CV Test Procedure

Preparation

- ZIVE SP/MP electrochemical workstation
- Pt working electrode
- Ag/AgCl reference electrode
- Graphite rod counter electrode
- Universal Electrode Holder
- Cell vial
- Electrolyte:2 mM potassium ferricyanide(K3Fe(CN)6) with 1 M potassium nitrate(KCN) in water.

✓ **Preparation of the Test Solution**

1. Weigh 16.5 mg potassium ferricyanide and place in a 25 mL volumetric flask.
2. Weigh 2.53 g potassium nitrate and add to the same volumetric flask.
3. Add about 20 mL deionized water to dissolve the potassium ferricyanide and potassium nitrate.
4. Dilute to 25 mL with deionized water.

Cell Connection

Platinum Working Electrode (Green lead & Blue lead)
Graphite Counter Electrode (Red lead)
Ag/AgCl Reference Electrode (White lead)

Add 10-15 mL of the ferricyanide solution to the cell vial and place in the cell holder.
Insert Pt working electrode on one of hole in cell top and screw right the electrode holding screw.
Insert Graphite counter electrode as same way of Pt electrode
Insert Ag/AgCl reference electrode as same way of Pt electrode (Reference electrode body is fragile. Be careful on holding screw. Too much forced screwing might break the electrode)
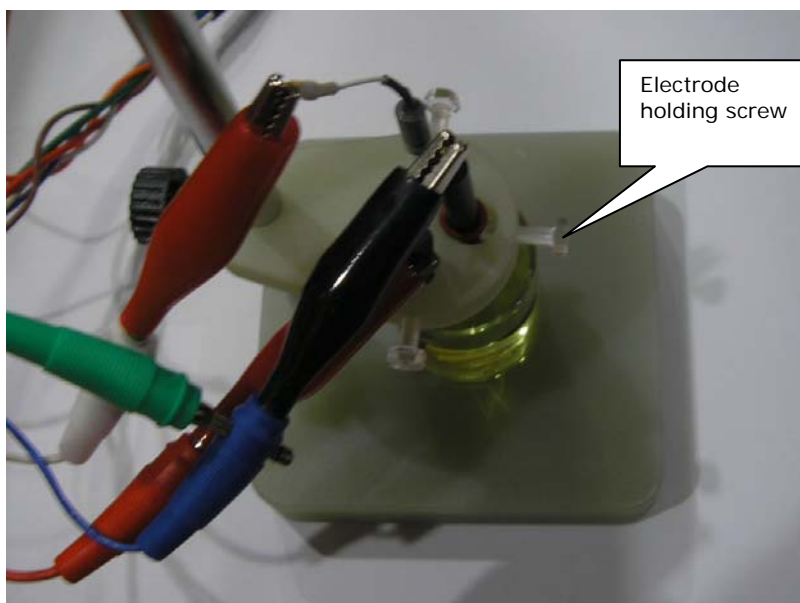

Electrode holding screw

photo: Universal holder (model: UEH)

Procedure

1. Turn the Power switch on the ZIVE SP/MP electrochemical workstation
2. Open the SM software by clicking the SM icon. The following progress box will appear, and will show the progress of checking instrument configuration and communication between ZIVE SP/MP electrochemical workstation and PC.

If the link is successfully connected, Click "OK" button on the box then the progress box will automatically disappear and SM software will appear. If the link failed, The following progress box will display then click the "Retry" button.

If the link failed again after clicking "Retry" button, you need to check USB cable connection.

