Optical Probe Station Standard Operation Procedures (SOP)

2008/06/01 Chang-Yong Nam

NOTICE:

Reading this instruction does not give you authorization to use the instruments described here. Please contact either CHANG-YONG NAM (x7066) or CHUCK BLACK (x4397) regarding authorization and training. Safety training should be also made to access the lab 1L35; please contact either FERNANDO CAMINO (x7606) or CHANG-YONG NAM.

This SOP covers only standard current voltage sweep operation. For solar cell measurement, contact CAHNG-YONG NAM.

Current Voltage Sweep Measurement

Turning on Instruments and Adjusting Probes

1. Turn on the Agilent 4156C Semiconductor Parameter Analyzer. The analyzer consists of two 'boxes'. Turn on the upper box by push the power button on the bottom left corner. NEVER touch the power button on the bottom box.
2. Wait until the analyzer finishes self-tests and calibration. You will hear beeping and clicking sounds during the tests/calibration.
3. Turn on the microscope light and place a sample of interest on the sample chuck (white round PTFE piece). If the sample is not a standard ITO/glass sample, cover the hole on the chuck using a slide glass and place your sample on it.
4. Adjust magnification and locate the metal contacts where you want to place your 'probes' down.

5. Two probes are available at present, and no. 1 is positive (+) and no. 3 is negative (-) terminal.
6. Using the microtranslators, probes can be moved along x, y, and z direction. Minimize moving probes too off from the neutral position.
7. To lower a probe down, the micrometer knob for the z axis should be turned COUNTER-CLOCKWISE. Place the probe gently on the contact in order to prevent ‘poking through’ or ‘scratching’.

Setting up Current Voltage Sweep Condition of Agilent 4156C

1. In the ‘Page Control’ key pads, push ‘CHAN’. Then, using key pads on the right side of LCD select ‘MORE’ and select ‘Diode’.
2. Again in the ‘Page Control’ key pads, push ‘MEAS’ button. It will show sweep parameters. Following four must be set using key pads in ‘Marker/Cursor’ and ‘Entry’ sections; ‘Start’, ‘Stop’, ‘Step size’, and ‘Compliance’. Typical values one can use are; Start: 500 mV, Stop: 2 V, Step size: 5 mV, and Compliance: 40 mA.
3. Now in the ‘Page Control’ section, push ‘GRAPGH/LIST’ button to bring up a plot display.

Measurement and Saving Data

1. Assuming probes are already brought down to the contacts, it is now ready to start measurement. To start, press ‘SINGLE’ button in the ‘Measurement’ section. Data will be displayed on the LCD screen in-situ.
2. After measurement is done, in order to rescale the graph, select ‘SCALE’ using a key pad on the bottom side of LCD, then select ‘AUTO SCALE’ using a key pad on the right side of LCD.

3. At this point the measured data is stored in the buffer memory of the instrument. If you measure one more time by using the 'SINGLE' button, the previous data will be deleted, and new data will be stored at the buffer. If you want to append the newly measured data onto the previous one, initiate the measurement by pressing 'APPEND' instead of 'SINGLE'. Multiple data can be appended by repeating 'APPEND' operation.
4. In order to save the data externally, first log in the computer using the general user ID/password written on a post-it note on the computer monitor. After log-in, start the Labview program named 'Saving Data from 4156C 06-01-08'. Follow the instruction given in there to retrieve/save the data.

Finishing Measurement

1. Once all the measurement is done, be sure to turn off the microscope light and the 4156C. The power button of the upper 'box' of 4156C should be turned off. Again, DO NOT touch the power button of the bottom box.
2. Once all data are saved and transmitted, be sure to log off the computer.

Safety

1. The connector body of positive terminal inside the dark box will be energized as high as the bias you set in the instrument. NEVER touch the connector body during the measurement or when the source is on.
2. The tips of probes can be very sharp and puncture your skin. Handle the probes with caution.

Log and Reporting

1. Be sure to record the log in the log book; time of usage and remarks.
2. One also must record the user name and time of usage in the web log, which is a shared online spreadsheet available at Google. Contact Chang-Yong Nam (cynam@bnl.gov) to set up an access to the online log.
3. If there is any concern with the measurement or instrument, please contact Chang-Yong Nam.