

# 코인셀 총방전 평가 실습

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

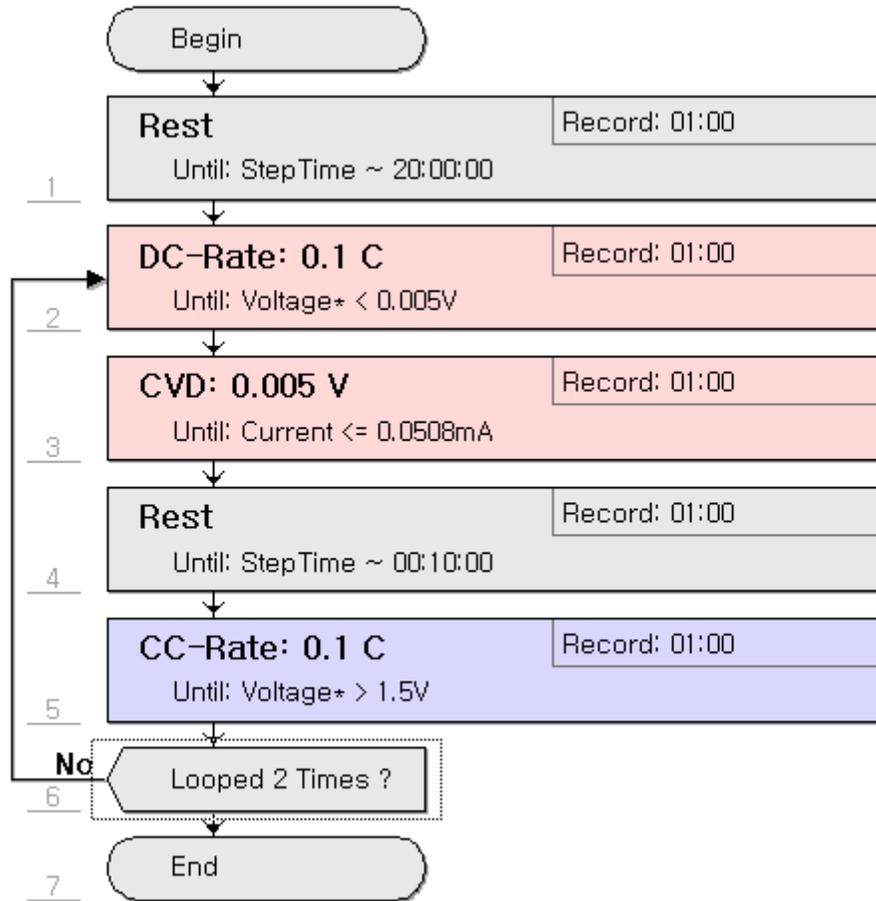
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# 코인셀 충방전 평가 실습

(1) 조건파일의 활물질 정보를 입력한다.

- ① 활물질 이름 ② 전극 용량 ③ safety condition



① 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:

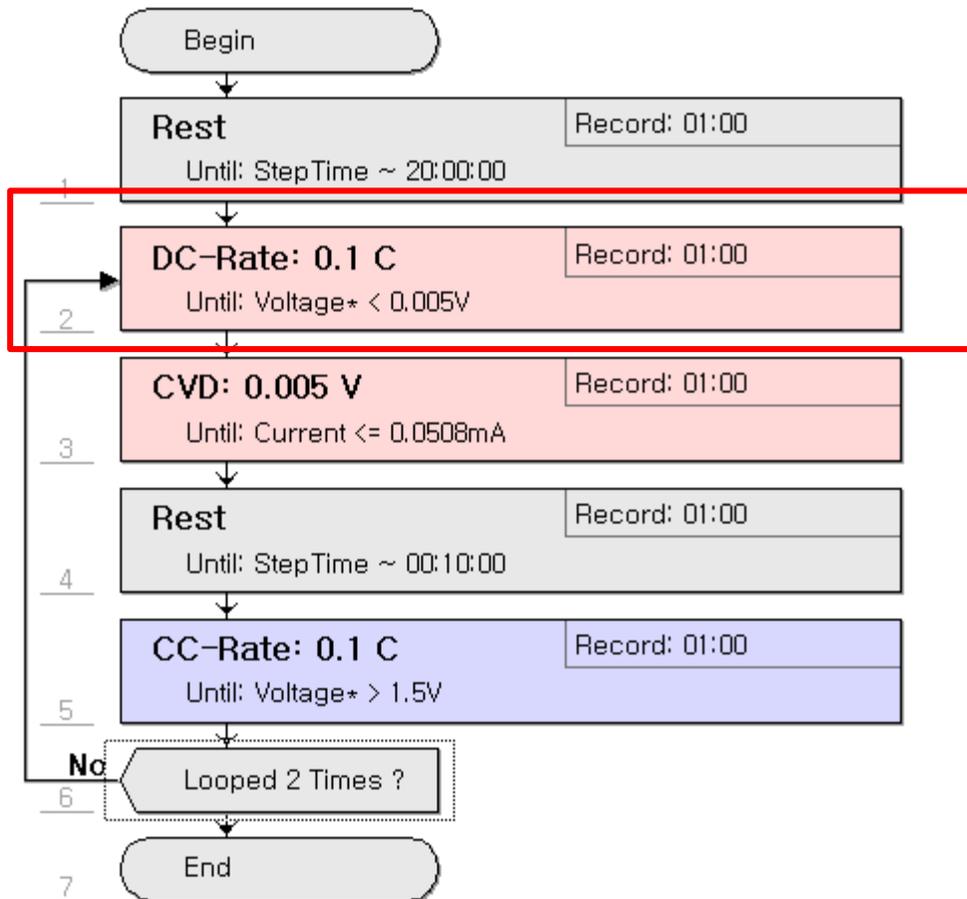
Aux Safety:

