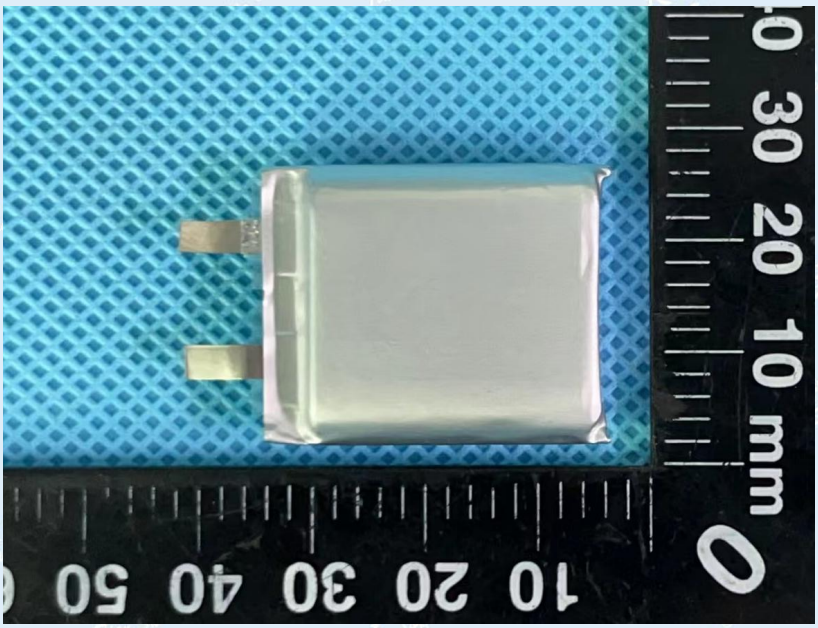
Photos of Battery\电池图片





Photos of Cell\电芯图片





38.3.4	Procedure/测试步骤	—
38.3.4.1	**Test 1: Altitude simulation/测试 1：高度模拟** Test cells and batteries shall be stored at a pressure of 11.6kPa or less for at least six hour at ambient temperature (20±5℃) . 将电芯和电池在温度为 20±5℃，大气压力为不大于 11.6kpa 的环境中贮存不少于 6 个小时。 Requirement/标准要求： 1.Cells and batteries Mass loss limit: ≤0.2% . 样品质量损失≤0.2%。 2.Open circuit voltage not less than 90%, The requirement relating to voltage is not applicable to test cells and batteries at full discharged states. 样品试验后开路电压应不低于试验前开路电压的 90%,此要求不适用于完全放完电的电池和电芯。 3.No leakage, no venting, no disassembly, no rupture and no fire. 样品（电池）应无漏液、无排气、无解体、无破裂以及无着火现象的发生。	P

Result
测试结果

Sample No. 样品编号	Before Test 测试前		After Test 测试后		Mass loss 质量损失(%)	Residual OCV 剩余电压(%)	Test result 测试结果
	Mass 样品质量 (g)	Voltage 开路电压(V)	Mass 样品质量(g)	Voltage 开路电压(V)			
B01#	10.936	4.179	10.933	4.176	0.03	99.93	P
B02#	10.928	4.182	10.926	4.180	0.02	99.95	P
B03#	10.939	4.180	10.938	4.176	0.01	99.90	P
B04#	10.944	4.175	10.943	4.172	0.01	99.93	P
B05#	10.931	4.179	10.929	4.177	0.02	99.95	P
B06#	10.938	4.182	10.933	4.179	0.05	99.93	P
B07#	10.936	4.176	10.933	4.173	0.03	99.93	P
B08#	10.935	4.177	10.931	4.176	0.04	99.98	P
B09#	10.926	4.179	10.923	4.175	0.03	99.90	P
B10#	10.945	4.175	10.944	4.174	0.01	99.98	P

Other supplements ： Test result "P" decides that the test item passes.
其他补充：测试结果“P”代表判定该测试项目通过。

