코인셀 충방전 평가 실습

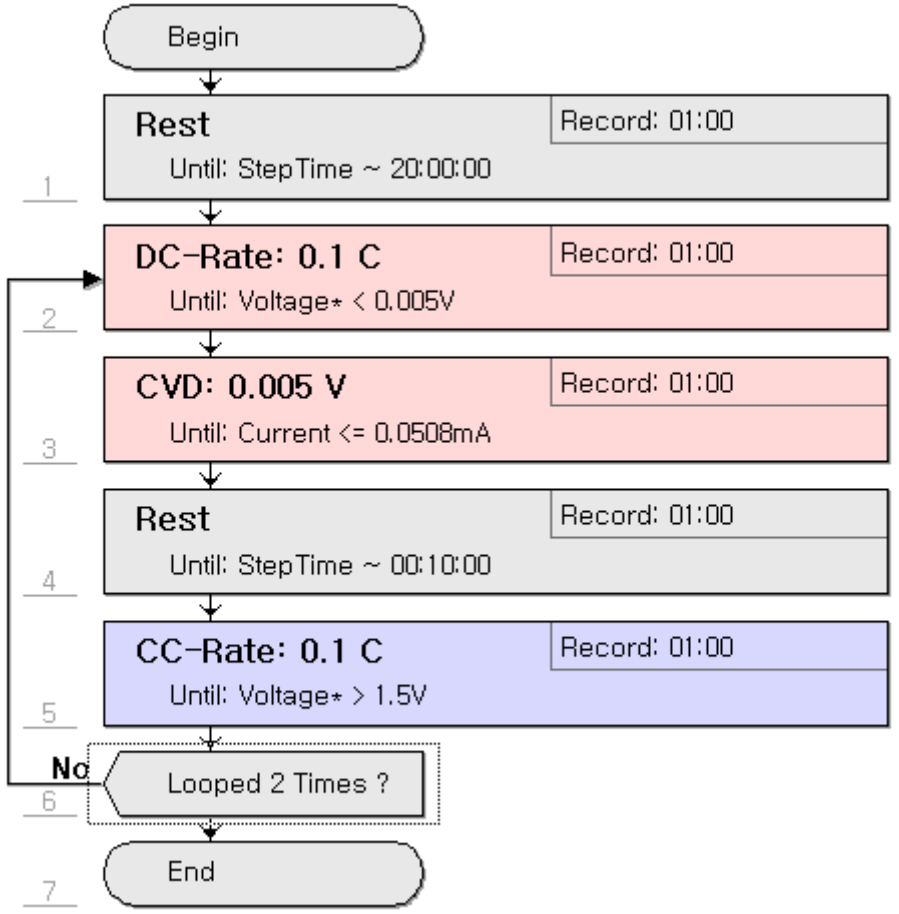
- 프로그램명: 이차전지(코인셀) 제조 실습교육-2차
- 일시: 2025.04.11, 15:00~17:00
- 장소: D9-131

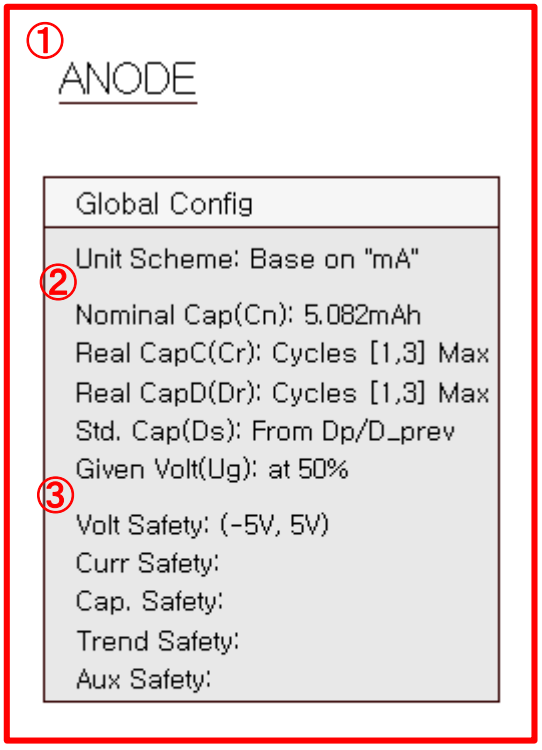
신소재화학공학과

박동호 (dh9.park@gmail.com)