3. Click Technique function icon (or select Technique function on Experiment menu)
   Then you can see the following menu

4. Select Cyclic voltammetry at left technique selection region. The parameter editing region is located at right.
   Input figure for parameter setting as the follows.
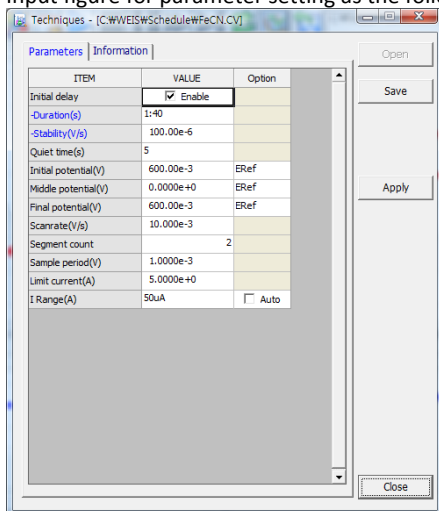
5. Click "Save" button to save the technique file which contains the above parameter and setting file name.
6. You can assign this technique file to channel(s) which you want by click "APPLY" button or select schedule file using file selection on "Single channel control/monitor" or "multi channel control/monitor"
   If you click "apply" button on technique menu, You can see the following channel selection menu.
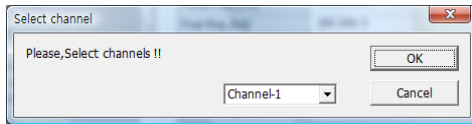
Select channel and click OK then this technique file will be assigned on the channel.

Click "Close" button or minimize technique window.

7. If you want control ZIVE SP/MP electrochemical workstation using "Single channel control/monitor", you can see following windows.


To start experiment, click Start button

If you want control ZIVE SP/MP multichannel, you can see the following window
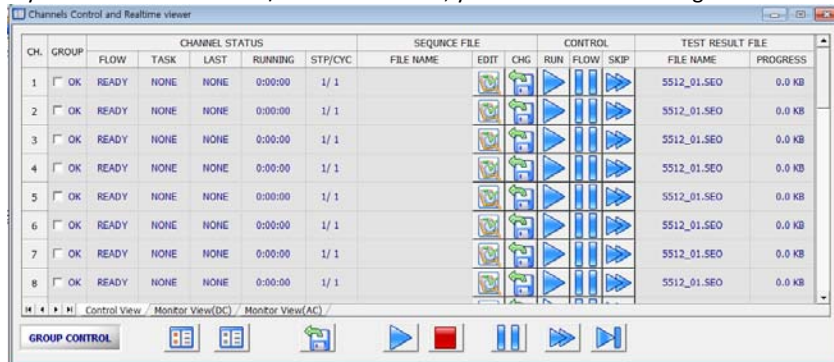
To start experiment for specific channel, click Start button on the channel. If you want to start experiment for multiple channel,

click on Group column which you want to start and click Start button **at bottom side.**

8. After click start button, you can see the following box.
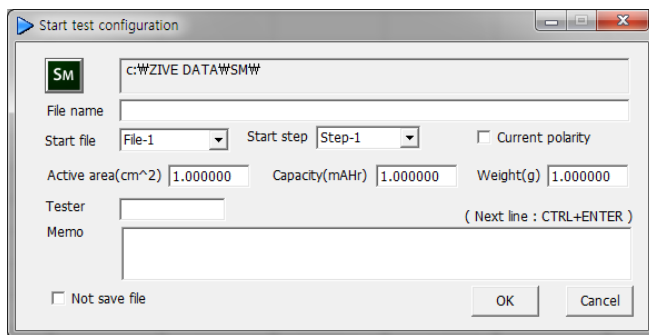
➢ The data file name is automatically determined as default value but if you want to change data file folder then click icon
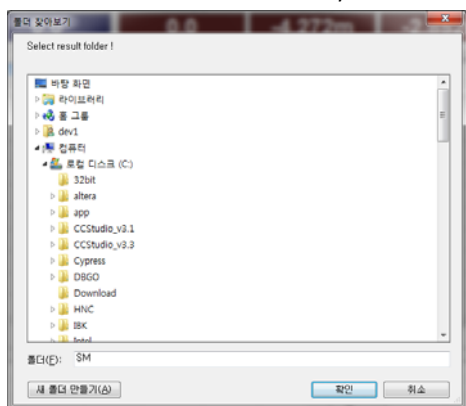
You can make new folder which you want to save.