38.3.4	**Procedure/测试步骤**	—
38.3.4.2	**Test 2: Thermal test/测试 2：温度测试** Test cells and batteries are to be stored for at least six hours at a test temperature equal to 72±2℃, followed by storage for at least six hours at a test temperature equal to -40±2℃, The maximum time interval between test temperature extremes in 30 minutes, This procedure is to be repeated until 10 total cycles are complete, after which all test cells and batteries are to be stored for 24 hours at ambient temperature (20±5℃). 将电芯和电池在温度为 72±2℃的条件下贮存不少于 6 个小时，然后，在温度-40±2℃条件下贮存不少于 6 个小时，两个温度间的间隔最长为 30min,重复操作上述步骤直到 10 次，然后，将其在环境温度为 20±5℃的条件下放置 24 个小时。 Requirement/标准要求： 1.Cells and batteries Mass loss limit: ≤0.2% . 样品质量损失≤0.2%. 2.Open circuit voltage not less than 90%, The requirement relating to voltage is not applicable to test cells and batteries at full discharged states. 样品试验后开路电压应不低于试验前开路电压的 90％,此要求不适用于完全放完电的电池和电芯。 3.No leakage, no venting, no disassembly, no rupture and no fire. 样品（电池）应无漏液、无排气、无解体、无破裂以及无着火现象的发生。	**P**

Result
测试结果

Sample No. 样品编号	Before Test 测试前		After Test 测试后		Mass loss 质量损失(%)	Residual OCV 剩余电压(%)	Test result 测试结果
	Mass 样品质量 (g)	Voltage 开路电压(V)	Mass 样品质量(g)	Voltage 开路电压(V)			
B01#	10.933	4.176	10.924	4.158	0.08	99.57	P
B02#	10.926	4.180	10.918	4.159	0.07	99.50	P
B03#	10.938	4.176	10.930	4.158	0.07	99.57	P
B04#	10.943	4.172	10.936	4.150	0.06	99.47	P
B05#	10.929	4.177	10.922	4.159	0.06	99.57	P
B06#	10.933	4.179	10.926	4.159	0.06	99.52	P
B07#	10.933	4.173	10.925	4.154	0.07	99.54	P
B08#	10.931	4.176	10.923	4.157	0.07	99.55	P
B09#	10.923	4.175	10.916	4.157	0.06	99.57	P
B10#	10.944	4.174	10.935	4.155	0.08	99.54	P

Other supplements ： Test result "P" decides that the test item passes.
其他补充： 测试结果“P”代表判定该测试项目通过。

38.3.4	**Procedure/测试步骤**	—
38.3.4.3	**Test 3: Vibration/测试 3：振动** Cells and batteries are firmly secured to the platform of the vibration machine without distorting the cells in such a manner as to faithfully transmit the vibration, The vibration shall be a sinusoidal wave form with a logarithmic sweep between 7 Hz and 200 Hz and back to 7 Hz traversed in 15 minutes, This cycle shall be repeated 12 times for a total of 3 hours for each of three mutually perpendicular mounting position of the cell. 将电芯和电池牢固地安装在振动台的台面上，然后开始振动。振动以正弦波形式，以 7Hz 增加至 200Hz，然后再减少回到 7Hz 为一个循环，一个循环持续 15 分钟的对数扫频。每个电芯和电池从三个互相垂直的方向上循环 12 次，3 个小时。 Requirement/标准要求： 1.Cells and batteries Mass loss limit: ≤0.2%. 样品质量损失≤0.2%. 2.Open circuit voltage not less than 90%, The requirement relating to voltage is not applicable to test cells and batteries at full discharged states. 样品试验后开路电压应不低于试验前开路电压的 90%,此要求不适用于完全放完电的电池和电芯。 3.No leakage, no venting, no disassembly, no rupture and no fire. 样品（电池）应无漏液、无排气、无解体、无破裂以及无着火现象的发生。	**P**

Result
测试结果

Sample No. 样品编号	Before Test 测试前		After Test 测试后		Mass loss 质量损失(%)	Residual OCV 剩余电压(%)	Test result 测试结果
	Mass 样品质量 (g)	Voltage 开路电压(V)	Mass 样品质量(g)	Voltage 开路电压(V)			
B01#	10.924	4.158	10.921	4.155	0.03	99.93	P
B02#	10.918	4.159	10.915	4.156	0.03	99.93	P
B03#	10.930	4.158	10.925	4.156	0.05	99.95	P
B04#	10.936	4.150	10.934	4.146	0.02	99.90	P
B05#	10.922	4.159	10.919	4.154	0.03	99.88	P
B06#	10.926	4.159	10.922	4.157	0.04	99.95	P
B07#	10.925	4.154	10.923	4.152	0.02	99.95	P
B08#	10.923	4.157	10.921	4.152	0.02	99.88	P
B09#	10.916	4.157	10.912	4.153	0.04	99.90	P
B10#	10.935	4.155	10.931	4.150	0.04	99.88	P