코인셀 충방전 평가 실습

(1) 조건파일의 활물질 정보를 입력한다.
① 활물질 이름 ② 전극 용량 ③ safety condition

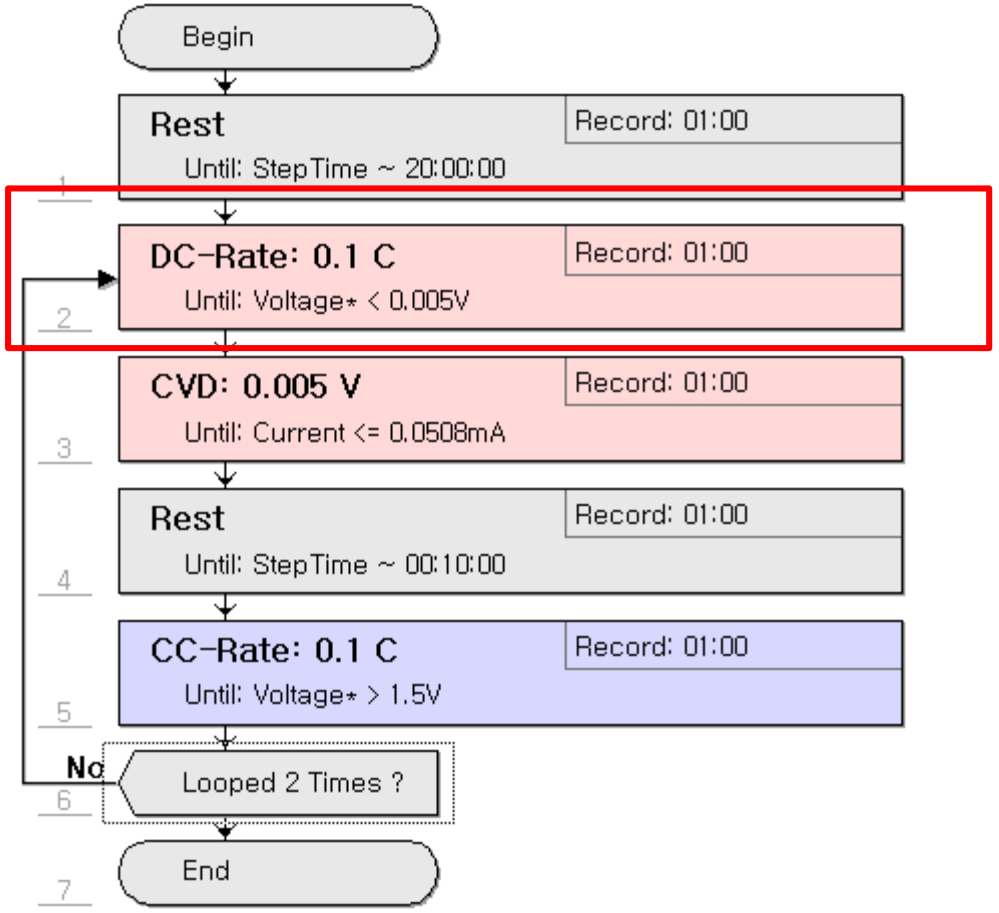




코인셀 충방전 평가 실습

1. Setting Measurement Condition

(2) Rest Step Time ~ 20:00:00 (음극 20h, 양극 10h)
*전해액의 충분한 함침을 위해 해당 시간 동안 Rest 진행



ANODE

Global Config

Unit Scheme: Base on "mA"

Nominal Cap(Cn): 5.082mAh
Real CapC(Cr): Cycles [1,3] Max
Real CapD(Dr): Cycles [1,3] Max
Std. Cap(Ds): From Dp/D_prev
Given Volt(Ug): at 50%

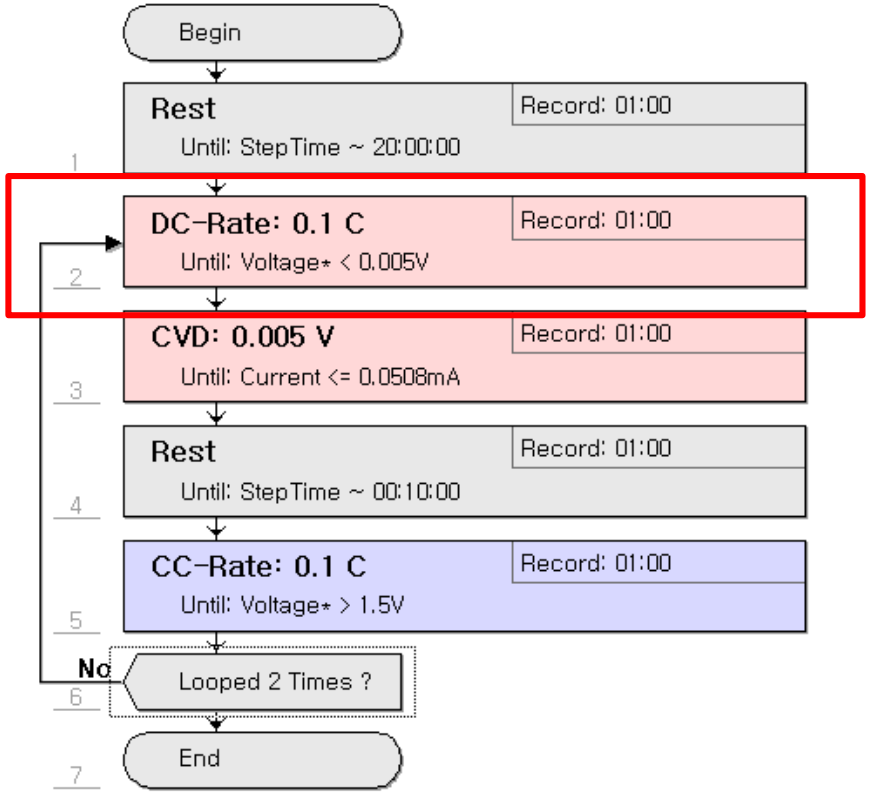
Volt Safety: (-5V, 5V)
Curr Safety:
Cap. Safety:
Trend Safety:
Aux Safety:

코인셀 충방전 평가 실습

1. Setting Measurement Condition

(3) 충전 C-Rate 설정 (Constant Current)
충전 시, 양극의 경우 CC-Rate (0.1C, Voltage ≥ 4.3, cut-off 4.2~4.5V)
음극의 경우 DC-Rate (0.1C, Voltage ≤ 0.005, cut-off 0.005V)

* Formation 과정에서 C-rate 속도, cut-off voltage 등은 활물질 종류 및 실험 목적에 따라 변경될 수 있다.



ANODE

Global Config

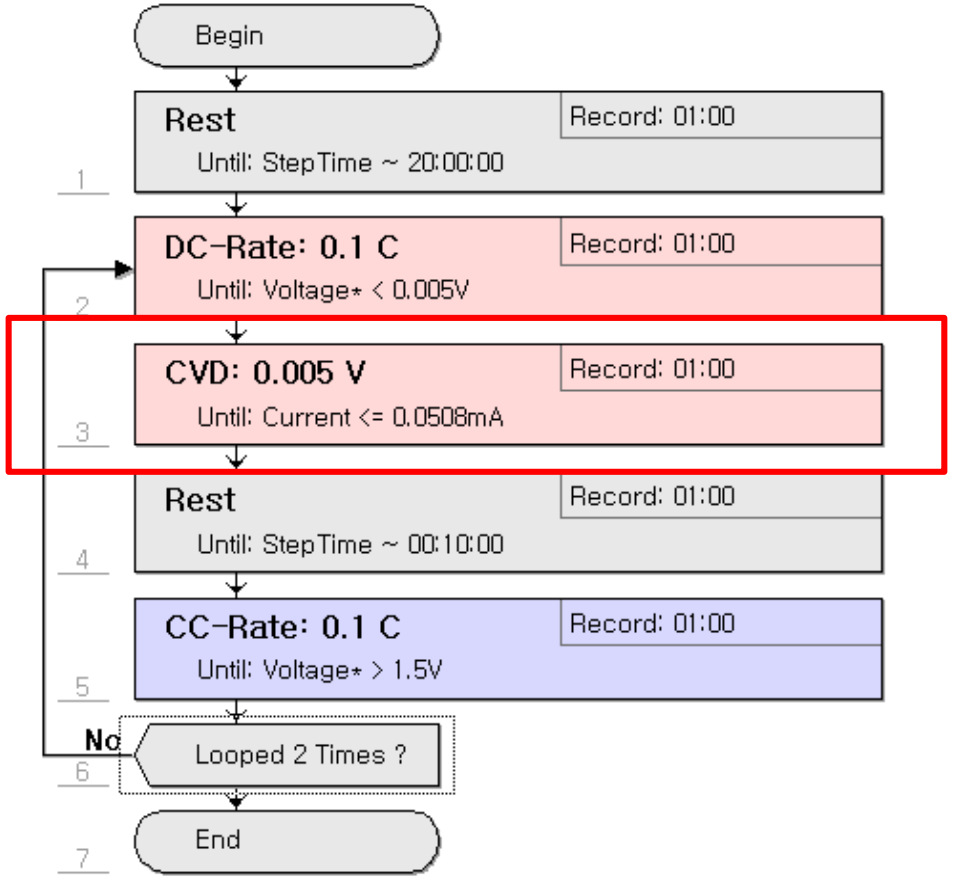
Unit Scheme: Base on "mA"