# 코인셀 충방전 평가 실습

## 1. Setting Measurement Condition

(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

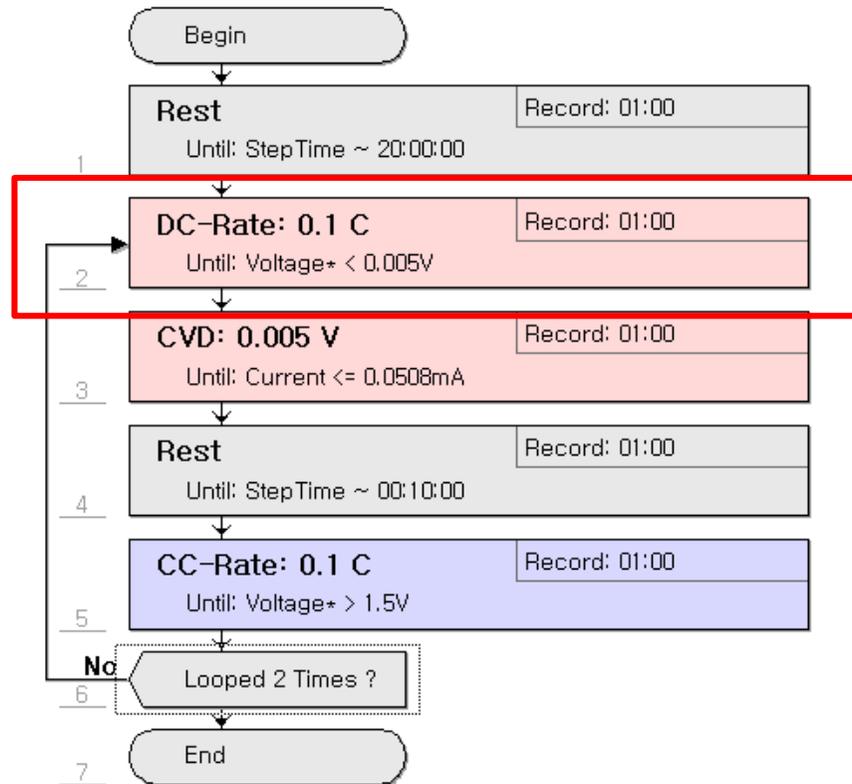
## 1. Setting Measurement Condition

### (3) 충전 C-Rate 설정 (Constant Current)

충전 시, 양극의 경우 CC-Rate (0.1C, Voltage  $\geq 4.3$ , cut-off 4.2~4.5V)

음극의 경우 DC-Rate (0.1C, Voltage  $\leq 0.005$ , cut-off 0.005V)