Other supplements ： Test result "P" decides that the test item passes.
其他补充：测试结果“P”代表判定该测试项目通过。

38.3.4	**Procedure/测试步骤**	—
38.3.4.4	**Test 4: Shock/测试 4：冲击** Test cells and batteries shall be secured to the testing machine, and each shall be subjected to a half-sine shock of peak acceleration of 150gn (or Acceleration(gn)= $\sqrt{\left(\frac{100850}{mass}\right)}$, which is smaller) and pulse duration of 6 milliseconds, large cells and large batteries shall be subjected to a half-sine of peak acceleration of 50gn (or Acceleration(gn)= $\sqrt{\left(\frac{30000}{mass}\right)}$, which is smaller) and pulse duration of 11 milliseconds. Each cell or battery shall be subjected to three shocks in the positive direction followed by three shocks in the negative direction of three mutually perpendicular mounting positions of the cell or battery for a total of 18 shocks. 以稳固的托架固定住每个电芯和电池样品的全部配件表面。对每个电芯或电池以峰值为 150gn（或与$\sqrt{\left(\frac{100850}{mass}\right)}$中的较小值）的半正弦的加速度撞击，脉冲持续 6 毫秒，大型电池和大型电池组须经受最大加速度 50gn（或与$\sqrt{\left(\frac{30000}{mass}\right)}$中的较小值）和脉冲持续时间 11 毫秒的半正弦波冲击。每个电池或电池组须在三个互相垂直的电池安装方位的正方向经受三次冲击，接着在反方向经受三次冲击，总共经受 18 次冲击。	**P**
	Requirement/标准要求： 1.Cells and batteries Mass loss limit: ≤0.2%. 样品质量损失≤0.2%. 2.Open circuit voltage not less than 90%, The requirement relating to voltage is not applicable to test cells and batteries at full discharged states. 样品试验后开路电压应不低于试验前开路电压的 90%,此要求不适用于完全放完电的电池和电芯。 3.No leakage, no venting, no disassembly, no rupture and no fire. 样品（电池）应无漏液、无排气、无解体、无破裂以及无着火现象的发生。	
	Result/测试结果	

Sample No. 样品编号	Before Test 测试前		After Test 测试后		Mass loss 质量损失(%)	Residual OCV 剩余电压(%)	Test result 测试结果
	Mass 样品质量 (g)	Voltage 开路电压(V)	Mass 样品质量(g)	Voltage 开路电压(V)			
B01#	10.921	4.155	10.921	4.153	0.00	99.95	P
B02#	10.915	4.156	10.912	4.153	0.03	99.93	P
B03#	10.925	4.156	10.922	4.154	0.03	99.95	P
B04#	10.934	4.146	10.932	4.144	0.02	99.95	P
B05#	10.919	4.154	10.918	4.151	0.01	99.93	P
B06#	10.922	4.157	10.921	4.152	0.01	99.88	P
B07#	10.923	4.152	10.921	4.151	0.02	99.98	P
B08#	10.921	4.152	10.918	4.149	0.03	99.93	P
B09#	10.912	4.153	10.912	4.152	0.00	99.98	P
B10#	10.931	4.150	10.929	4.149	0.02	99.98	P

Other supplements ： Test result "P" decides that the test item passes.
其他补充： 测试结果“P”代表判定该测试项目通过。