➢ If you want use your file name, input your file name on "File name"

➢ If you did not make file name manually, new data folder which named as sequence file name or technique file name under data folder and it's subfolder will be created with name as date. The data file will be saved in this folder. The data file name will be determined automatically as string with sequence file name or technique file name and hour and minute and second, finally channel number will be added.

example) If you used sequence file for test and its file name is testabc.zsc and channel number is 1 and test date is 2000 year January 1st time is 15:30: 1 then the data file will be saved as

C:\Zive data\sm\data**testabc.zsc\2000010115\3001_01**.sdo (If data file have DC data only)

Or

C:\Zive data\sm\data**testabc.zsc\2000010115\3001_01**.sde (If data file have DC data and EIS data)

Or

C:\Zive data\sm\data**testabc.zsc\2000010115\3001_01**.seo (If data file have EIS data only)

e.g.) schedule file name with extension\yearmonthdayhour\minutesecond_channel number

If you input file name as "tommy" then

C:\Zive data\sm\data**testabc.zsc\2000010115\tommy3001_01**.sdo (sde,seo)

① Start Step: If your sequence file has several steps, you can select starting step.

② Start file: If batch file is loaded, select file number

③ Current polarity: If you want reverse polarity for measured current, check on this box.

④ Active area: For calculation of current density

⑤ Capacity: For C-rate value calculation

⑥ Weight: For specific capacity calculation

⑦ Tester: Operator name

⑧ Memo: Text information for test (For line change, use CTRL+ENTER)

➢ No Save file: If you click this check box, the data will NOT be saved.

If you are ready to test, click OK button then experiment will be started.
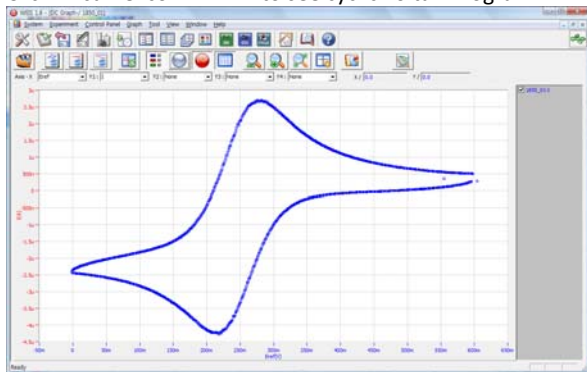
9. You can see real time plot as the following.
   When experiment done, the display will be changed as following.
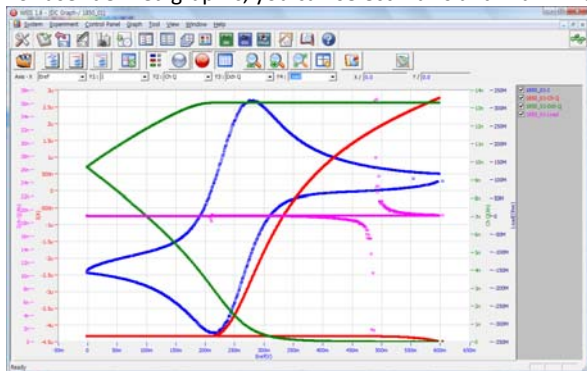