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



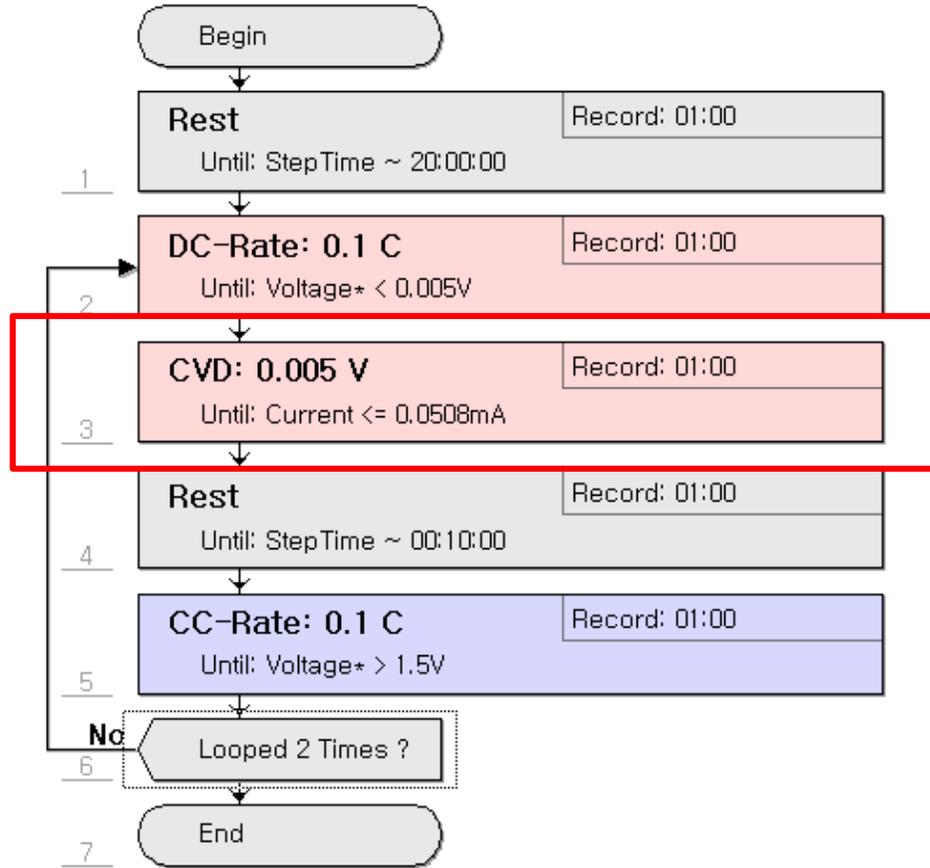
ANODE

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 <sub>prev</sub>
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

(4) 충전 CV 설정 (constant voltage)  
충전 시, 양극의 경우 CVC(4.3V, Current  $\geq 0.05C$ )  
음극의 경우 CVD(0.005V, Current  $\leq 0.01C$ )