38.3.4	**Procedure/测试步骤**	—
38.3.4.5	**Test 5: External short circuit/测试 5：外部短路** The cell or battery to be tested shall be temperature stabilized so that its external case temperature reaches 57±4℃ and then the cell or battery shall be subjected to a short circuit condition with a total external resistance of less than 0.1 ohm at 57±4℃, This short circuit condition is continued for at least one hour after the cell or battery external case temperature has returned to 57±4℃, the cell or battery must be observed for a further six hour for the test to be concluded. 保持试验环境温度稳定在 57±4℃，以使电芯或电池样品外表温度达到 57±4℃，然后，在此温度下，将其正负极用小于 0.1 欧姆的线路短接，待电芯或电池的外表温度恢复到 57±4℃之后再持续 1 小时以上，对电芯或电池必须进一步观察 6 个小时才能下结论。 Requirement/标准要求： 1.Cells and batteries meet this requirement if their external temperature does not exceed 170℃; 电芯或电池的外壳温度应不超过 170℃； 2. No disassembly, no rupture and no fire during the test and within six hours after this test. 试验后 6 小时内无解体、无破裂、无起火。	**P**

Result
测试结果

Sample No. 样品编号	**Max External Temp** **样品表面最高温度(℃)**	Test result 测试结果
B01#	58.1	P
B02#	58.0	P
B03#	57.2	P
B04#	57.6	P
B05#	58.5	P
B06#	58.3	P
B07#	57.4	P
B08#	58.4	P
B09#	57.7	P
B10#	57.8	P

Other supplements ： Test result "P" decides that the test item passes.
其他补充：测试结果“P”代表判定该测试项目通过。

38.3.4	**Procedure/测试步骤**	—
38.3.4.6	**Test 6: Crush\Impact/** **测试 6：挤压(适用)** **撞击(不适用)**	**P**
	Crush 挤压 A cell or component cell is to be crushed between two flat surfaces. The crushing is to be gradual with a speed of approximately 1.5 cm/s at the first point of contact. The crushing is to be continued until the first of the three options below is reached. (a) The applied force reaches 13kN±0.78kN; (b) The voltage of the cell drops by at least 100 mV; (c) The cell is deformed by 50% or more of its original thickness. Once the maximum pressure has been obtained, the voltage drops by 100mV or more, or the cell is deformed by at least 50% of its original thickness, the pressure shall be released. 电池芯或组成电池芯在两个平面间挤压。挤压在第一个接触点以约 1.5cm/s 的速度慢慢进行，直到下面三个选项之一达到为止： (a)作用力达到 13kN±0.78kN； (b)电池芯电压降至少达到 100mV； (c)电池厚度和最初比较变形至少 50%。 一旦达到最大压力，电压降超过 100 mV 或者电池芯变形超过 50%，压力应该解除。	
	Impact 撞击 (applicable to cylindrical cells not less than 18mm in diameter) The sample cell or component cell is to be placed on a flat smooth surface. A 15.8 mm ± 0.1 mm diameter, at least 6 cm long, or the longest dimension of the cell, whichever is greater, Type 316 stainless steel bar is to be placed across the centre of the sample. A 9.1 kg ± 0.1 kg mass is to be dropped from a height of 61 ± 2.5 cm at the intersection of the bar and sample in a controlled manner using a near frictionless, vertical sliding track or channel with minimal drag on the falling mass. The vertical track or channel used to guide the falling mass shall be oriented 90 degrees from the horizontal supporting surface. The test sample is to be impacted with its longitudinal axis parallel to the flat surface and perpendicular to the longitudinal axis of the 15.8 mm ± 0.1 mm diameter curved surface lying across the centre of the test sample. Each sample is to be subjected to only a single impact. Cells and component cells meet this requirement if their external temperature does not exceed 170°C and there is no disassembly and no fire during the test and within six hours after this test. (适用于直径不小于 18 毫米的圆柱形电池)将电池或元件电池样品平放在一个平面上，其纵轴平行于测试台面年，将一直径为 15.8 mm ± 0.1 mm 的 316 型不锈钢棒横放在电池中心位置。然后，将一质量为 9.1 kg ± 0.1 kg 的物体从 61±2.5 cm 的高度落向样品。样品在进行试验时，其外表温度应不超过 170℃。且试验结束后 6 个小时之内，样品应无解体、无起火现象发生。	
	Requirements/标准要求： 1.Cells and component cells meet this requirement if their external temperature does not exceed 170℃; 电芯的外壳温度应不超过 170℃； 2. No disassembly, no fire during the test and within six hours after this test. 试验后 6 小时内无解体、无起火。	

	Result **测试结果**		
Sample No. 样品编号	**OCV prior to test** **试验前电压（V）**	**Max External Temp** **样品表面最高温度(℃)**	**Test result** **测试结果**
C01#	3.820	23.9	P
C02#	3.825	23.7	P
C03#	3.820	23.7	P
C04#	3.818	23.9	P
C05#	3.783	24.4	P
C06#	3.817	23.2	P
C07#	3.822	24.7	P
C08#	3.800	24.1	P
C09#	3.827	24.9	P
C10#	3.784	24.0	P

Other supplements ： Test result "P" decides that the test item passes.

