Simulation Exercise: Effect of series and shunt resistance

Download the model file for solar cell from downloads Write ngSPICE netlist to plot I/V characteristics for the same for following conditions with the input voltage varied from -2V to 2V:

1. Dark
2. Lighted characteristics for the intensities corresponding to light generated current I L = 8 mA and 10 mA.
3. Obtain the values of ideality factor , V_{oc} , I_{sc} , and fill factor in each case.

For I_L=10 mA,

1. Plot I/V characteristics for series resistance R_S = 0, 10, and 30 Ω. You may plot the part of characteristic in fourth quadrant in the first quadrant for convenience.
2. What do you observe?
3. Plot I/V characteristics for shunt resistance R_{sh} = 100Ω, 500Ω, and 5KΩ.
4. What do you observe?
5. Explain your observations in both the cases.