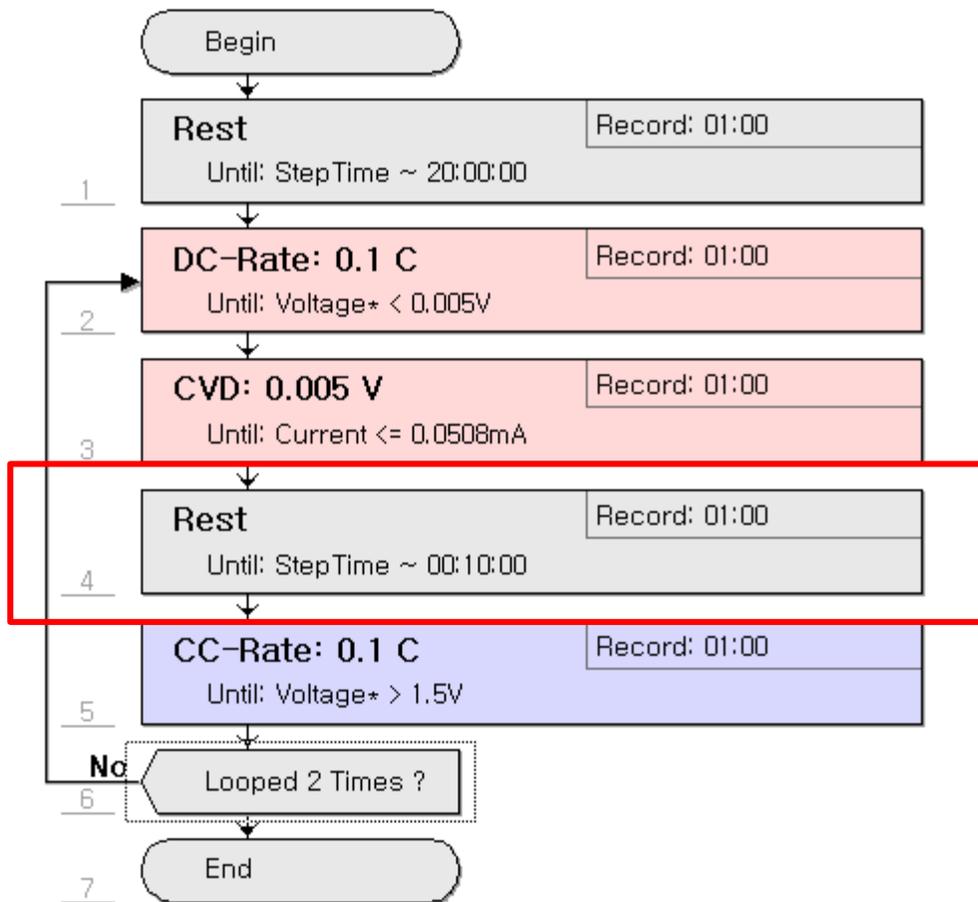
ANODE

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

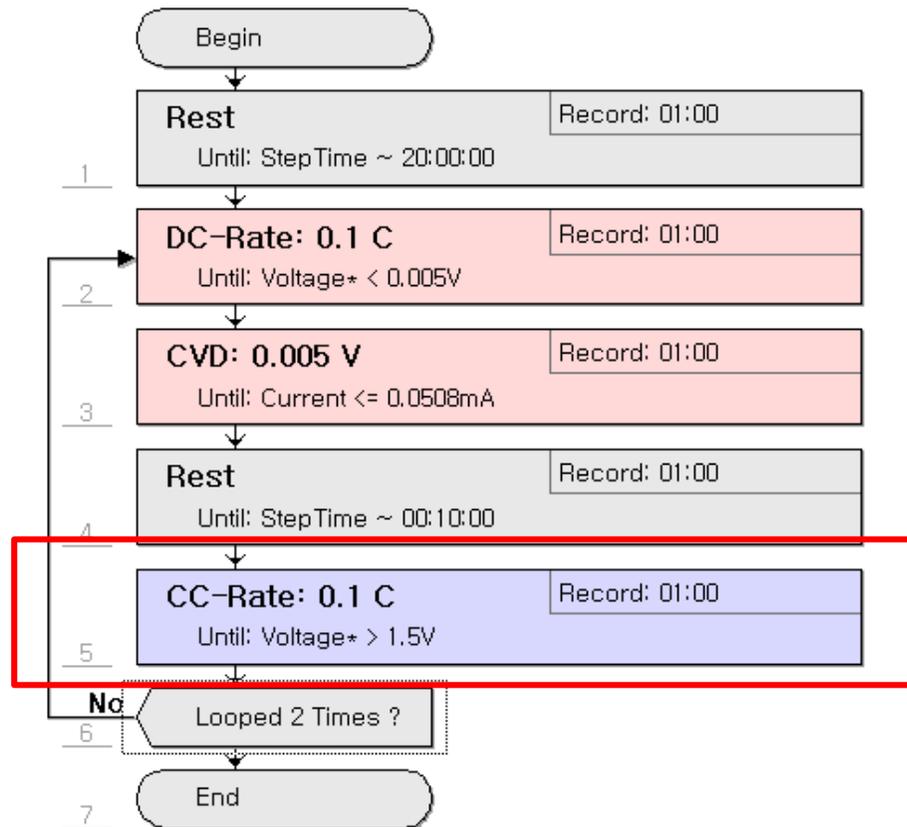
## 1. Setting Measurement Condition

(6) 방전 C-Rate 설정 (constant current)

충전 시, 양극의 경우 DC-Rate(0.1C, Voltage  $\leq$  3.0)

음극의 경우 CC-Rate(0.1C, Voltage  $\geq$  1.5)

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



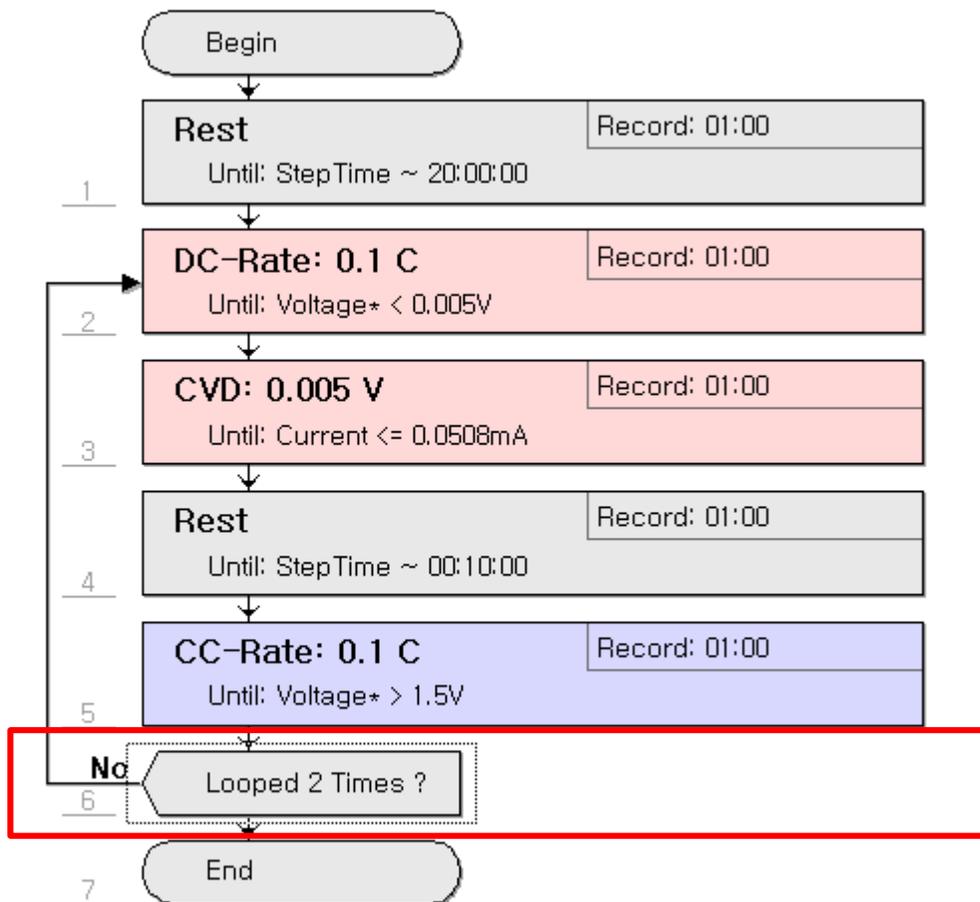
ANODE

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)