其他补充：测试结果“P”代表判定该测试项目通过。

38.3.4	**Procedure/测试步骤**	—
38.3.4.7	**Test 7: Overcharge/测试 7：过度充电**	**P**
	When the manufacturer's recommended charge voltage is not more than 18V, the minimum voltage of the test shall be the lesser of two times the maximum charge voltage of the or 22V，whichever is less. When the manufacturer's recommended charge voltage is more than 18V, the charging voltage of the test shall be 1.2 times maximum charge voltage. The charging current is 2 times of the maximum charging current recommended by the manufacturer. 如果厂家推荐的充电电压不超过 18V，本测试的最小充电电压应该是两倍的厂家标定最大充电电压或者是 22V，取其中较小者。如果厂家推荐的充电电压超过 18V，充电电压应该为 1.2 倍的厂家标定最大充电电压。充电电流为厂家推荐的最大充电电流 2 倍。	
	Requirements/标准要求: No disassembly and no fire during the test and within seven days after the test. 试验样品在试验中和试验后 7 天内，应无解体和无起火现象发生。	
	Result **测试结果**	

Sample No. 样品编号	**OCV prior to test** **试验前电压（V）**	Test result 测试结果
B11#	4.176	P
B12#	4.176	P
B13#	4.178	P
B14#	4.176	P
B15#	4.180	P
B16#	4.180	P
B17#	4.180	P
B18#	4.176	P

Other supplements ：Test result "P" decides that the test item passes.

其他补充：测试结果"P"代表判定该测试项目通过。

38.3.4	Procedure/测试步骤	—
38.3.4.8	**Test 8: Forced discharge/测试 8：强制放电** Each cell shall be forced discharged at ambient temperature by connecting it in series with a 12V D.C power supply at an initial current equal to the maximum discharge current specified the manufacturer The specified discharge current is to be obtained by connecting a resistive load of the appropriate size and rating in series with the test cell, Each cell shall be forced discharged for a time interval(in hours) equal to its rated capacity divided by the initial test current(in ampere). 在 20±5℃的环境温度下，将单个电芯连接在 12V 的直流电源上进行强制放电，此直流电源提供每个电芯初始电流为制造厂指定的最大放电电流，放电时间为额定容量除以初始电流。 Requirements/标准要求: No disassembly and no fire during the test and within seven days after the test. 试验样品在试验中和试验后 7 天内，应无解体和无起火现象发生。	P

Result

测试结果

Sample No. 样品编号	OCV prior to test 试验前电压（V）	Test result 测试结果	Sample No. 样品编号	OCV prior to test 试验前电压（V）	Test result 测试结果
C11#	3.113	P	C21#	3.056	P
C12#	3.057	P	C22#	3.121	P
C13#	3.074	P	C23#	3.097	P
C14#	3.117	P	C24#	3.110	P
C15#	3.111	P	C25#	3.076	P
C16#	3.108	P	C26#	3.125	P
C17#	3.103	P	C27#	3.115	P
C18#	3.055	P	C28#	3.135	P
C19#	3.134	P	C29#	3.049	P
C20#	3.118	P	C30#	3.124	P

Other supplements ： Test result "P" decides that the test item passes.

其他补充：测试结果“P”代表判定该测试项目通过。

STATEMENTS

声　　明

1. The test report is invalid without the official stamp of Tiansu.
   本报告无检测单位印章无效。

2. This report shall not be copied partly without the written approval of Shenzhen Tiansu Calibration and Testing Co.,Ltd.
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5. Objections to the test report must be submitted to Tiansu within 15 days.
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6. The test report is valid for the tested samples only.
   本报告仅与送检样品有关。

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