Nominal Cap(Cn): 5.082mAh
Real CapC(Cr): Cycles [1,3] Max
Real CapD(Dr): Cycles [1,3] Max
Std. Cap(Ds): From Dp/D_prev
Given Volt(Ug): at 50%

Volt Safety: (-5V, 5V)
Curr Safety:
Cap. Safety:
Trend Safety:
Aux Safety:

1. Setting Measurement Condition

(4) 충전 CV 설정 (constant voltage)
충전 시, 양극의 경우 CVC(4.3V, Current ≥ 0.05C)
음극의 경우 CVD(0.005V, Current ≤ 0.01C)



ANODE

Global Config

Unit Scheme: Base on "mA"

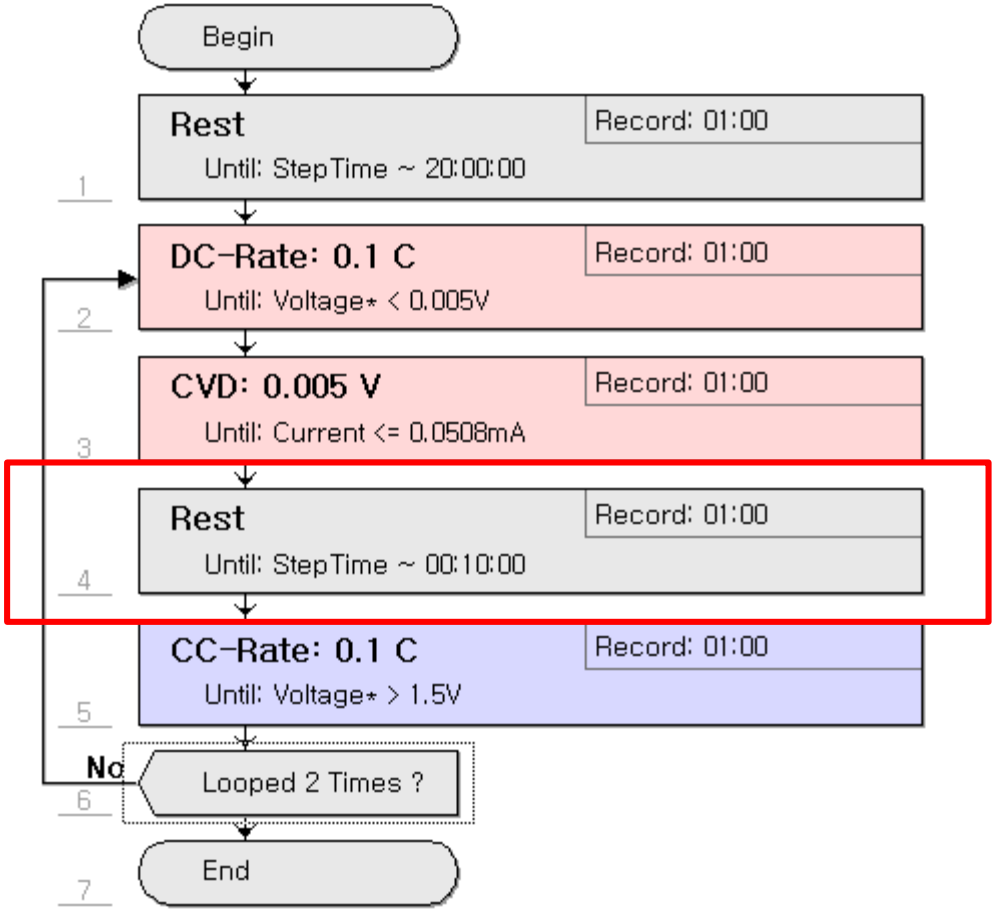
Nominal Cap(Cn): 5.082mAh
Real CapC(Cr): Cycles [1,3] Max
Real CapD(Dr): Cycles [1,3] Max
Std. Cap(Ds): From Dp/D_prev
Given Volt(Ug): at 50%

Volt Safety: (-5V, 5V)
Curr Safety:
Cap. Safety:
Trend Safety:
Aux Safety:

코인셀 충방전 평가 실습

1. Setting Measurement Condition

(5) Rest Step Time ~ 00:10:00



ANODE

Global Config

Unit Scheme: Base on "mA"

Nominal Cap(Cn): 5.082mAh
Real CapC(Cr): Cycles [1,3] Max
Real CapD(Dr): Cycles [1,3] Max
Std. Cap(Ds): From Dp/D_prev
Given Volt(Ug): at 50%