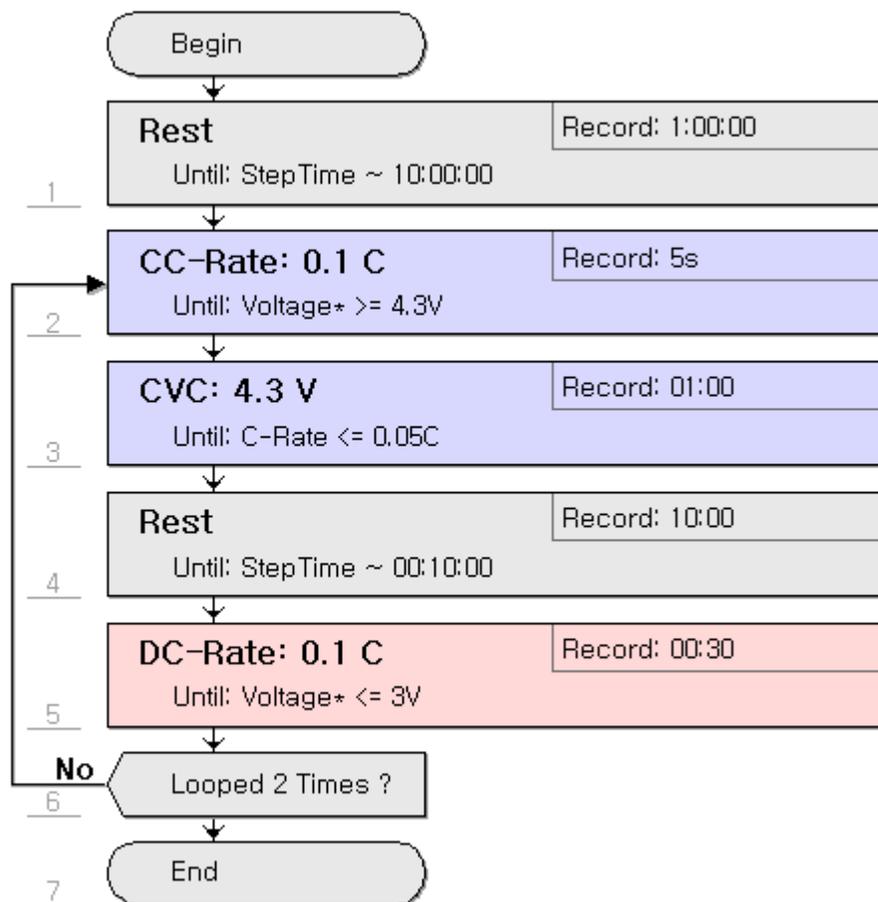
ANODE

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

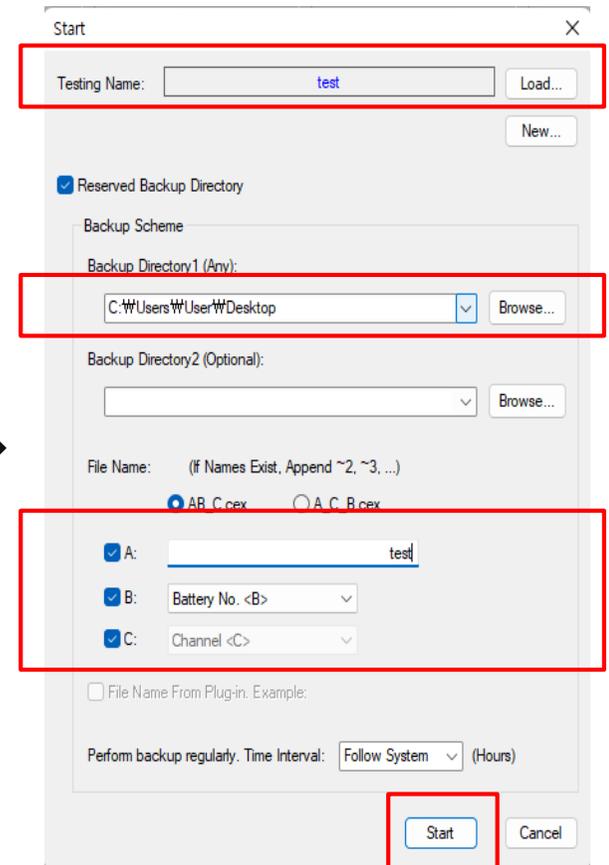
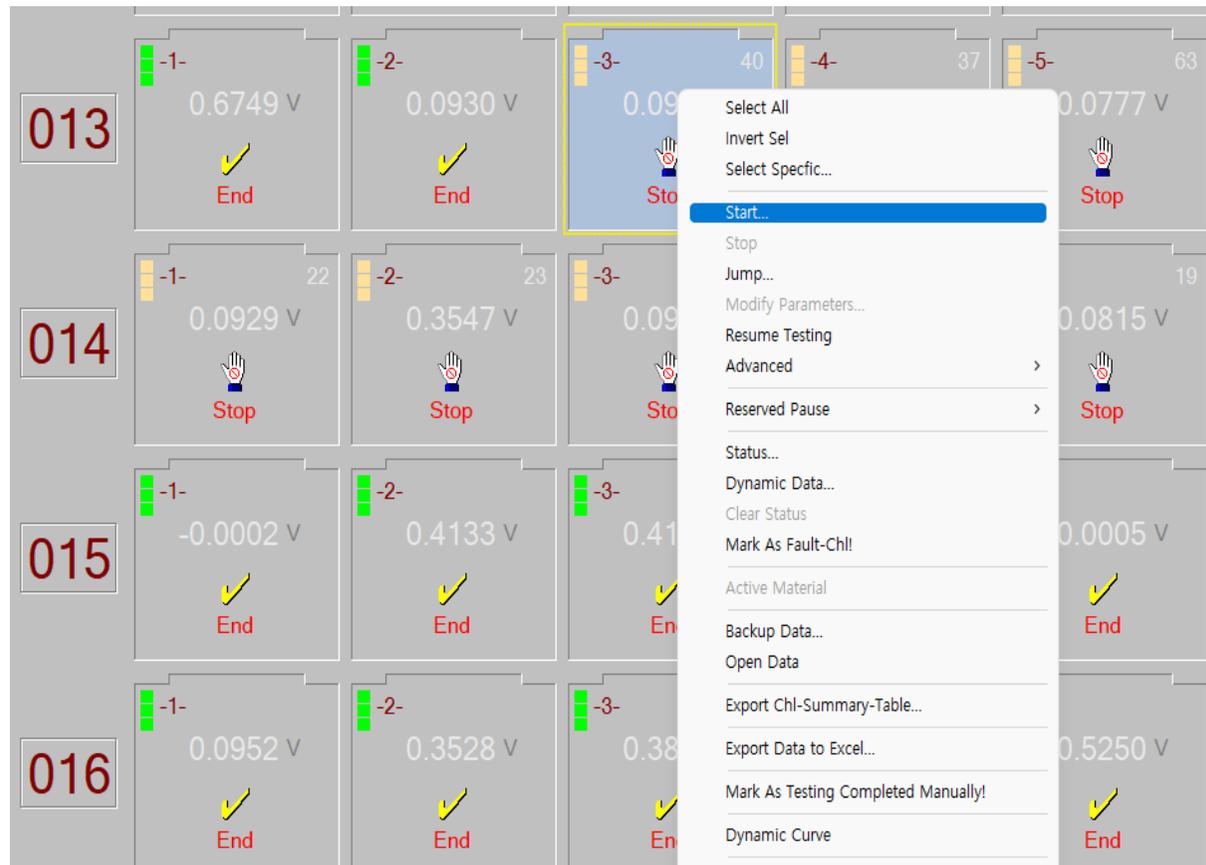