10. You can display graphic by clicking button on tool bar
    Click "Open data file" icon and select data file which you run the experiment.
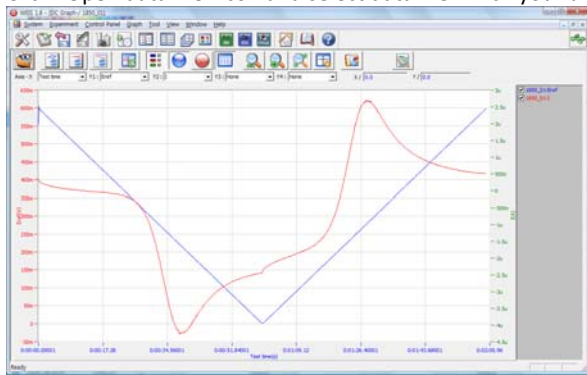
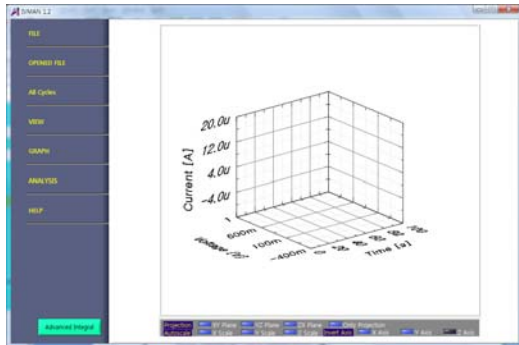
Click IV curve icon to see cyclic voltammogram.

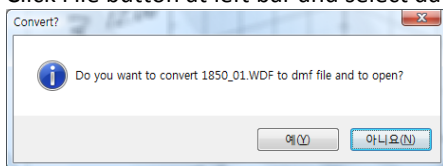For user defined graphic, you can select X axis and Max 4 Y axis parameter as you wanted.

Data Analysis

1. Open "IVMAN" by clicking IVMAN icon. IVMAN program is located c:\program files\wonatech\ivman1.2 folder.

You can see the following window.

Click File button at left bar and select data file(*.wdf) then you can see the following message box.

Click Yes.
Display will be changed as following
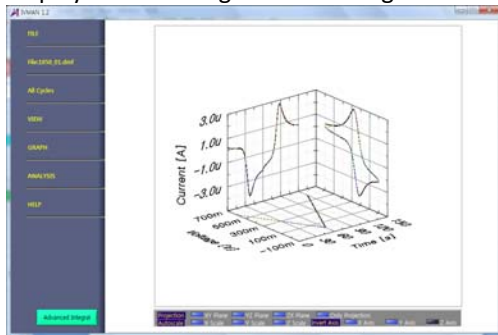
Data is uploaded on IVMAN software for analyzing.

2. To view cyclic voltammogram click Graph and select I vs.V .
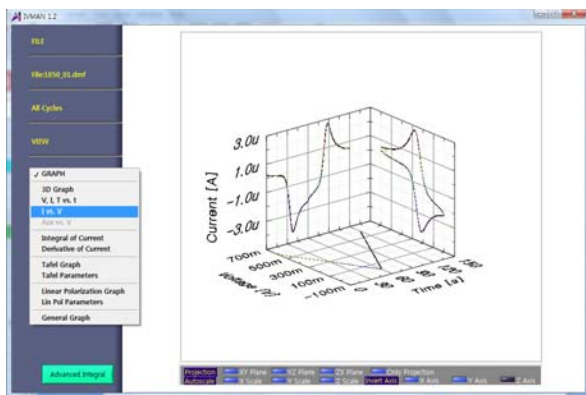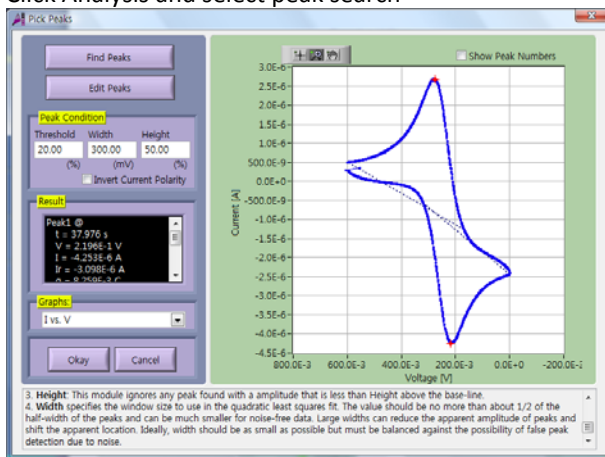