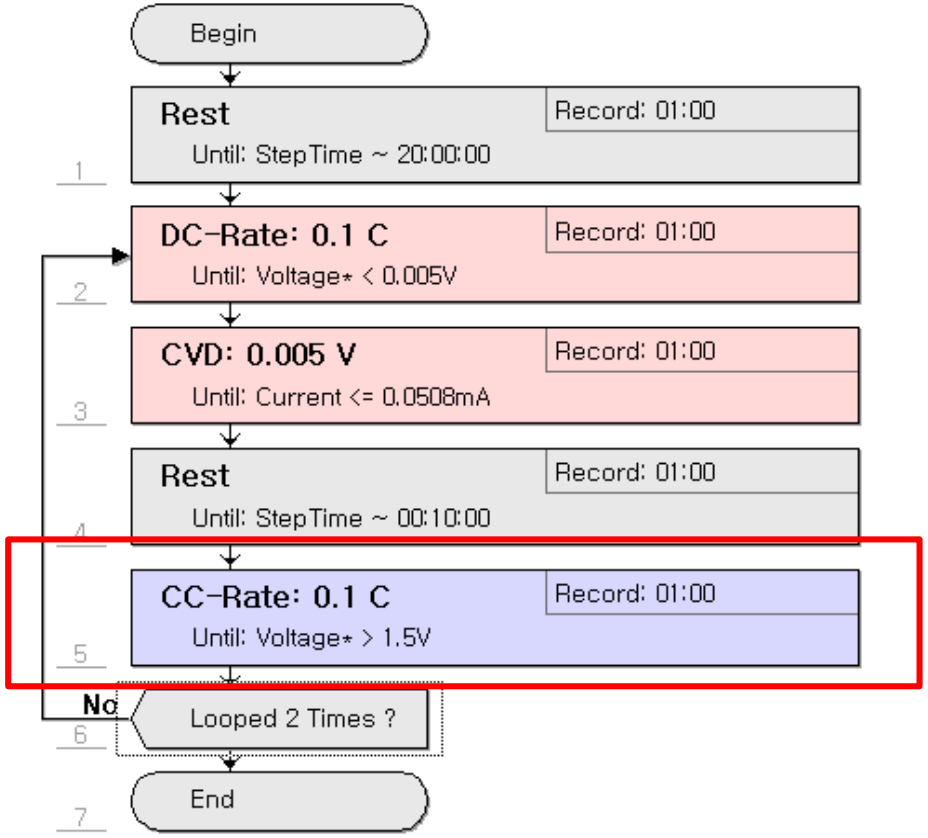
Volt Safety: (-5V, 5V)
Curr Safety:
Cap. Safety:
Trend Safety:
Aux Safety:

코인셀 충방전 평가 실습

1. Setting Measurement Condition

(6) 방전 C-Rate 설정 (constant current)
충전 시, 양극의 경우 DC-Rate(0.1C, Voltage ≤ 3.0)
음극의 경우 CC-Rate(0.1C, Voltage ≥ 1.5)

* Formation 과정에서 C-rate 속도, cut-off voltage 등은 활물질 종류 및 실험 목적에 따라 변경될 수 있습니다.



ANODE

Global Config

Unit Scheme: Base on "mA"

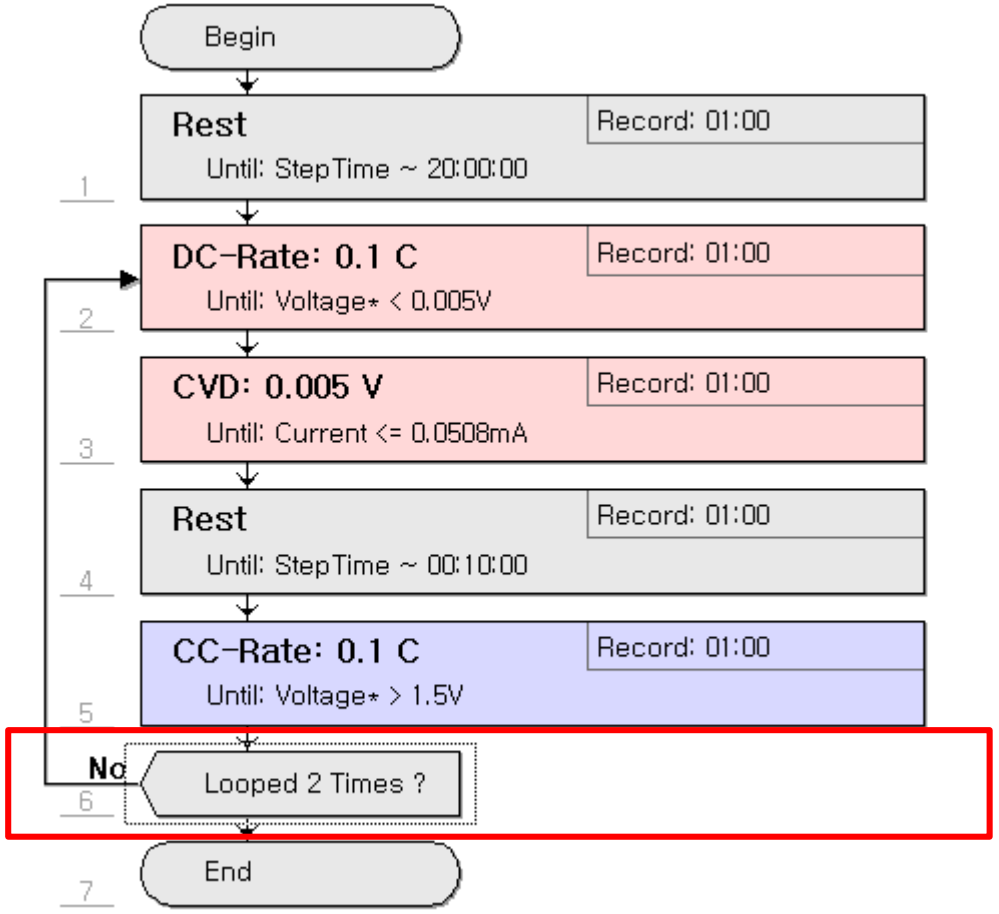
Nominal Cap(Cn): 5.082mAh
Real CapC(Cr): Cycles [1,3] Max
Real CapD(Dr): Cycles [1,3] Max
Std. Cap(Ds): From Dp/D_prev
Given Volt(Ug): at 50%

Volt Safety: (-5V, 5V)
Curr Safety:
Cap. Safety:
Trend Safety:
Aux Safety:

코인셀 충방전 평가 실습

1. Setting Measurement Condition

(7) Loop 설정 2 times
(추가적인 test를 진행하려면 반복하려는 횟수 만큼 Loop 설정)



ANODE

Global Config

Unit Scheme: Base on "mA"

