Instructions for Sensor Probing

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1 Handling instructions

- Be careful with the sensors
- Use always gloves
- Transport the sensors with the vacuum pen. While transporting, keep always their envelope or your hand under them
- Check that the material (vacuum pen, probe needles, chuck,..) is clean

2 I-V curves

Setup

- Connect the devices as in the sketch:

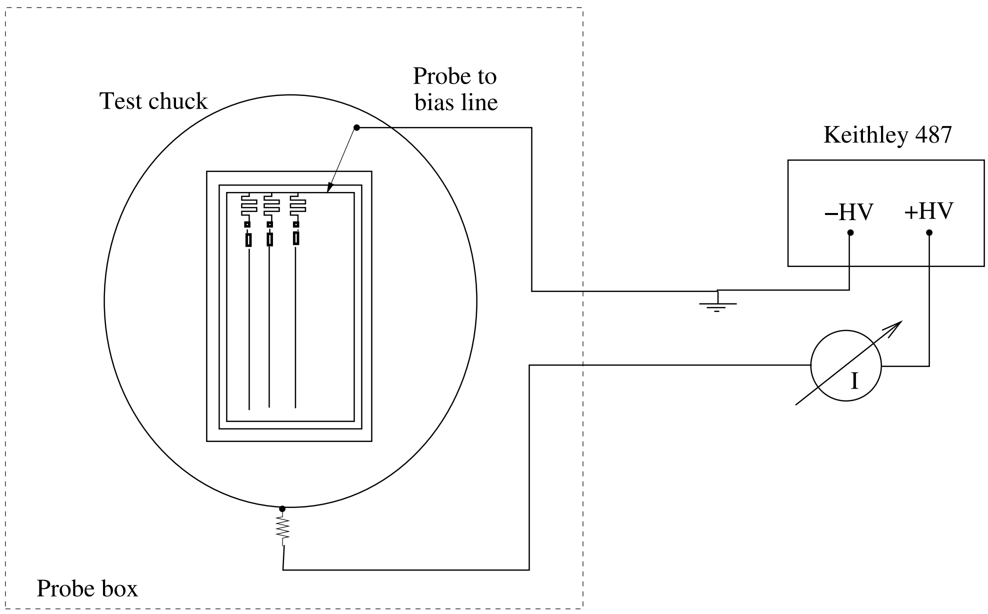

Figure 1: Setup for the leakage current measurement (IV curves).

- Turn on the Keithley 487 (Voltage source + Pico-ammeter). See instructions in section 4
- Turn on the vacuum pump
- Place the sensor on the chuck of the probe station
- Turn on the vacuum, and check that the sensor is fixed
- Put the probe needle on the bias line, as shown in figure 1
- Check that there is nothing else connected to the sensor or to the chuck (for example, the LCR meter)

Software and settings

- Use the Labview program **Si I-V Keithley 487.vi** (it is in the folder Desktop\probestation\probe_station_programs.llb\user.lib\ \Si_IV_Keithley487.llb), with the following settings:
  - Range: $0 - 500\ V$
  - Step size: $5\ V$
  - Time between steps: $3\ s$
- File saving: xxx_iv.txt, where xxx is the sensor ID number
- Run continously the Labview program **HT_cont_readout.vi** (in folder Desktop\probestation\Humidity_sensor.llb) to read-out the temperature and relative humidity

3 C-V curves

Setup

- Connect the devices as in the sketch shown in figure 2
- Turn on the Keithley 487 (Voltage source + Pico-ammeter). See instructions in section 4
- Turn on the LCR meter. See instructions in section 5
- Turn on the vacuum pump
- Place the sensor on the chuck of the probe station

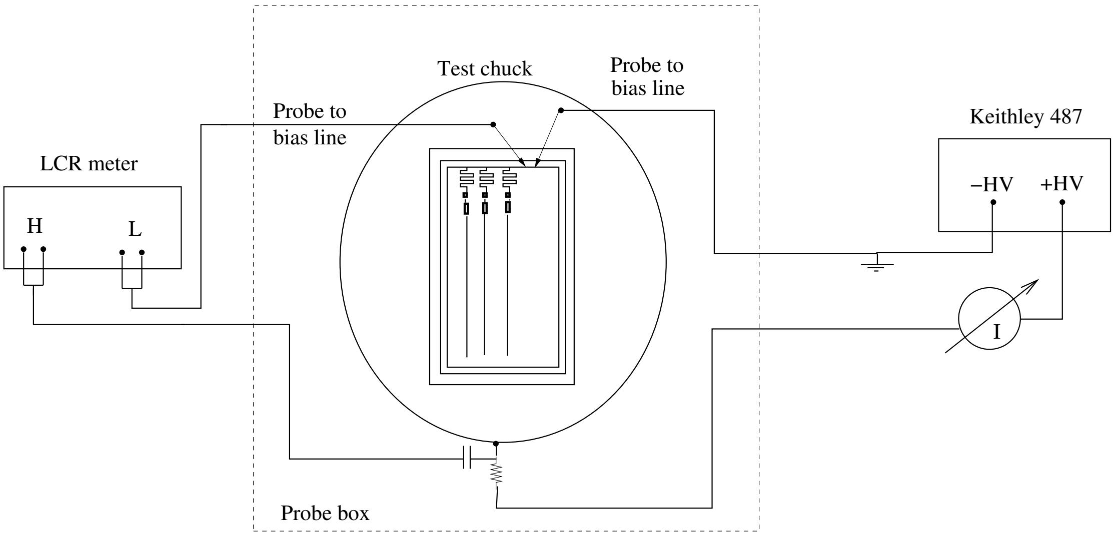

Figure 2: Setup for the depletion voltage measurement (CV curves).

- Turn on the vacuum, and check that the sensor is fixed
- Put the probe needles on the bias line contact pad as shown in figure 2. Before moving the chuck, make sure that all the needles are up.

Software and settings

- Use the Labview program **Si I-V Keithley + LRC.vi** (it is in the folder Desktop\probestation\probe_station_programs.llb\user.lib\ \Si I-V Keithley LCR.llb), with the following settings:
  - Range: $0 - 300\ V$
  - Step size: $3\ V$
  - Time between steps: $5\ s$
  - Freq.: 1 kHz
- File saving: xxx_cv.txt, where xxx is the sensor ID number
- Run continously the Labview program **HT_cont_readout.vi** (in folder Desktop\probestation\Humidity_sensor.llb) to read-out the temperature and relative humidity

4 Keithley 487: how to start a measurement

- Switch on the Keithley
- Press "zero check"
- "Operate" on
- Press the control arrows to have 3 digits left to the decimal points
- After using the Labview program, press "Local" to have manual control of the device

5 LCR meter: how to start a measurement

- Switch on the LCR meter
- Press the control arrows until "C" is on
- After using the Labview program, press "Local" to have manual control of the device

6 Data analysis

- Open .txt files with Excel
- Prepare plots:
  - $I\ vs\ V$
  - $\frac{1}{C^2}\ vs\ V$
- Determine the depletion voltage and breakdown voltage
- Fill out the "Electrical Sensor Probing Traveler"