Then you can see cyclic voltammogram
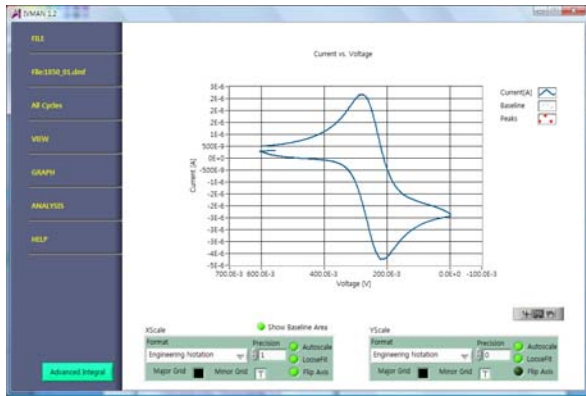
If you want to make graphic as minus current is on top position at y axis, click "Flip Axis" on Yscale at bottom side.
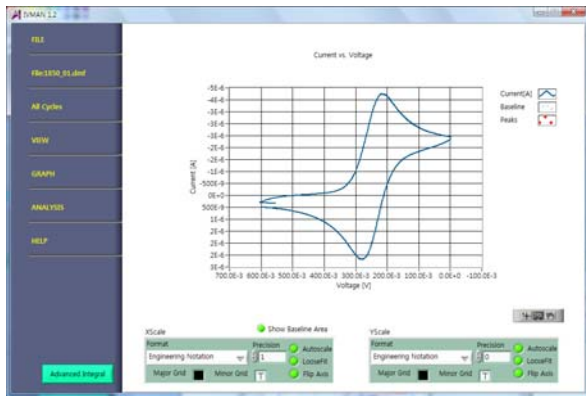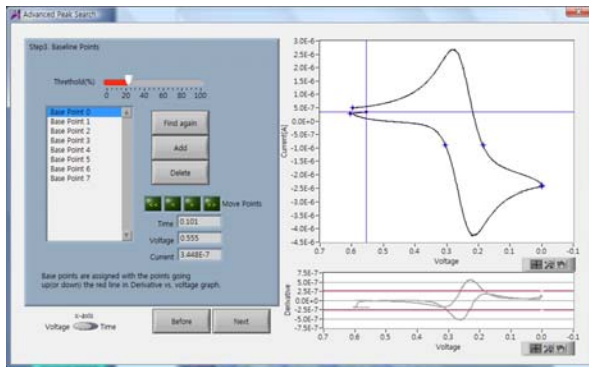

Analysis

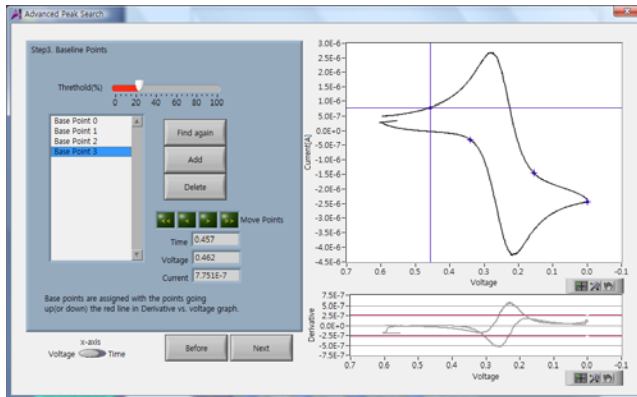1. Click Analysis and select peak search
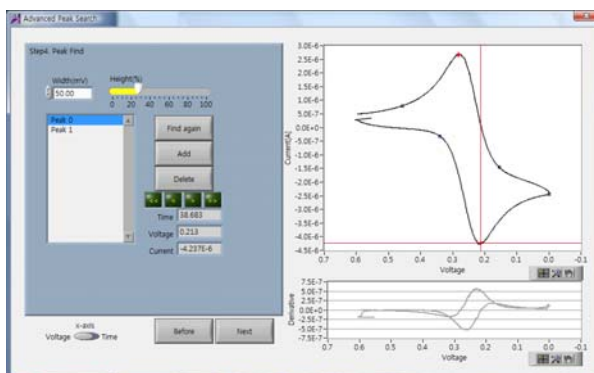