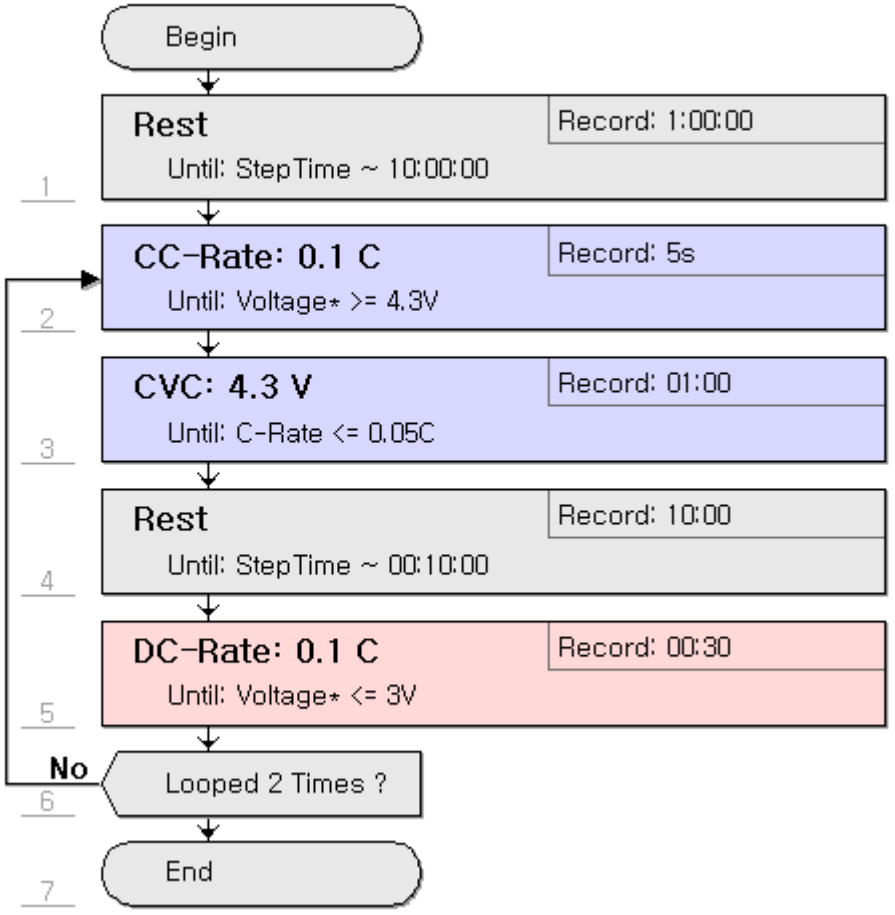
Nominal Cap(Cn): 5.082mAh
Real CapC(Cr): Cycles [1,3] Max
Real CapD(Dr): Cycles [1,3] Max
Std. Cap(Ds): From Dp/D_prev
Given Volt(Ug): at 50%

Volt Safety: (-5V, 5V)
Curr Safety:
Cap. Safety:
Trend Safety:
Aux Safety:

코인셀 충방전 평가 실습

1. Setting Measurement Condition

(7-2) Cathode Reference



Cathode

Global Config

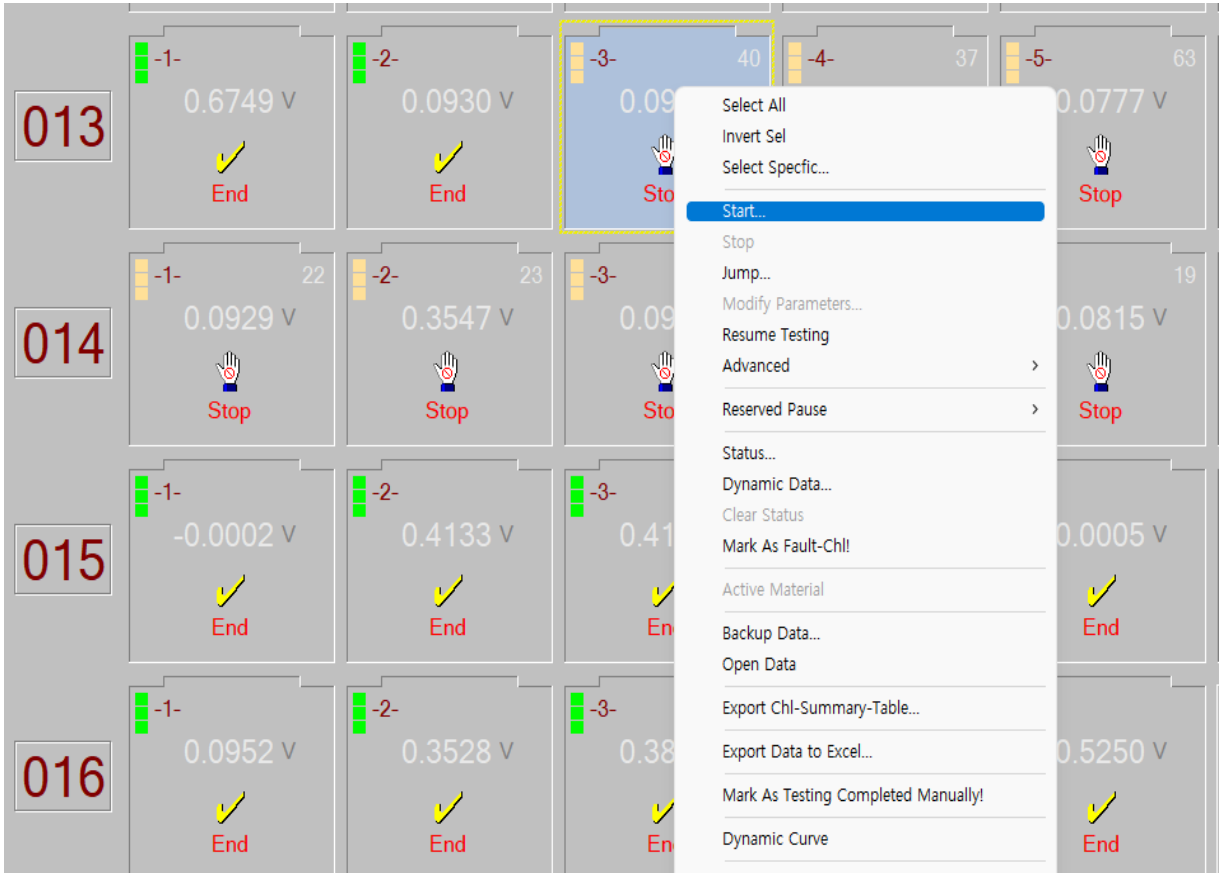
Unit Scheme: Base on "mA"