### Cathode

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

The screenshot displays a grid of battery cells with various parameters and status indicators. A context menu is open over cell 013, showing options such as 'Start...', 'Stop', 'Jump...', 'Modify Parameters...', 'Resume Testing', 'Advanced', 'Reserved Pause', 'Status...', 'Dynamic Data...', 'Clear Status', 'Mark As Fault-Ch!', 'Active Material', 'Backup Data...', 'Open Data', 'Export Chl-Summary-Table...', 'Export Data to Excel...', 'Mark As Testing Completed Manually!', and 'Dynamic Curve'. The 'Start...' option is highlighted in blue.

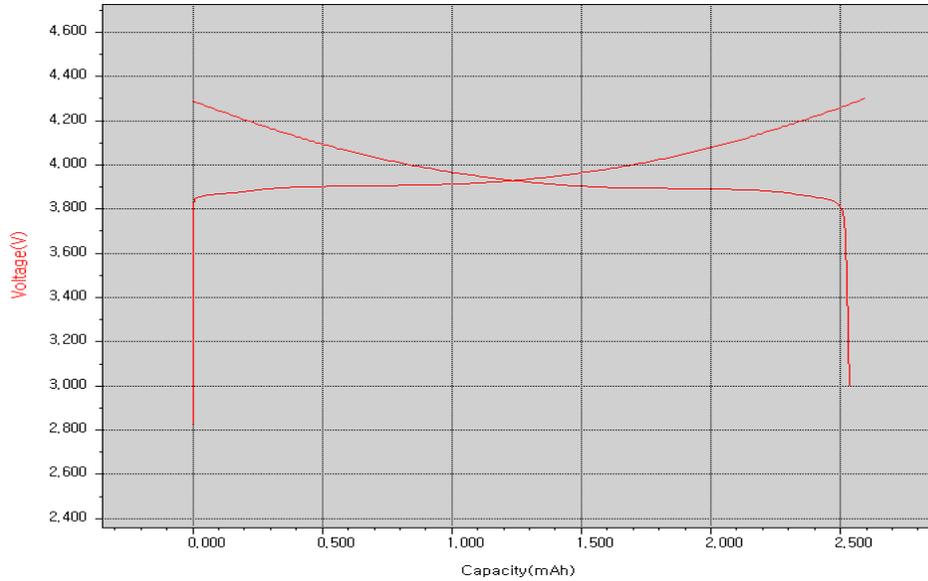


The 'Start' dialog box is shown with the following settings:

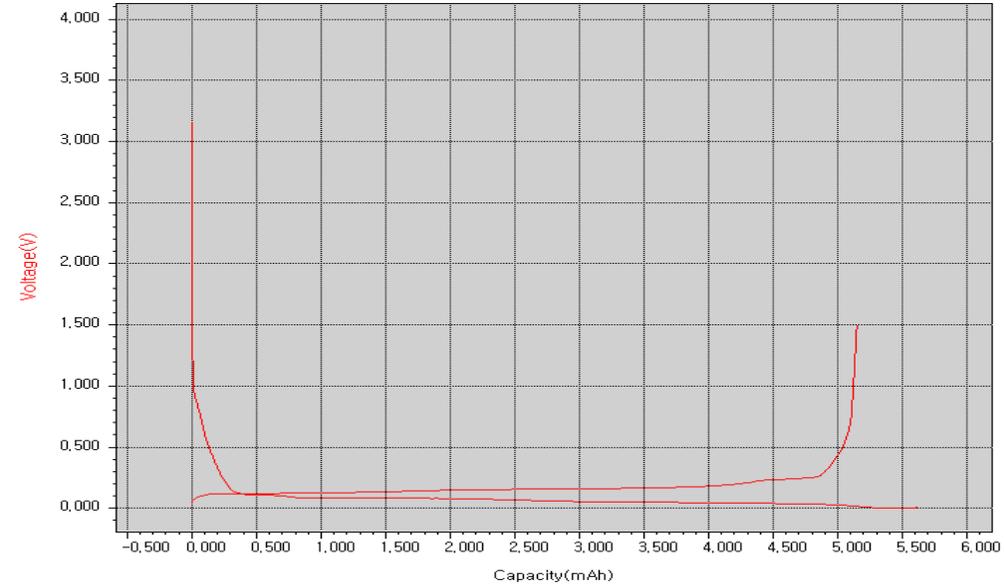
- Testing Name: test
- Reserved Backup Directory:
- Backup Scheme: Backup Directory1 (Any): C:\Users\User\Desktop
- Backup Directory2 (Optional):
- File Name: (If Names Exist, Append ~2, ~3, ...)  
 AB\_C.cex  A\_C\_B.cex
- A: test
- B: Battery No. <B>
- C: Channel <C>
- File Name From Plug-in. Example:
- Perform backup regularly. Time Interval: Follow System (Hours)

## 3. Charging & Discharging Graph

### (3) Result



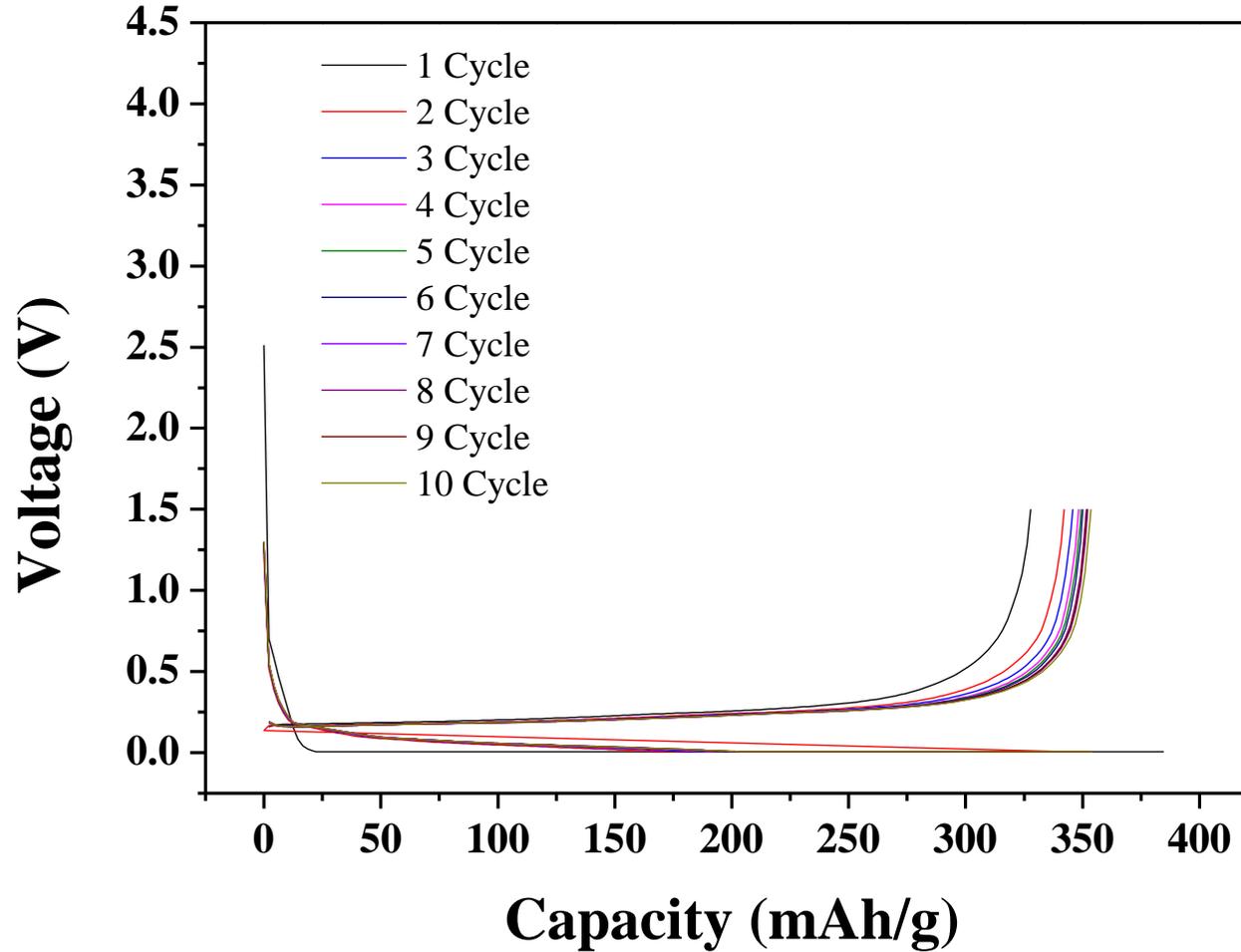
LCO의 충·방전 그래프(formation)