2. Advanced peak search
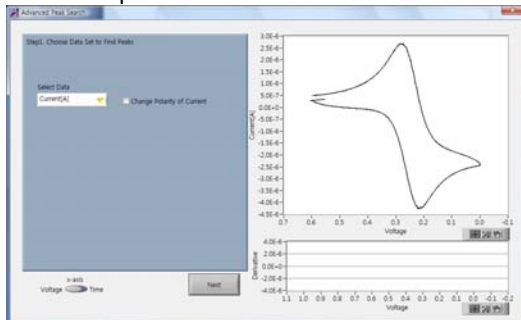
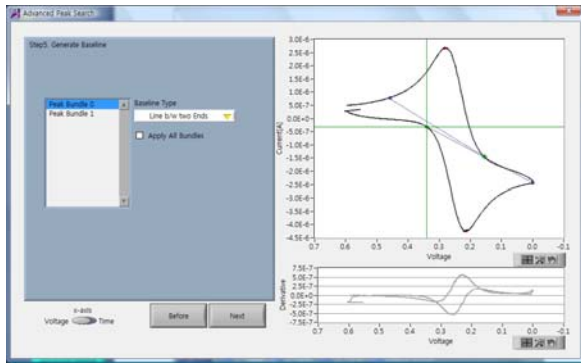

Click Next
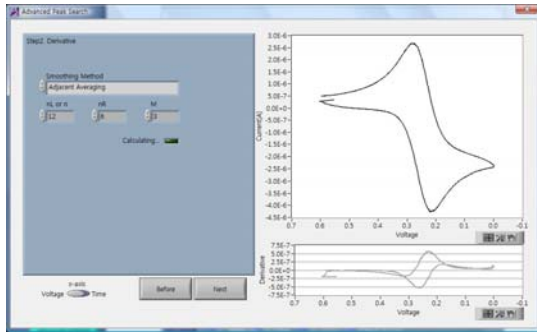
Click next

Delete baseline point(s) and move the points.
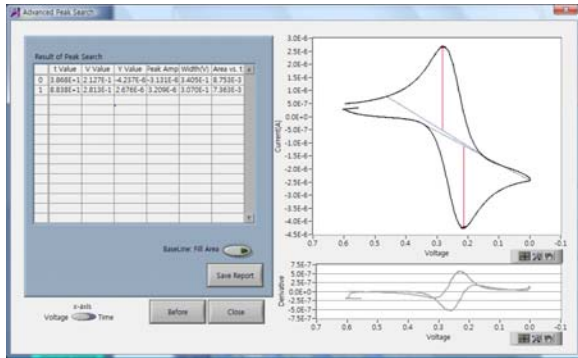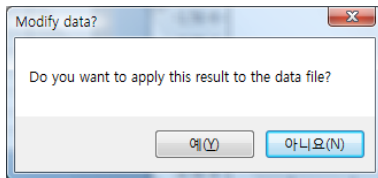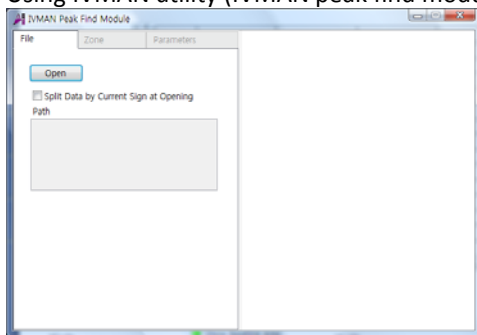

Click next

Click Next

Click Next

Click Close

Click Yes

3. Using IVMAN utility (IVMAN peak find module)

Click open button and select data file

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