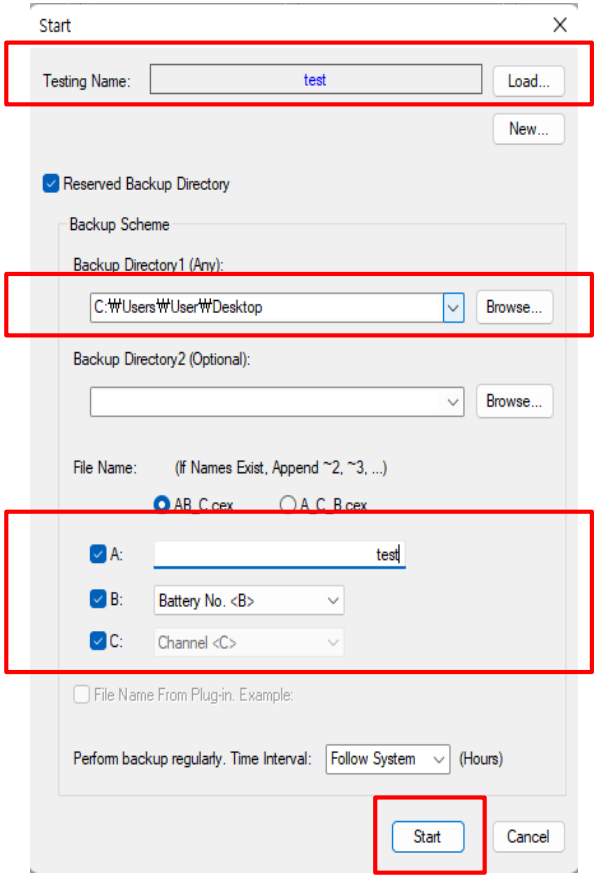
Nominal Cap(Cn):
Real CapC(Cr): Cycles [1,3] Max
Real CapD(Dr): Cycles [1,3] Max
Std. Cap(Ds): From Dp/D_prev
Given Volt(Vg): at 50%

Volt Safety: (2V, 5V)
Curr Safety:
Cap. Safety:
Trend Safety:
Aux Safety:

2. Setting Measurement Program Condition

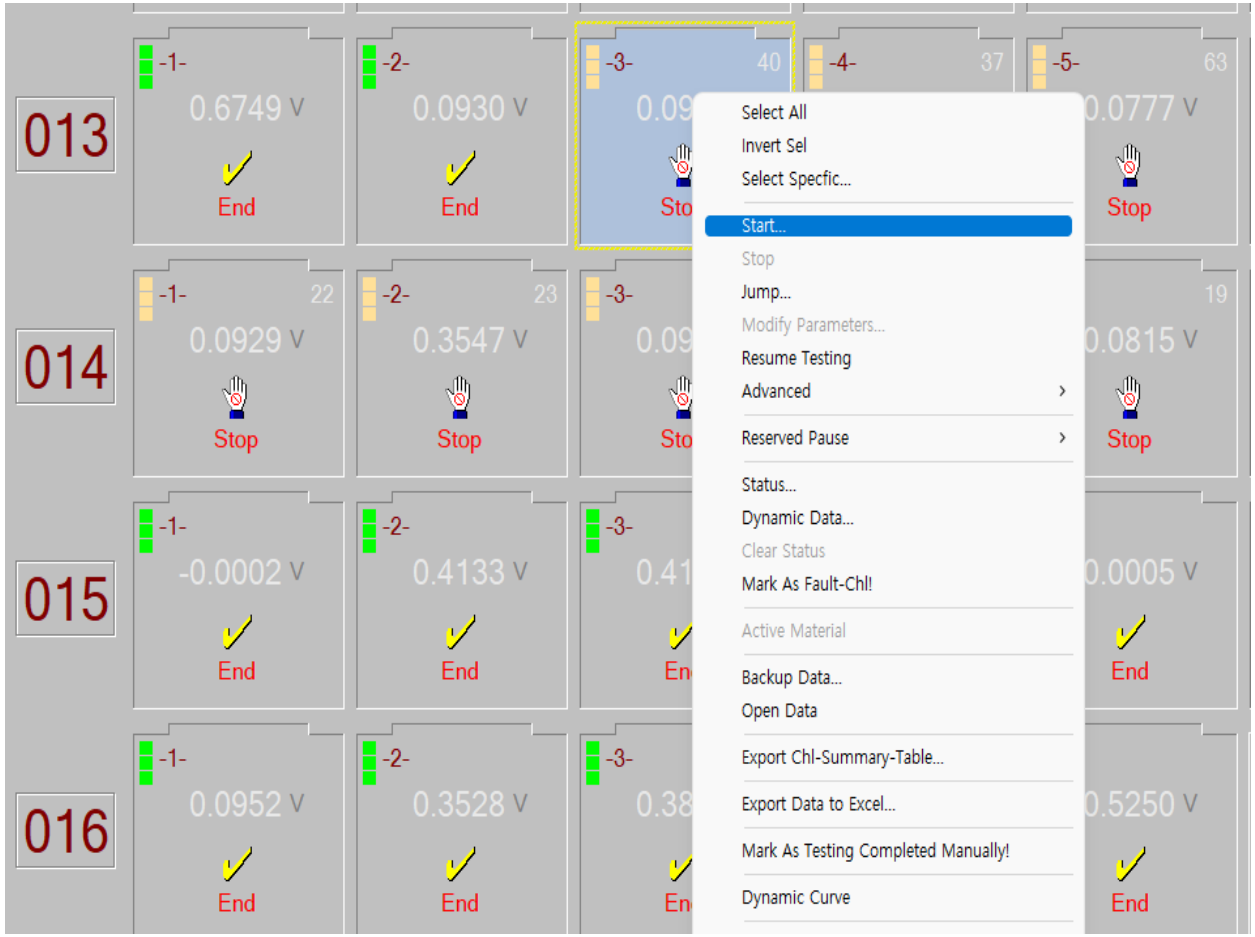
(1) Start → Testing Name Load → Backup Directory → File Name 설정 후 Start