흑연의 충·방전 그래프 (formation)

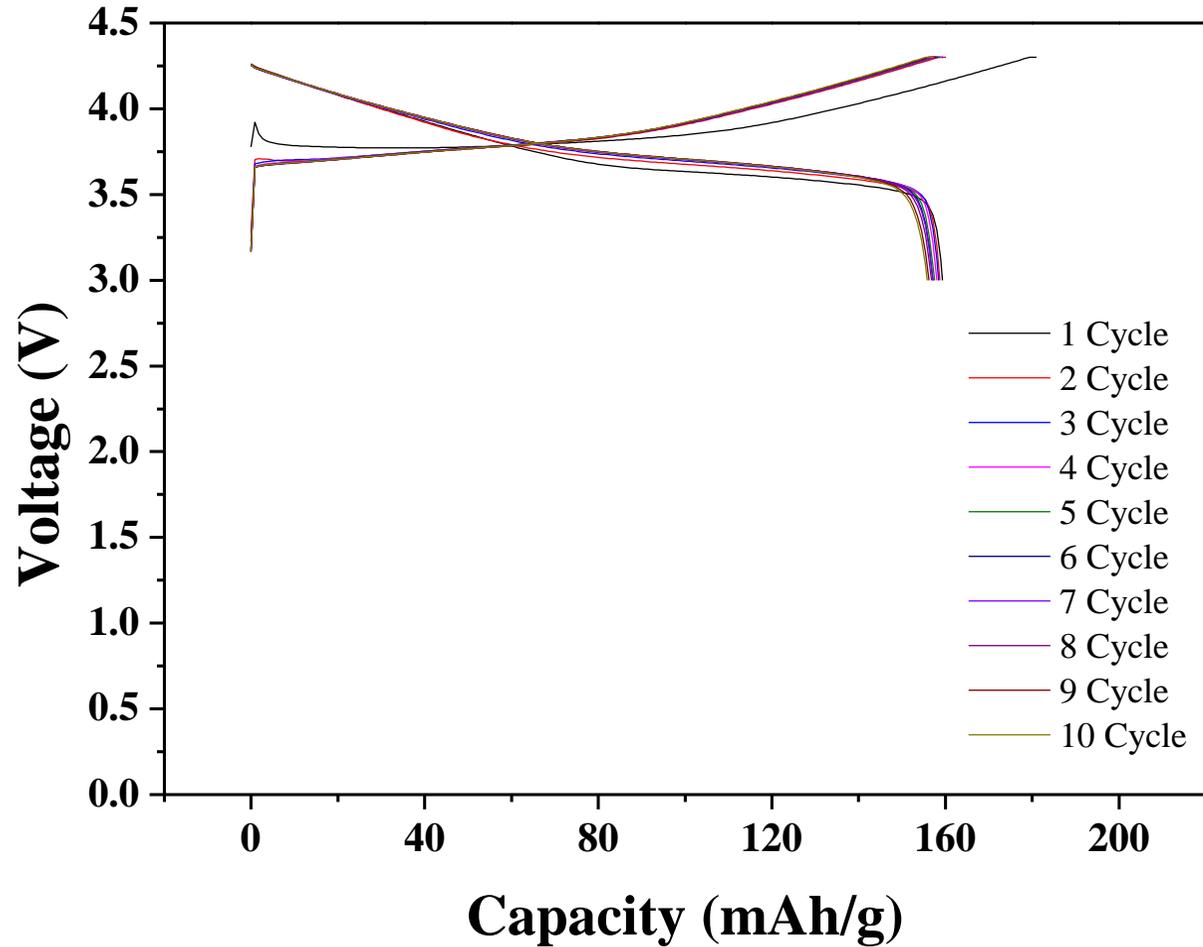
## 4. 실제 측정 Data

Artificial graphite 기반 코인셀의 충방전 특성



## 4. 실제 측정 Data

### NCM622 기반 코인셀의 충방전 특성



**감사합니다!**