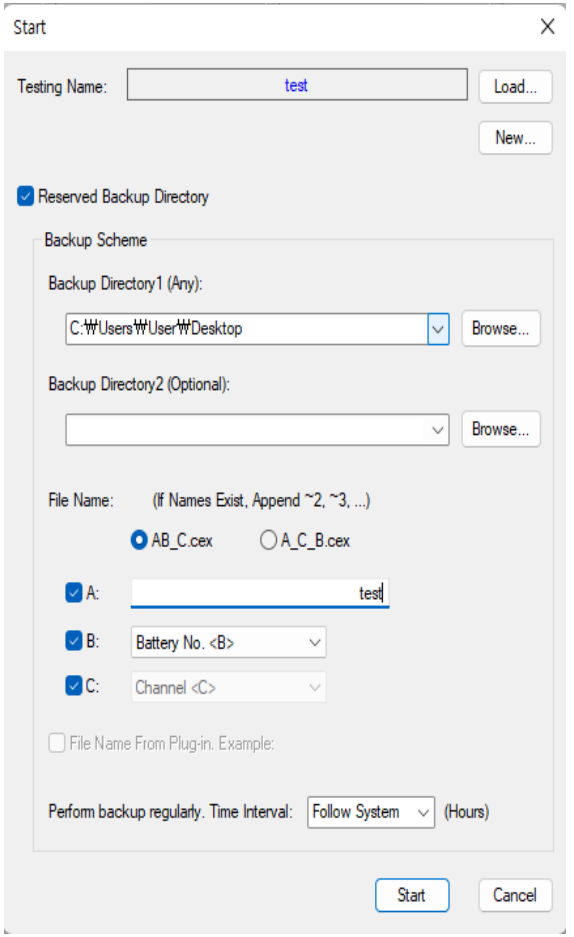




2. Setting Measurement Program Condition

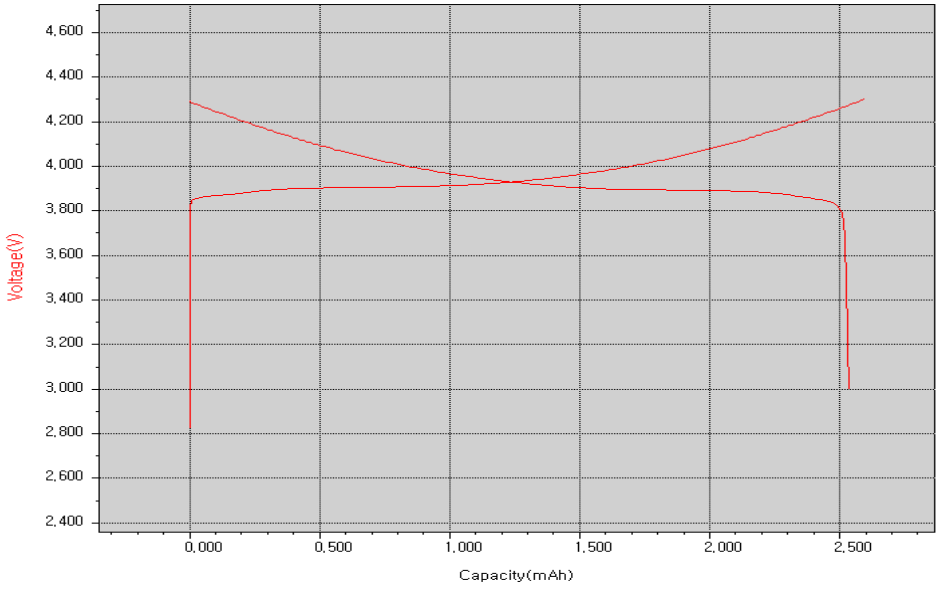
(2) Open Data



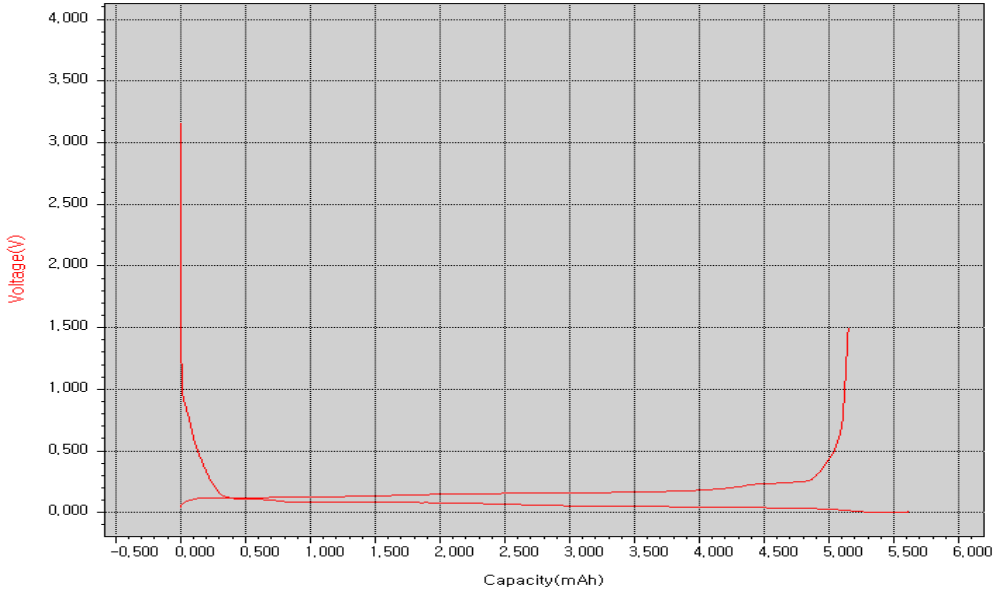


3. Charging & Discharging Graph

(3) Result



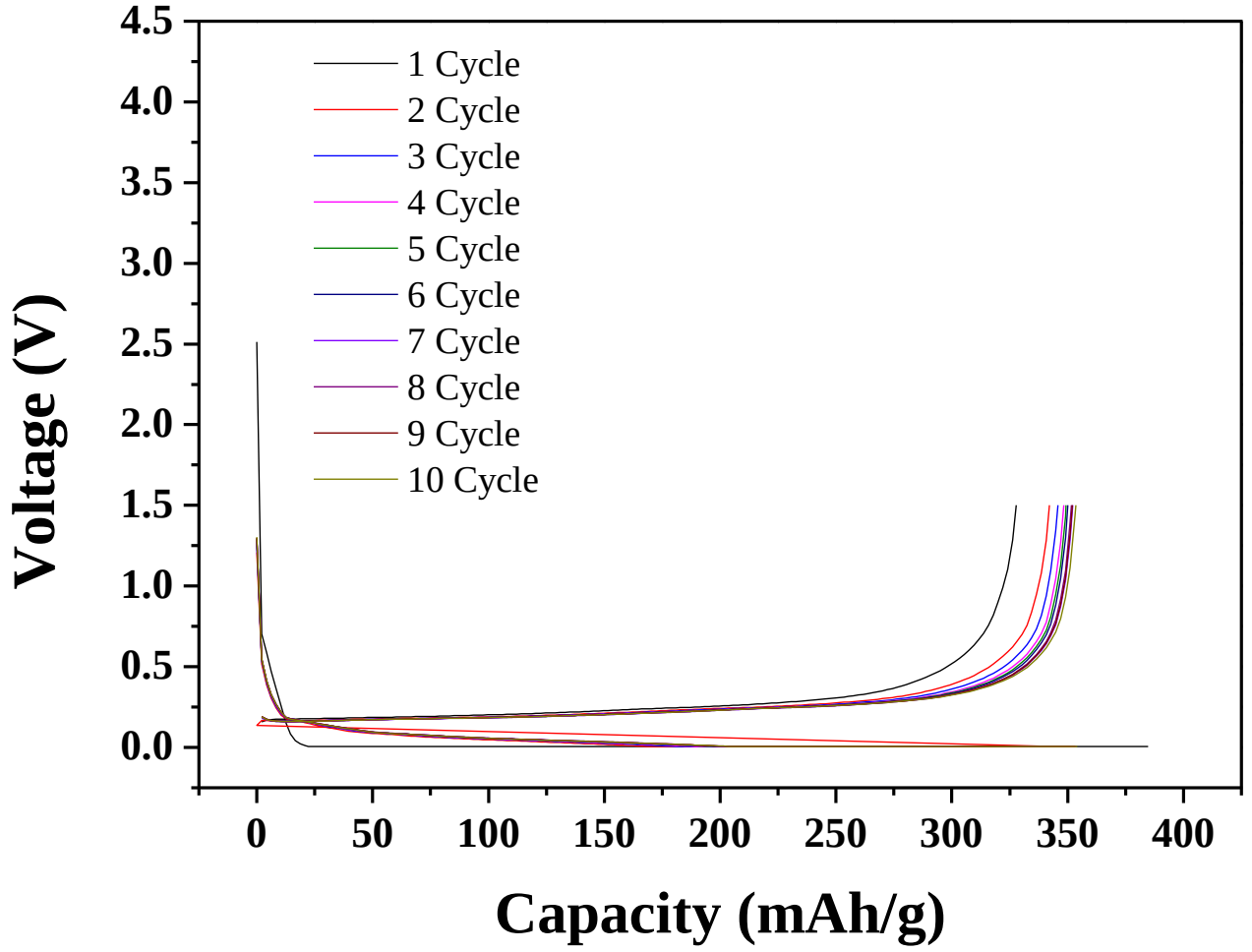
LCO의 충·방전 그래프(formation)



흑연의 충·방전 그래프 (formation)

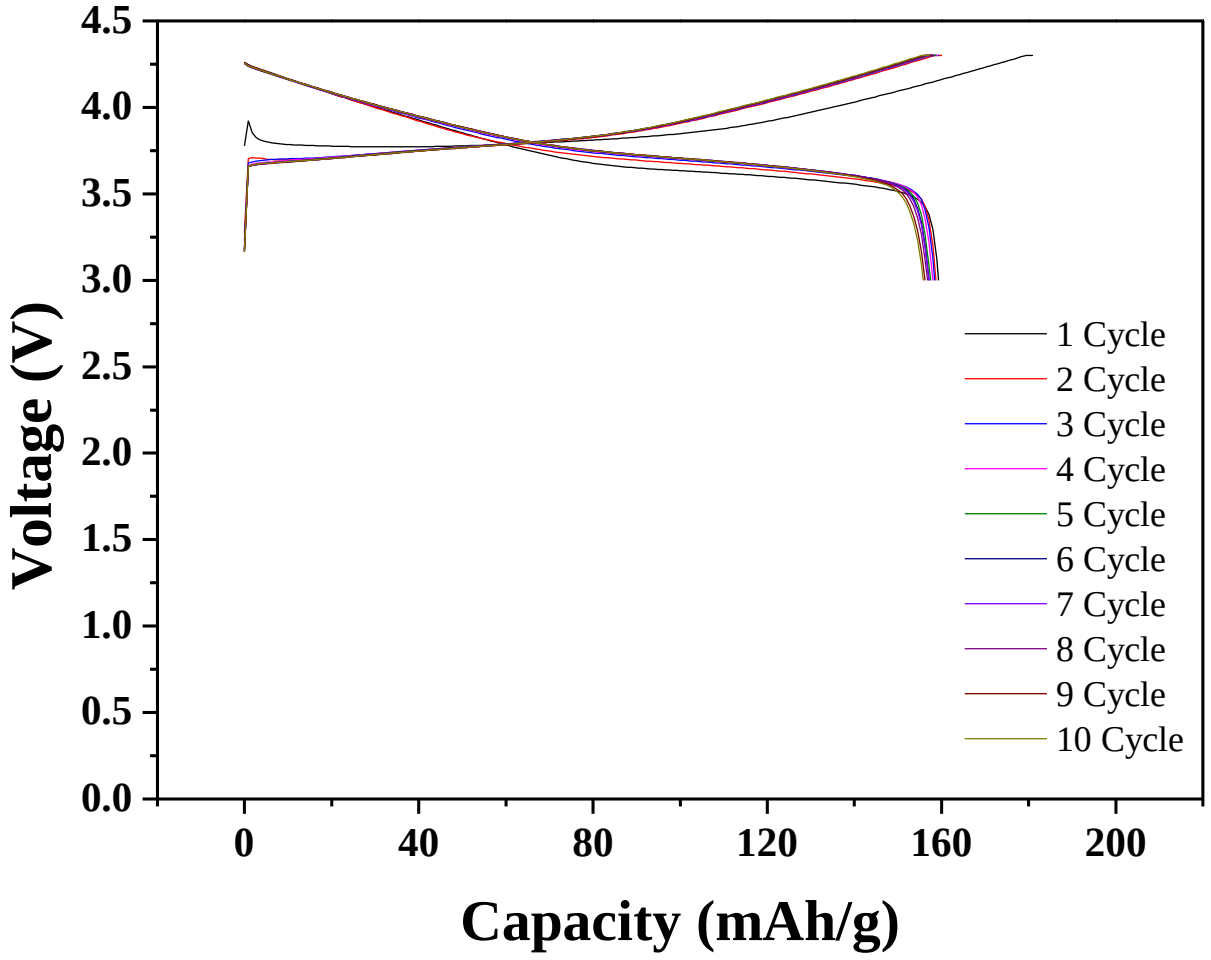
4. 실제 측정 Data

Artificial graphite 기반 코인셀의 충방전 특성



4. 실제 측정 Data

NCM622 기반 코인셀의 충방전 특성



감사합니다!